Volume II
(Figures and Tables)

CONTENTS

Volume II

List of Tables (Volume II, except where stated)

(full titles not necessarily given; Volume I page numbers given in brackets)

Figure no.	List of Figures (Volume II, except where stated) *(full titles not necessarily given; Volume I page numbers in brackets)*	Page
	Chapter One (Figures)	
1.1	The effect of altitude on temperature within 100 km of the Jotunheimen	**1**
1.2	Comparison of brown soil and podzol profiles (after Whittow, 1984)	**2**
	Chapter Two (Figures)	
2.1	Location of glacier forelands used for sampling in the Jostedalsbreen region	**3 - 5**
2.2	Location of glacier forelands used for sampling in the Jotunheim region	**6 - 10**
2.3	Late snow duration at Høgvaglbreen	**11**
2.4	Location of sites across a moraine (Volume 1)	**(67)**
2.5	Position scale (Volume 1)	**(74)**
2.6-8	Placement of Grant thermistor probes (1989-91) (Volume 1)	**(79-81)**
2.9	Explanation of TWINSPAN hierarchy (Volume 1)	**(92)**
	Chapter Three (Figures)	
3.1	Altitude of the sites/moraines across the forelands	**15**
3.2-9	Snow-cover at the selected sites on each foreland	**16**
3.10	Calibration chart for the capacitance probe (from the Institute of Hydrology)	**17**
3.11a-b	Comparison of moisture results using two techniques ("finger test" and capacitance probe)	**18**
3.12-19	Moisture at the selected sites on each foreland	**19**
3.20-30	Temperature results from the Grant thermistor recorders emplaced 1989-91	**20-25**
3.31-38	Frost evidence at the selected sites on each foreland	**26**
3.39-46	Dowel heave at the selected sites on each foreland	**27**
3.47-54	Slope and solifluction at the selected sites on each foreland	**28**
3.55-62	Fluvial activity at the selected sites on each foreland	**29**
3.63-70	Trampling and grazing at the selected sites on each foreland	**30**
3.71-78	Total vegetation and total bryophyte cover at the selected sites on each foreland	**31**
3.79-86	Proportion of clast sizes at the selected sites on each foreland	**32**
3.87-94	General depth of soil (incipient Ea, Eb and B horizons) and roots at the selected sites on each foreland	**33**
3.95-102	General depth of humus (O horizons) at selected sites on each foreland	**34**
3.103-3.110	pH at selected sites on each foreland	**35**
3.111-3.118	Soil texture at selected sites on each foreland	**36**

Chapter Four (Figures)

Chapter Five (Figures)

Chapter Six (Figures)

Chapter 7 (Figures)

Table 1.2 Average annual temperatures (°C) for meteorological stations within 100 km of the Jotunheim.

Station no.	Name	Altitude	Mean temp'
5584	Fjærland	10	5.1
6050	Tafjord	15	6.9
5516	Fortun	27	4.4
5413	Lærdal-tøn	36	5.9
5578	Leikanger	53	6.6
5540	Myklemyr	98	3.4
5870	Oppstryn	201	5.7
5543	Bjørkedal	324	3.7
1554	Gjeilo i sk	378	2.6
2350	Løken i vol	525	1.4
2496	Gol-stake	542	2.1
1531	Bøverdal s	594	1.7
6177	Lesjaskog	621	0.8
2316	Åbjørsbråt	634	1.3
1536	Elveseter	677	1
1572	Bråtå	712	1.2
1367	Skåbu	865	0.4
1661	Fokstua	974	-0.1
2573	Haugastøl	988	-0.3
2584	Finse	1224	-2
5523	Fanaråken	2062	-4.5

Note: All temperatures are 1961-1990 measurements except Fanaråken (1957-93) and Bøverdal sletten (1972-1993).

Fig. 1.1 Altitudinal gradient in the mean annual temperature of 21 meteorological stations within 100 km of the Jotunheim.

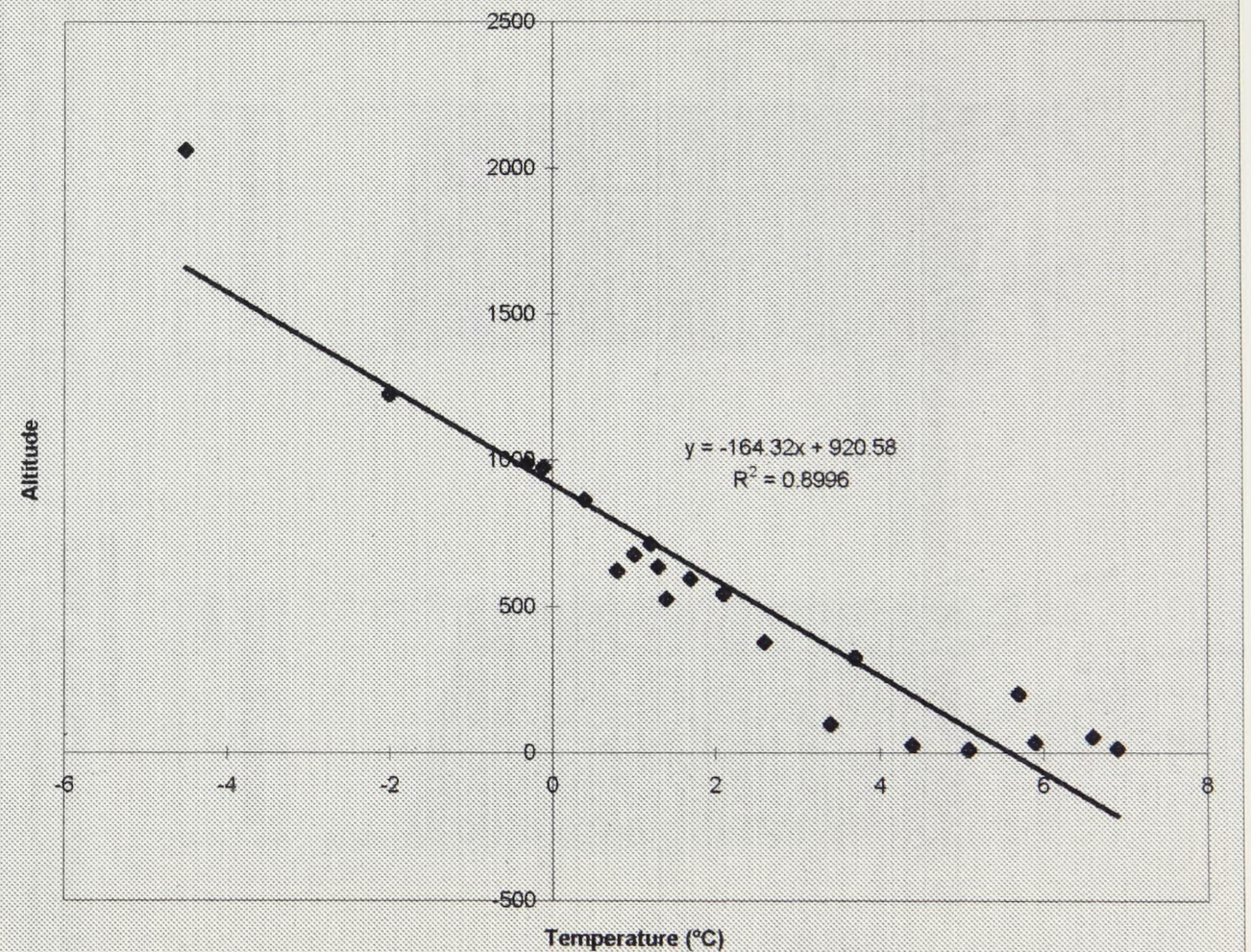
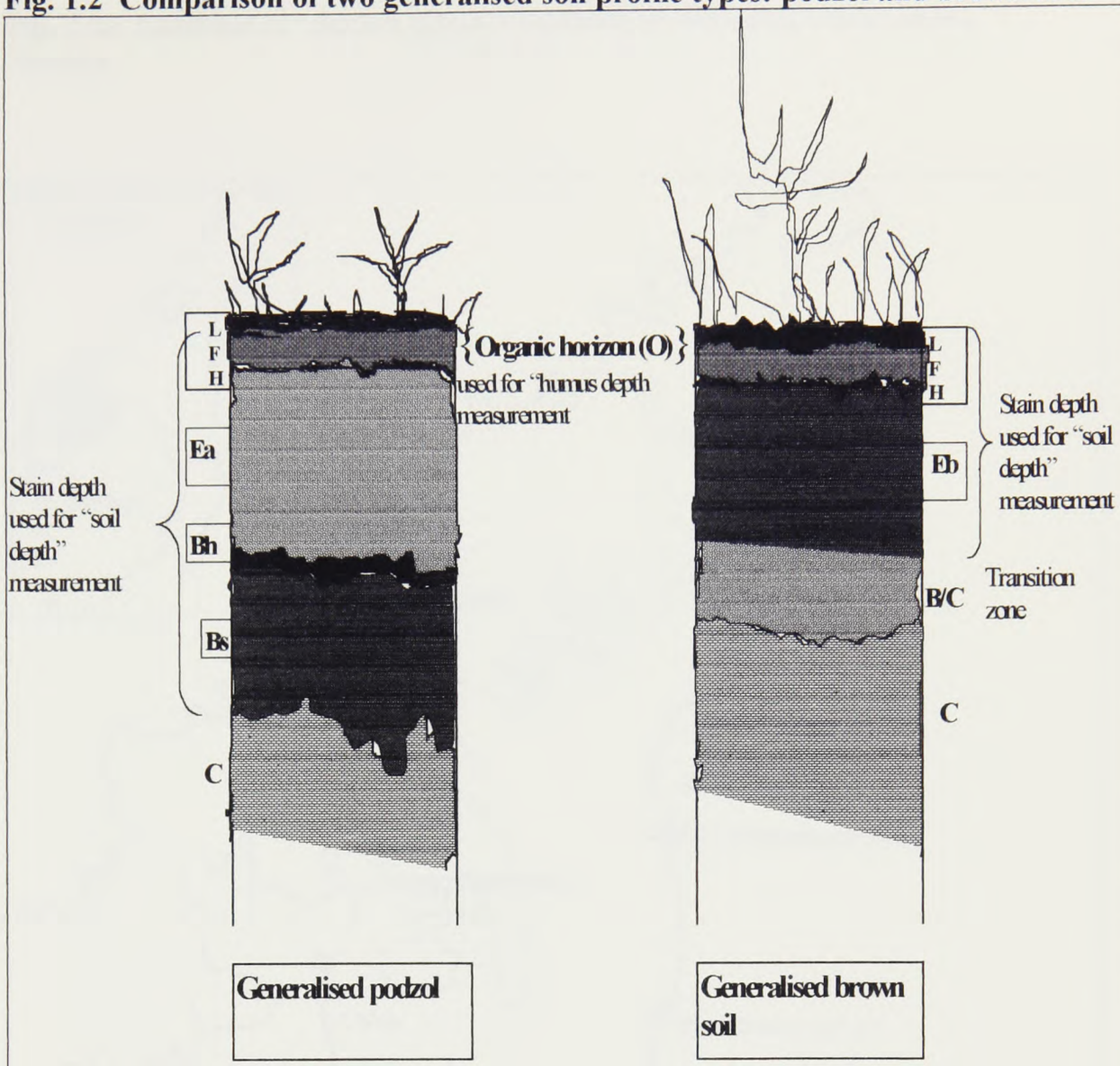


Fig. 1.2 Comparison of two generalised soil profile types: podzol and brown soil.



Podzol key:

L,F,H - organic horizon which comprises the litter (L), fermentation (F) and humus (H) subdivisions (not differentiated for present study purposes)

Ea - eluviated or bleached horizon leached of iron sequioxides

Bh - dark horizon where accumulation of organic particles occurs

Bs - red-brown horizon where accumulation of sesquioxides and clays occurs

C - parent material

Modern nomenclature described in Whittow (1984).

Brown soil key:

L,F,H - organic (**O**) horizon which comprises the litter (L), fermentation (F) and humus (H) subdivisions (not differentiated for present study purposes)

Eb – brown horizon, includes organic particles and sesquioxides but eluviated of clays and carbonates

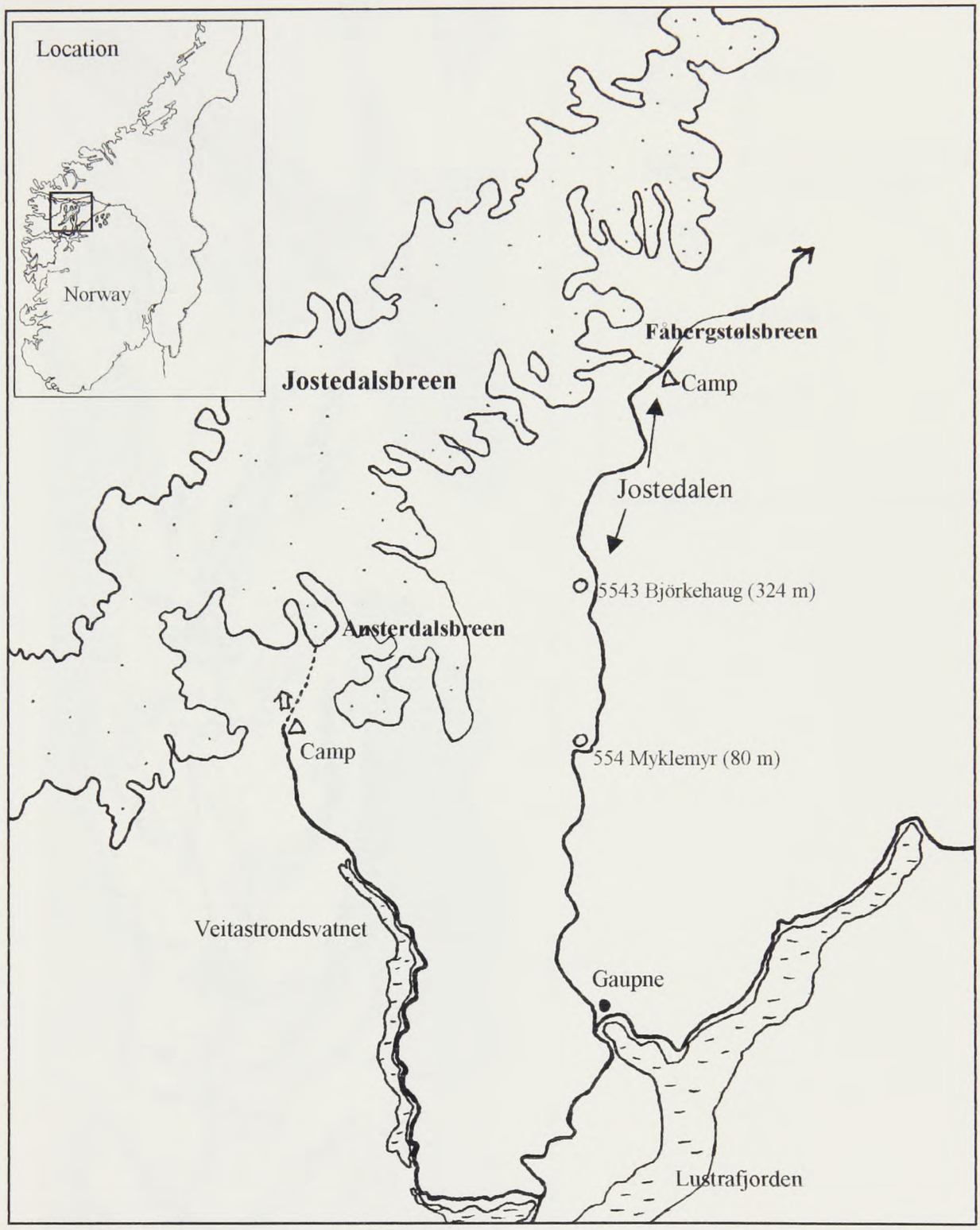
B/C Transition zone - a lighter horizon

C - parent material

Modern nomenclature described in Whittow (1984).

Note: the differentiation of the horizons is not very clear in young "regosols", but nevertheless a darker "stain" can be distinguished lower down the soil profile and is used to signify the soil depth.

Fig. 2.1a Location of selected glacier forelands in Jostedalsbreen region, Norway.



Key:

⇑ - Hostel/mountain hut; △ - Camp; • - Town; o - Weather station;

- Fjord; - Glacier; — - Road

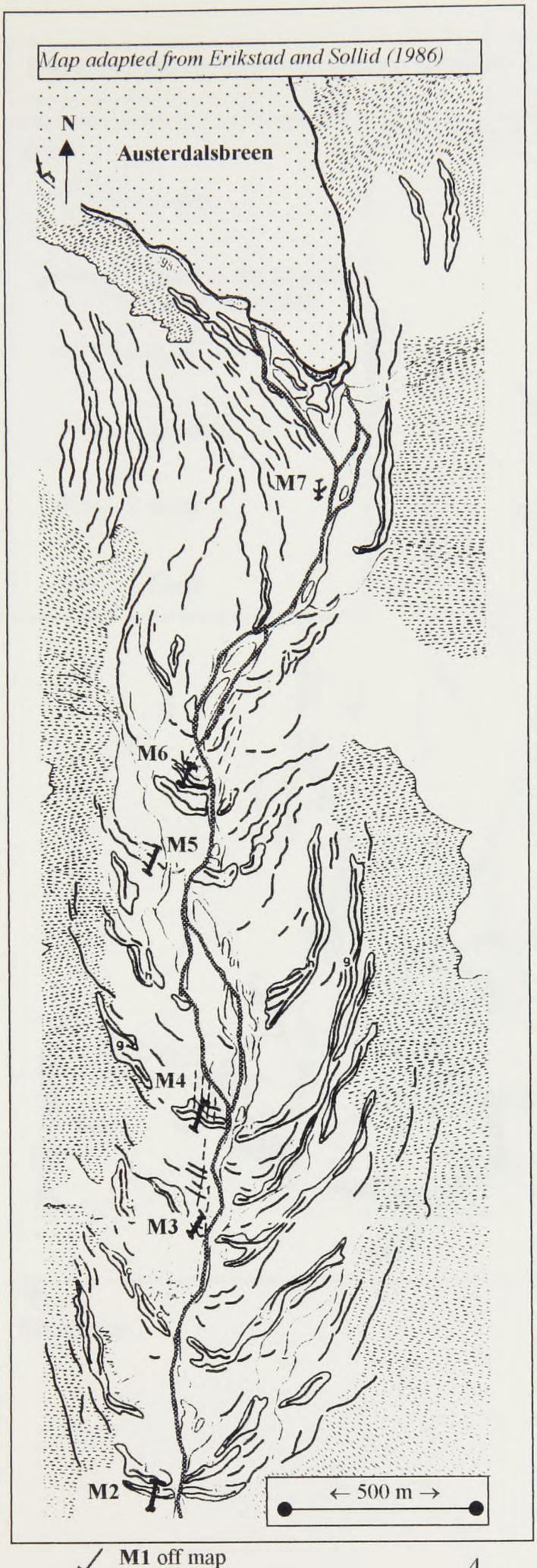


Fig. 2.1b Austerdalsbreen glacier foreland, Jostedalsbreen, Norway.

Key:

- Glacier
- Moraine, **M1** (mature) to **M7** (youngest)
- Scree
- Transect
- River

Fig. 2.1c Fåbergstølsbreen glacier foreland, Jostedalsbreen, Norway.

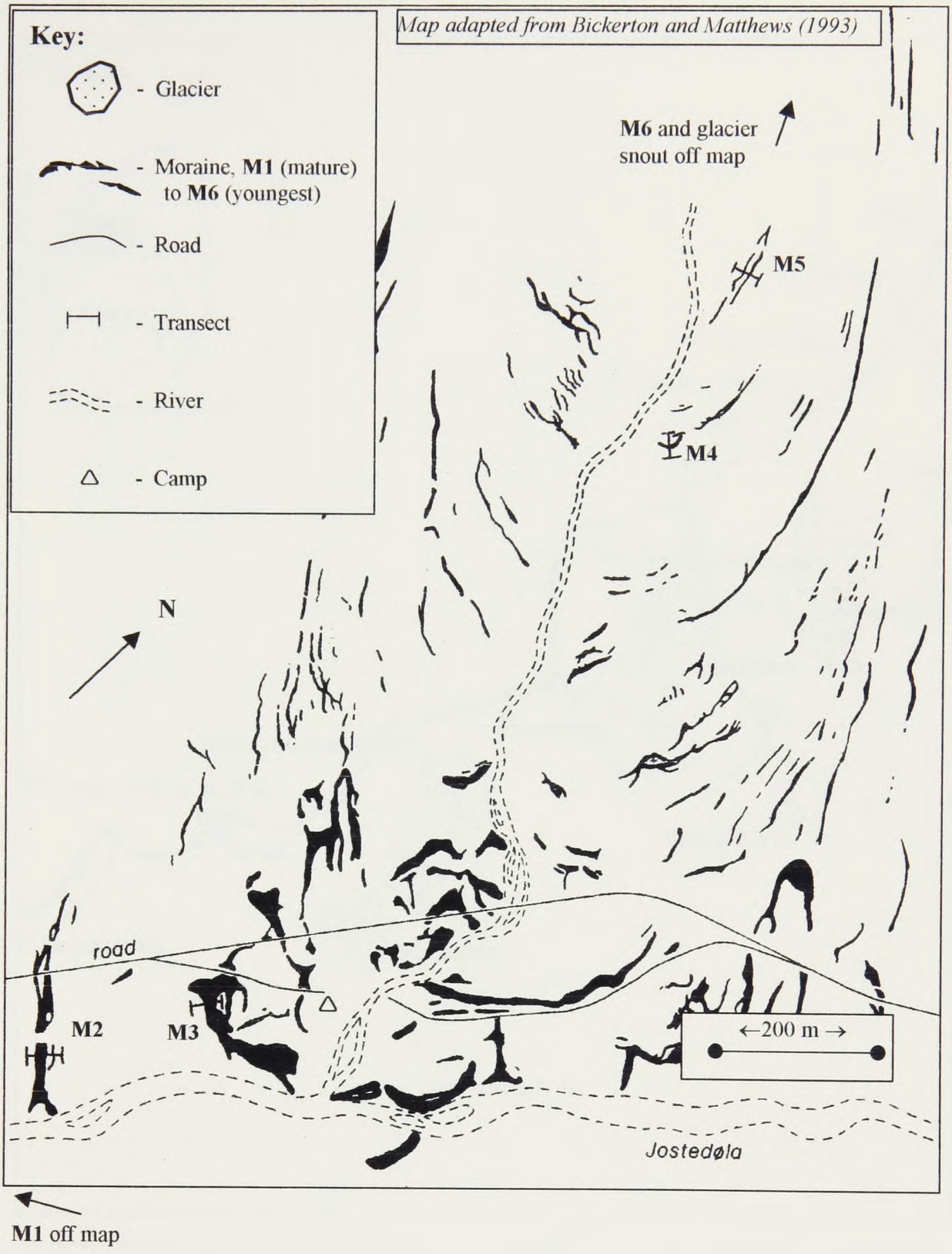
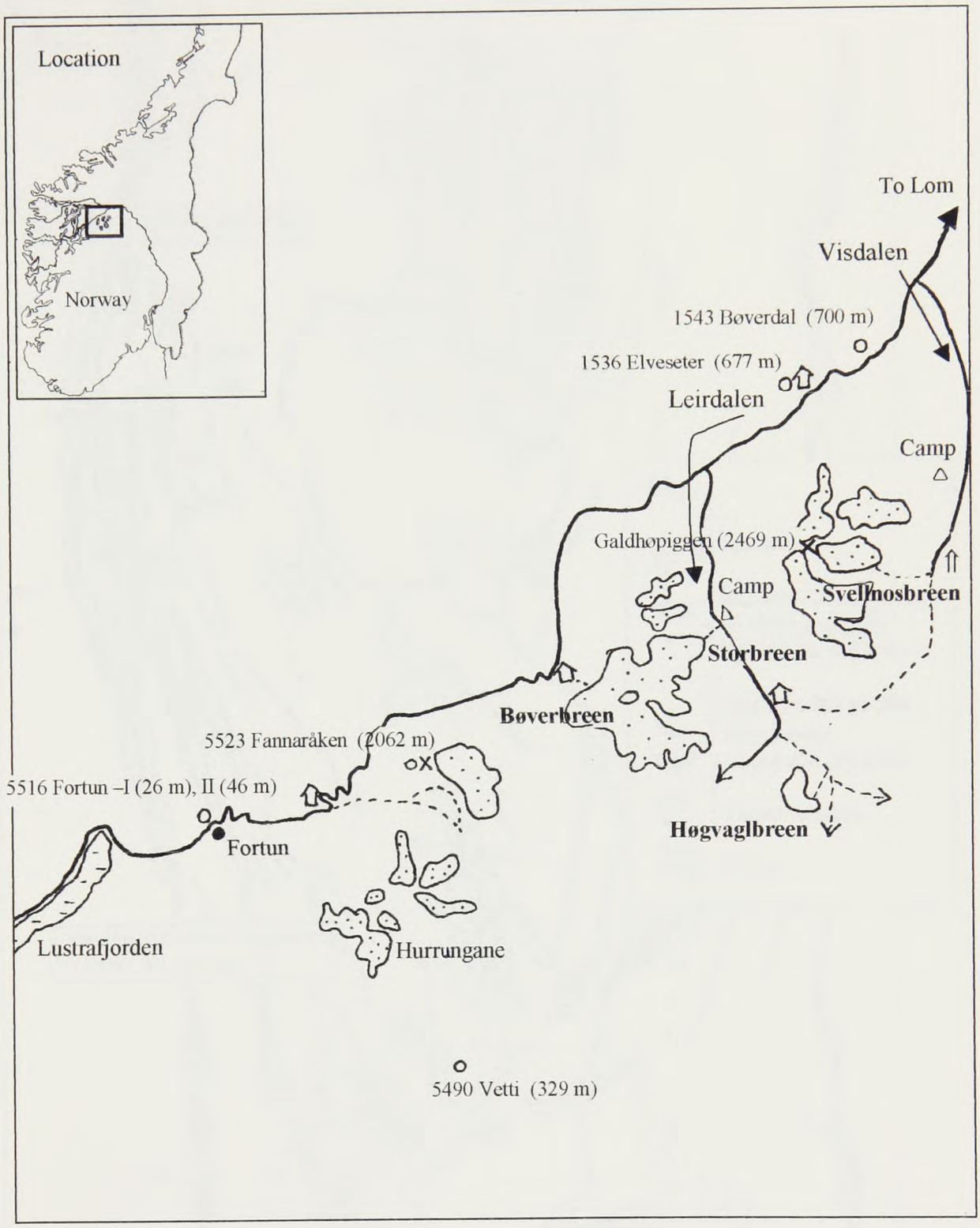


Fig. 2.2a Location of selected glacier forelands in Jotunheim region, Norway.



Key:

⇑ - Hostel/mountain hut; △ - Camp; • - Town; ○ - Weather station; - Fjord;

- Glacier; —— - Road; ----- - Mountain track/path; × - Mountain peak;

Arrows used to signify direction of roads, tracks and major valleys.

Fig. 2.2b Storbreen glacier foreland sequences, Jotunheimen, Norway.

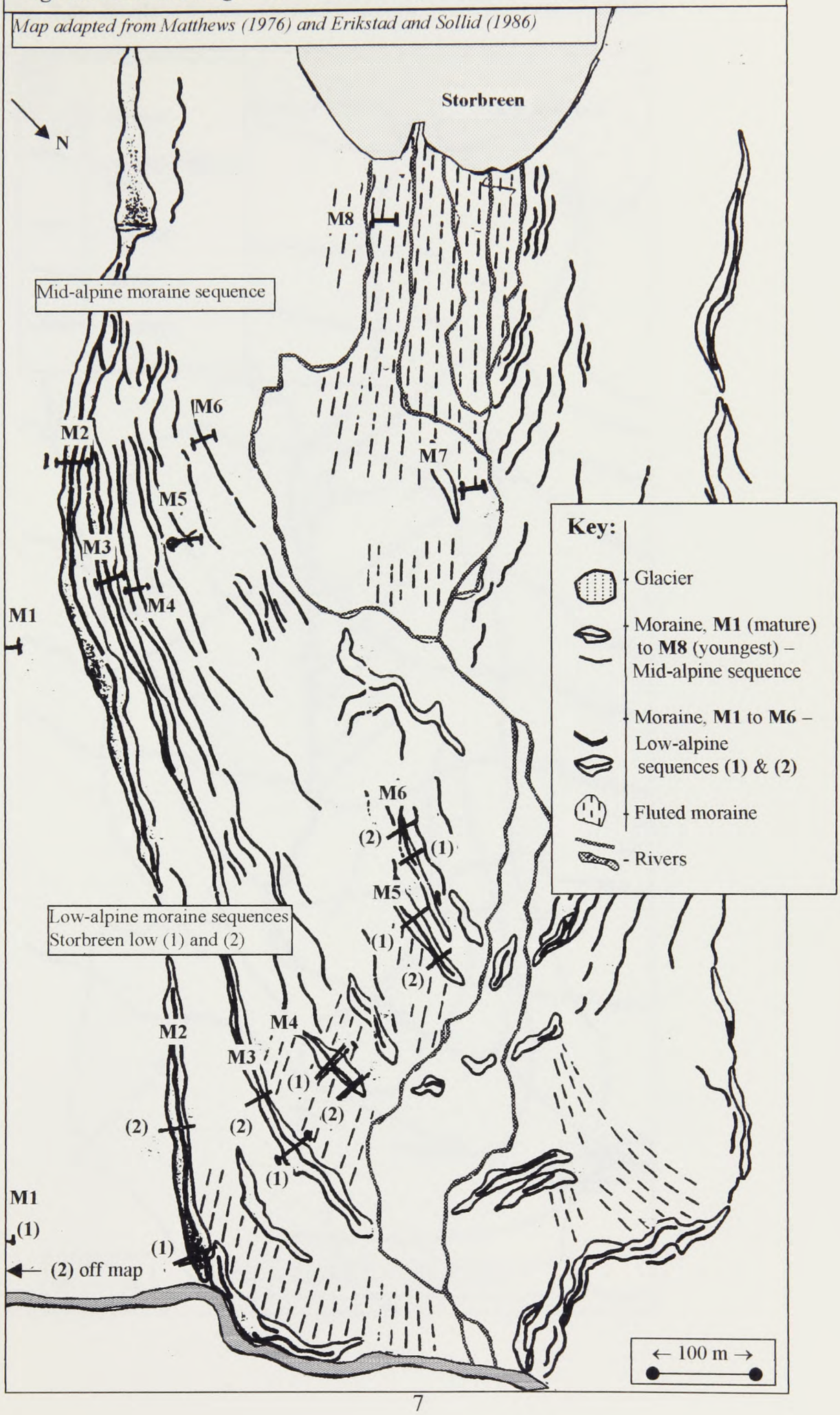


Fig. 2.2c Svellnosbreen glacier foreland, Jotunheimen, Norway.

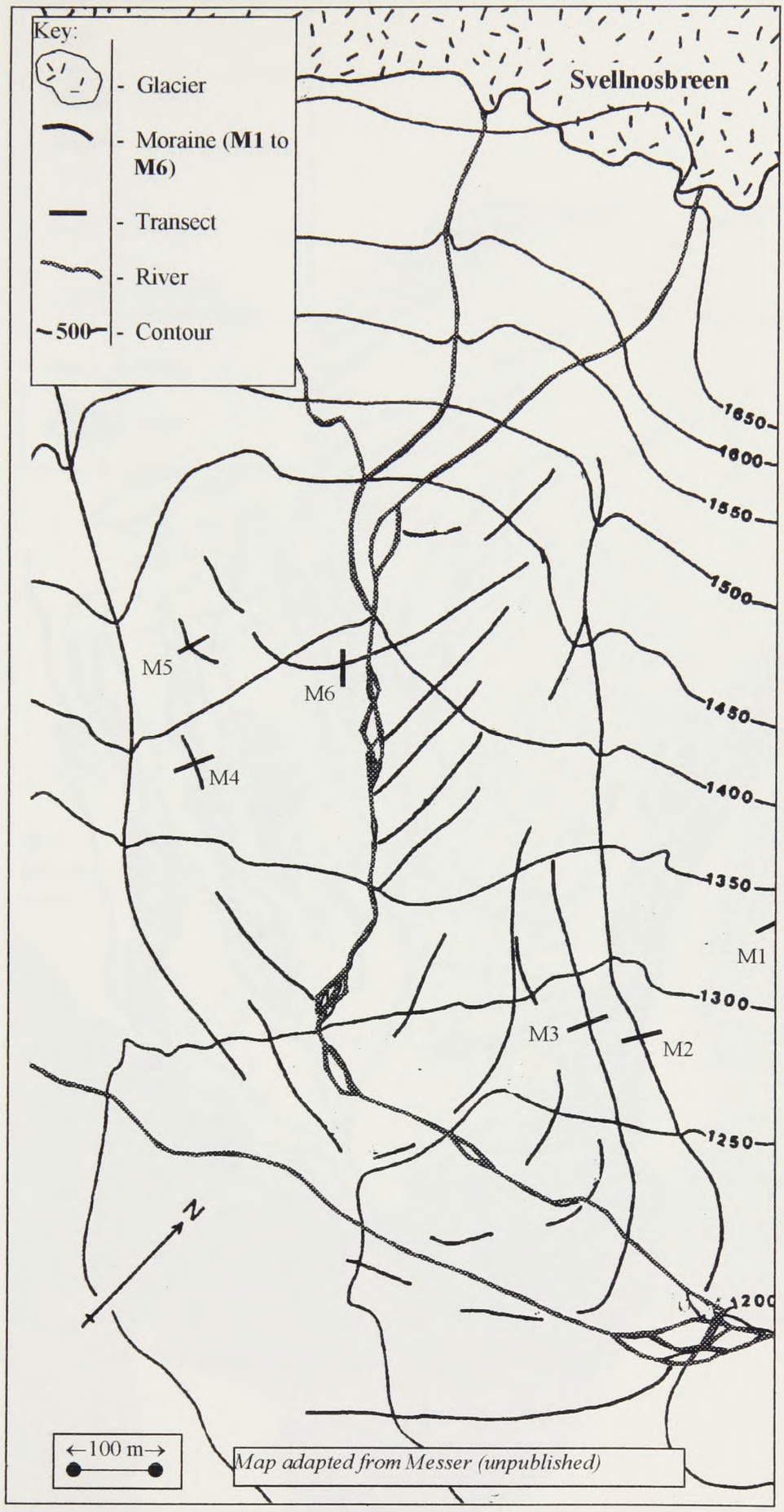


Fig. 2.2d Høgvaglbreen glacier foreland, Jotunheimen, Norway.

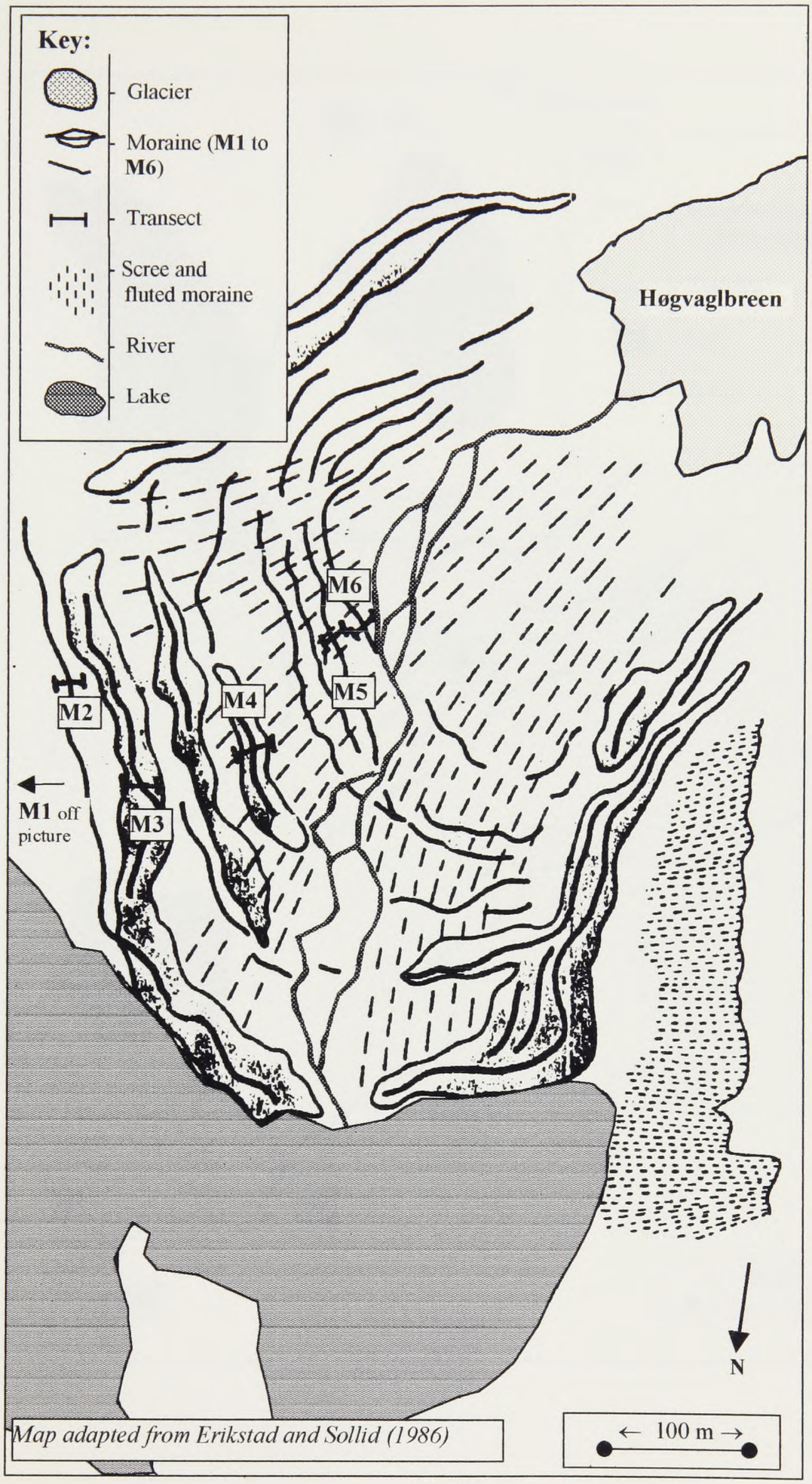


Fig. 2.2e Bøverbreen glacier foreland, Jotunheimen, Norway.

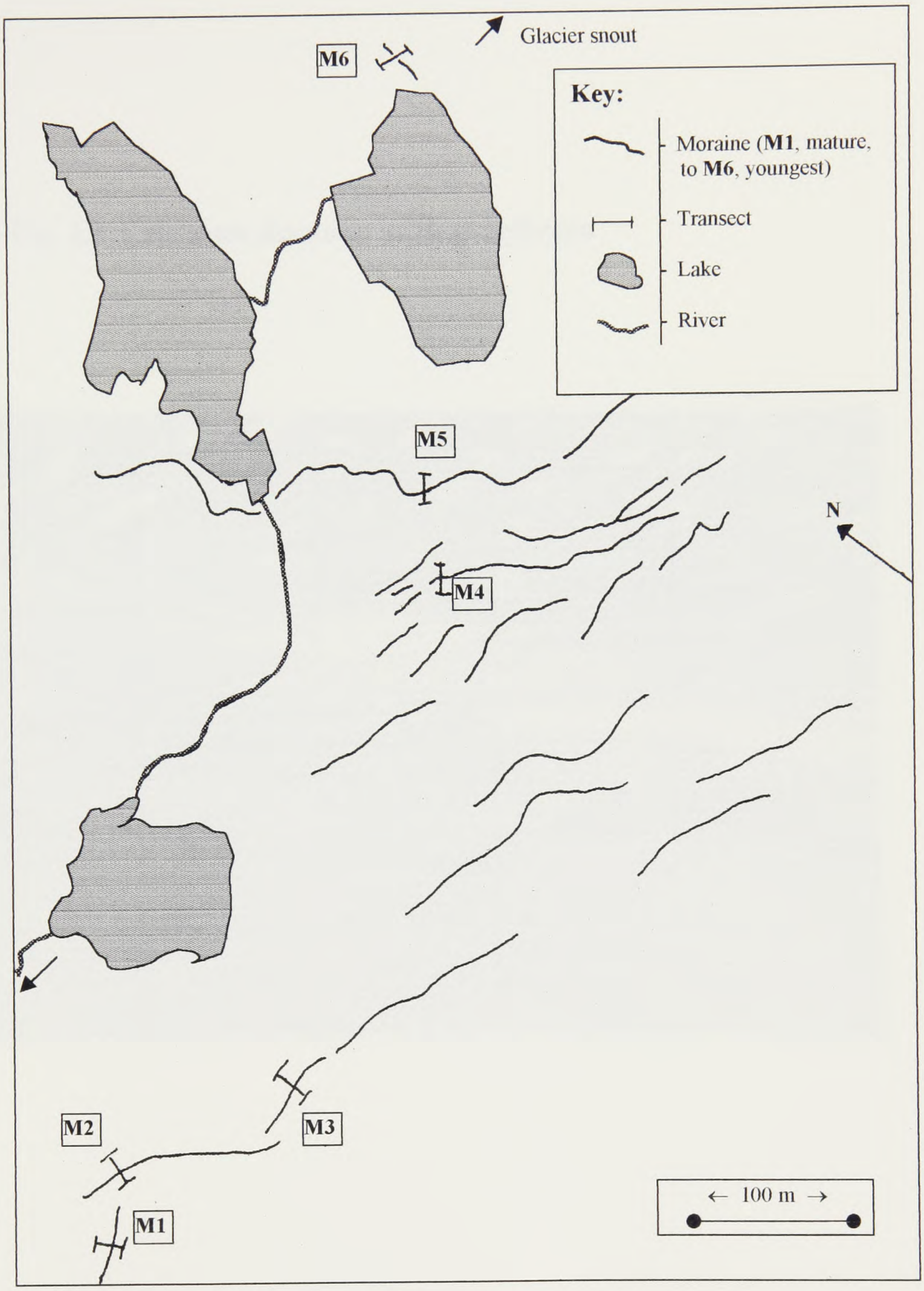


Fig. 2.3 Late snow duration at Høgvaglbreen

Table 3.4 Number of measurements (n*) needed to provide an estimate of moisture, to an accuracy of ± 0.05, after heavy rain using a prototype capacitance probe (1990)

Position (no. prods)	$\bar{X}$	SD	$\sqrt{n^*-1}$	n* - 1	n*
Crest 0 cm (n=50)	1.6656	0.050839	2.03	4.13	5.13
Crest 2.5 cm (n=50)	1.5094	0.072620	2.90	8.44	9.44
Crest 5 cm (n=50)	1.3630	0.074733	2.99	8.94	9.94
Base (prx) 0 cm (n=50)	1.4896	0.036658	1.47	2.15	3.15
Base (prx 2.5 cm (n=50)	1.2188	0.040281	1.61	2.60	3.60
Base (prx) 5 cm(n=50)	1.1224	0.161934	6.48	41.96	42.96
Base (dist) 0 cm (n=50)	1.4974	0.045202	1.81	3.27	4.27
Base (dist) 2.5 cm (n=50)	1.2170	0.043881	1.75	3.08	4.08
Base (dist) 5 cm (n=50)	1.1125	0.044010	1.76	3.10	4.10

Mean (excluding wet sites and proximal base), **n* = 5.46 prods**

WET SITES					
Base (prx) 0cm (n=25)	1.5064	0.068110	2.72	7.42	8.42
Base (prx) 2.5 cm (n=25)	1.2440	0.066272	2.65	7.03	8.03
Base (prx) 5 cm (n=25)	1.0004	0.028493	1.14	1.30	2.30

Total mean (excluding proximal base), **n* = 5.68 prods**

Note: the probe records on a scale from 1 (wet) to 1.78 (air reading) and it was these readings that were used in the above calculations. It is necessary to use a calibration chart to convert the probe readings to a volumetric % water content (Fig. 3.10) for discussion purposes.

Table 3.5 Number of measurements (n*) needed to provide an estimate of moisture, to an accuracy of ± 0.05, after two weeks of dry weather using the prototype capacitance probe (1990)

Position (no. prods)	$\bar{X}$	SD	$\sqrt{n^*-1}$	n* - 1	n*
Crest 0 cm (n = 50)	1.7488	0.0088634	0.34536	0.12	1.12
Crest 2.5 cm (n = 50)	1.6856	0.030342	1.21368	1.473	2.473
Crest 5 cm (n = 50)	1.5260	0.0466476	1.865904	3.48159	4.482
Base (prx) 0 cm (n = 50)	1.7196	0.03406	1.3624	1.85614	2.85614
Base (prx 2.5cm(n = 50)	1.3182	0.06737	2.6948	7.261947	8.262
Base (prx) 5 cm (n = 50)	1.1488	0.04172	1.6688	2.785	3.785
Base (dist) 0 cm (n = 50)	1.5390	0.04258	1.7032	2.9009	3.900
Base (dist) 2.5cm(n = 50)	1.2464	0.04533	1.8132	3.288	4.288
Base (dist) 5 cm (n = 50)	1.1200	0.05689	2.2756	5.178	6.178

Mean (excluding wet sites), **n* = 4.5 prods**

WET SITES					
Base (prx) 0cm (n=25)	1.3940	0.07965	3.186	10.151	11.151
Base (prx) 2.5 cm (n=25)	1.1976	0.0553	2.212	4.891	5.891
Base (prx) 5 cm (n=25)	1.0380	0.04038	1.6152	2.609	3.609

Total mean, **n* = 4.8 prods**

Note: the probe records on a scale from 1 (wet) to 1.78 (air reading) and it was these readings that were used in the above calculations. It is necessary to use a calibration chart to convert the probe readings to a volumetric % water content (Fig. 3.10) for discussion purposes.

Table 3.6a-g Descriptive statistics from five thermistors emplaced on moraines at various positions at Storbreen low glacier foreland.

Table 3.6a Thermistor (1) 1750 moraine, twice daily for a period of two weeks, 26 August 1989 to 19 August 1990

Mid (P)2		Mid (P)0		Crest 2		Low (P)2		Shou (P)2		Toe (P)0		Crest (0)		Air (5)		Mid (P)1	
Mean	2.684	Mean	2.92	Mean	2.49	Mean	2.9	Mean	2.96	Mean	2.7272	Mean	2.298	Mean	1.548	Mean	2.644
Standard E	0.663336	Standard E	0.72152	Standard E	1.077783	Standard E	0.646065	Standard E	0.786517	Standard E	0.623827	Standard E	1.039994	Standard E	0.857324	Standard E	0.623139
Range	9.7	Range	10.2	Range	17.7	Range	10.4	Range	12.8	Range	9.6	Range	17.4	Range	14.1	Range	9.2

Table 3.6b Thermistor (2) 1750 moraine, twice daily for a period of two weeks, 26 August 1989 to 17 August1990.

Shou (D)2		Mid (D)0		Mid (D)2		Crest 15		Crest 2		Toe (D)15		Mid (D)15		Low (D)2	
Mean	1.684	Mean	2.388	Mean	2.828	Mean	1.924	Mean	2.236	Mean	2.468	Mean	2.56	Mean	2.732
Standard E	1.076982	Standard E	0.939824	Standard E	0.963786	Standard E	1.327759	Standard E	1.396685	Standard E	0.736223	Standard E	0.820528	Standard E	0.976161
Range	19.1	Range	14.95	Range	15.4	Range	21.8	Range	21.8	Range	12.5	Range	13.2	Range	14.8

Table 3.6c Thermistor (3) 1900 moraine, twice daily for a period of two weeks, 24 August 1990 to 14 August 1991

Toe (P)15		Toe (P)1		Mid (P)1		Air (5)		Top (1)		Crest (15)		Mid (D)1		Toe (D)1		Toe (D)15	
Mean	-0.791667	Mean	-0.5125	Mean	-0.4125	Mean	-0.860417	Mean	-0.183333	Mean	-0.685417	Mean	0.183333	Mean	-0.233333	Mean	-0.0125
Standard E	1.039334	Standard E	1.177758	Standard E	1.3082	Standard E	1.32292	Standard E	1.591504	Standard E	1.481607	Standard E	1.032263	Standard E	0.916074	Standard E	0.879071
Range	17.8	Range	19.1	Range	20.8	Range	21.9	Range	25	Range	23.5	Range	15	Range	13.9	Range	14.6

Table 3.6d Thermistor (3) 1900 moraine, twice daily for a period of two weeks, 24 August 1990 to 31 May 1991

Toe (P)15		*Toe (P)1*		*Mid (P)1*		*Air (5)*		*Crest (1)*		*Crest (15)*		*Mid (D)1*		*Toe (D)1*		*Toe (D)15*	
Mean	-2.568421	Mean	-2.631579	Mean	-3.026316	Mean	-3.25	Mean	-3.205263	Mean	-3.5	Mean	-1.421053	Mean	-1.557895	Mean	-1.257895
Standard E	0.767698	Standard E	0.829185	Standard E	0.858764	Standard E	1.044752	Standard E	1.220547	Standard E	1.123721	Standard E	0.680668	Standard E	0.64347	Standard E	0.591772
Range	14.2	Range	15.9	Range	16	Range	18.8	Range	19.8	Range	18.3	Range	11.7	Range	11.1	Range	9.7

Table 3.6e Thermistor (4) 1750 moraine, twice-daily for a period of two weeks, 24 August 1990 to 31 May 1991

Toe (P)15		Toe (P)1		Mid (P)1		Air (5)		Crest (1)		Mid (D)1		Toe (D)1	
Mean	0.831579	Mean	0.7	Mean	-0.573684	Mean	-1.410526	Mean	-1.426316	Mean	0.884211	Mean	1.163158
Standard E	0.746808	Standard E	0.790699	Standard E	0.868077	Standard E	1.18116	Standard E	1.280644	Standard E	0.810034	Standard E	0.796491
Range	10.1	Range	10.6	Range	13.3	Range	18.9	Range	18.6	Range	11.1	Range	10.6

Table 3.6f Thermistor (4) 1750 moraine, twice-daily for a period of two weeks, 24 August to 31 December

Toe (P)15		*Toe (P)1*		*Mid (P)1*		*Air (5)*		*Crest (1)*		*Mid (D)1*		*Toe (D)1*	
Mean	3.033333	Mean	2.855556	Mean	2.033333	Mean	2.5	Mean	2.955556	Mean	3.266667	Mean	3.277778
Standard E	1.221338	Standard E	1.362403	Standard E	1.353801	Standard E	1.521877	Standard E	1.623278	Standard E	1.325393	Standard E	1.396402
Range	9.7	Range	10.6	Range	11.3	Range	13.2	Range	13.1	Range	10.4	Range	10.6

Table 3.6g Thermistor (5) 1750 moraine, 6 times daily for a period of five days, 21 August 1990 to 20 December 1990

Toe (P)1		Low (P)1		Shou (P)1		Crest (1)		Shou (1)		Low (D)1		Toe (D)1	
Mean	2.172	Mean	2.004	Mean	0.948	Mean	1.204	Mean	2.344	Mean	2.384	Mean	2.64
Standard E	0.697221	Standard E	0.687519	Standard E	0.898779	Standard E	0.949078	Standard E	0.78013	Standard E	0.698013	Standard E	0.730571
Range	10.9	Range	11.7	Range	14.5	Range	16.2	Range	13.5	Range	11.2	Range	11.1

Note: Displayed for each position (proximal (P) or distal (D) slope and depth (0 -15) of probe are also indicated) is the mean (of the period means); the time period; the standard error of the mean; and the range of the mean. Thermistors have been numbered 1 to 5 for easy reference and some averages have been repeated for different time periods for the same thermistor so that the data are comparable between thermistors.

Fig. 3.1 Altitude of quadrats on moraines, of decreasing age, across selected glacier forelands.

Note 1: for foreland abbreviations see Appendix 2

Note 2: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.2 to 3.9 Snow duration, as shown by the % ratio of black to green lichens, across moraines, of decreasing age, on selected forelands *(high proportions of black lichens represent a short snow duration)*

Fig. 3.2 Austerdalsbreen.

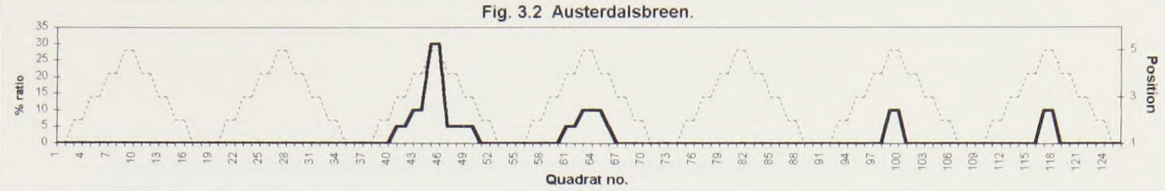


Fig. 3.3 Fabergstølsbreen.

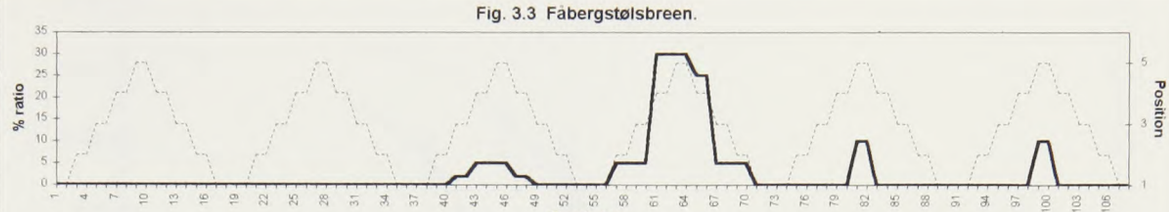


Fig. 3.4 Storbreen low (1)

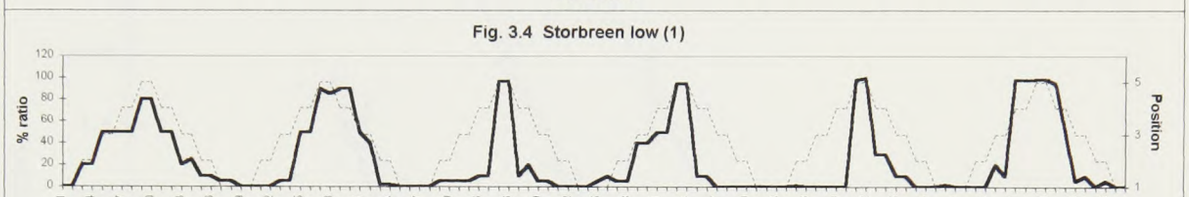


Fig. 3.5 Storbreen low (2)

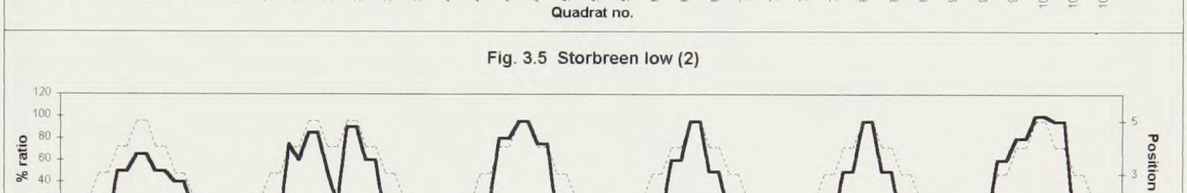


Fig. 3.6 Svellnosbreen.

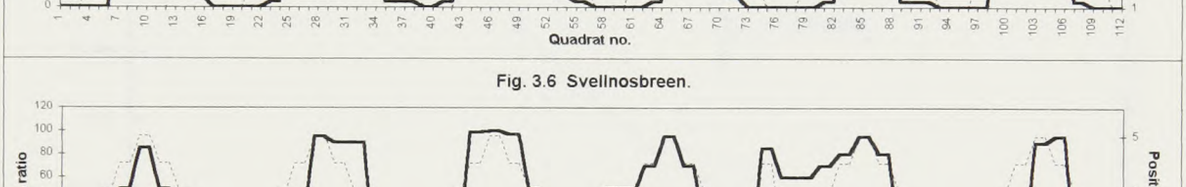


Fig. 3.7 Storbreen high.

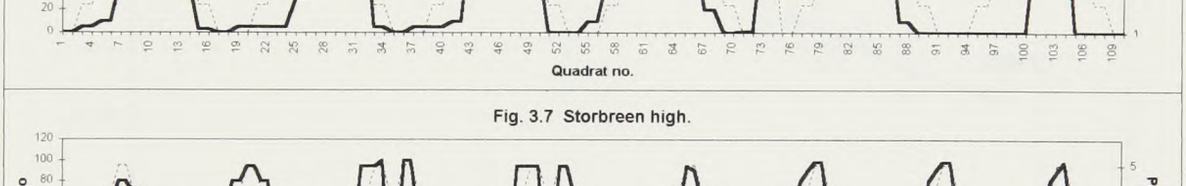


Fig. 3.8 Høgvaglbreen.

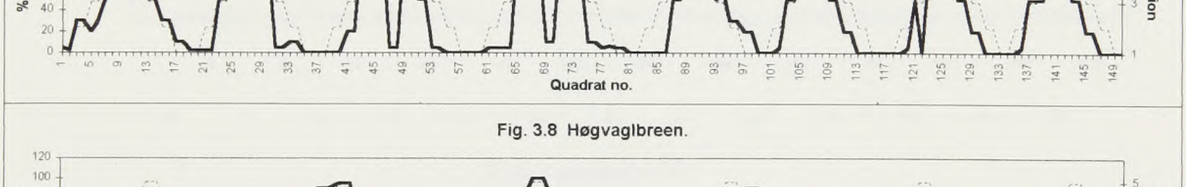
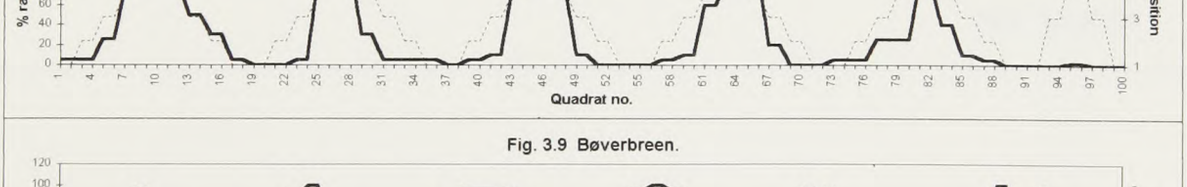


Fig. 3.9 Bøverbreen.



Key:

——— = % black : green lichens

..... = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Fig. 3.10 Calibration of capacitance probe at a depth of 5 cm, 2.5 cm and surface.
(Graph provided courtesy of the Institute of Hydrology, Wallingford)

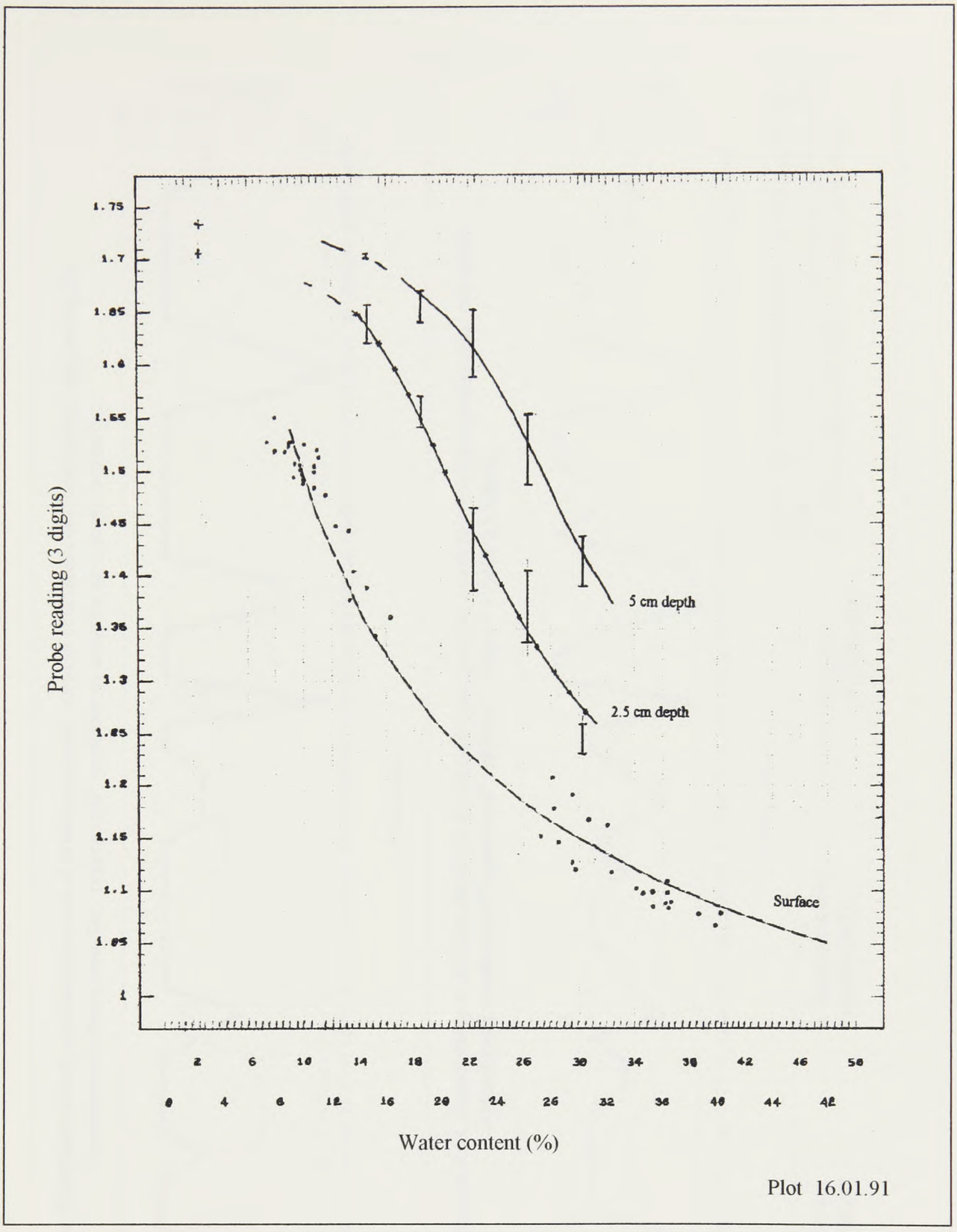


Fig 3.11a Comparison of surface moisture at Svellnosbreen, across moraines of decreasing age, using the capacitance probe and the "finger test" method on a scale of 1 (wet) to 5 (dry).

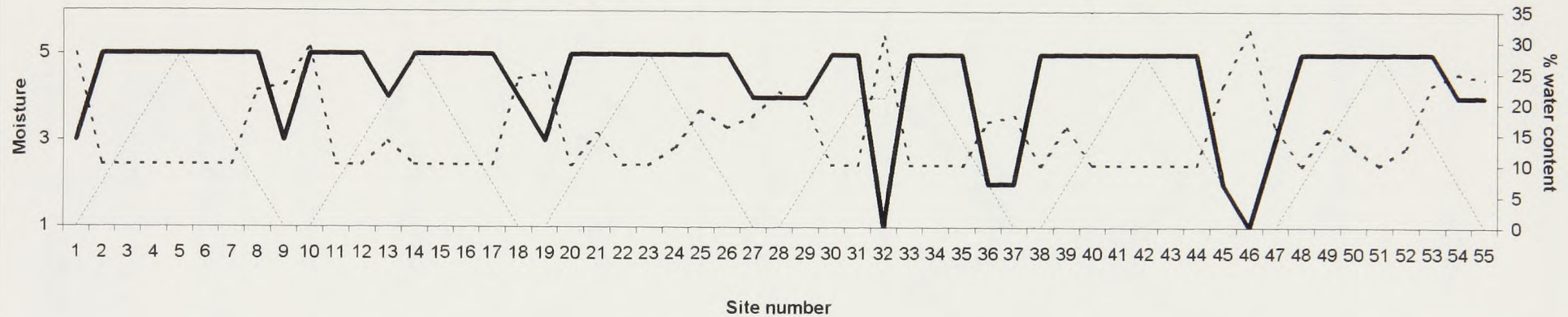
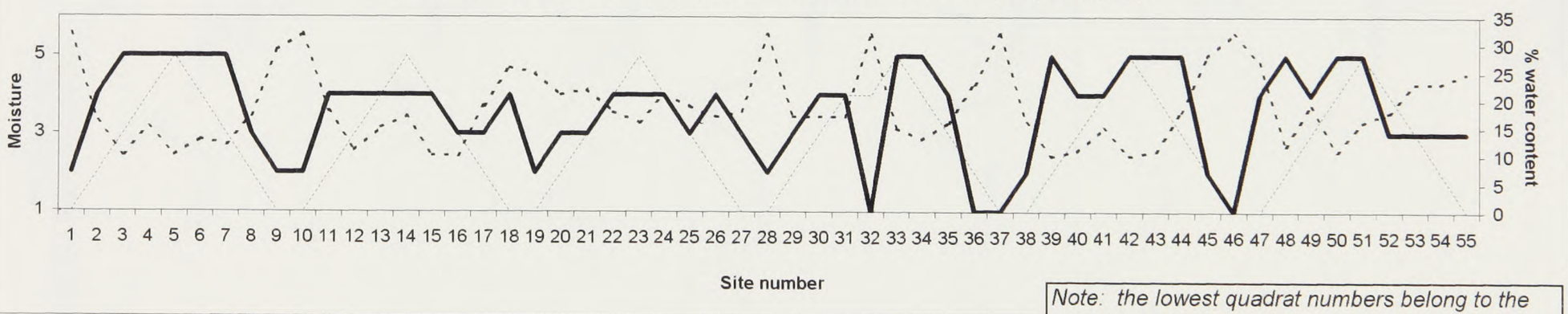


Fig 3.11b Comparison of moisture at 2.5 cm depth at Svellnosbreen, across moraines of decreasing age, using the capacitance probe and "finger test" method - scale = 1 (wet) to 5 (dry).



Key: ------ = Capacitance probe readings ..... = Moraine profile representation ——— = Finger test measurement

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.12 to 3.19 Moisture (using "finger test" method) in quadrats across moraines, of decreasing age, on selected forelands on a scale of 1 (wet) to 15 (dry).

Fig. 3.12 Austerdalsbreen

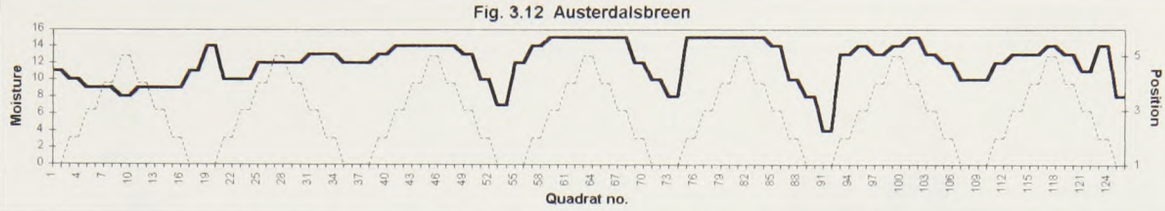


Fig. 3.13 Fåbergstølsbreen.

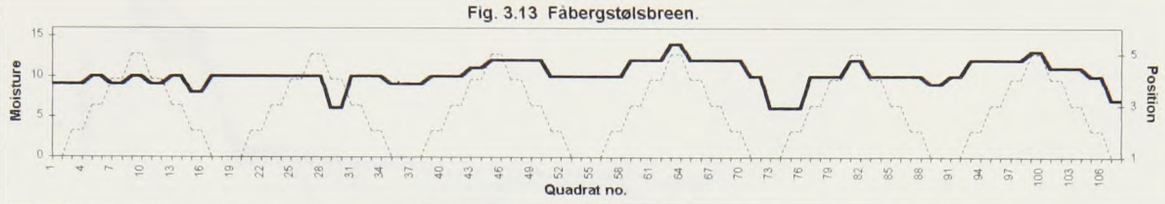


Fig 3.14 Storbreen low (1).

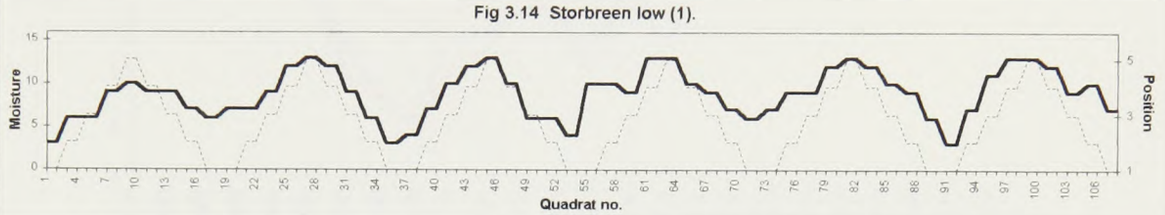


Fig. 3.15 Storbreen low (2)

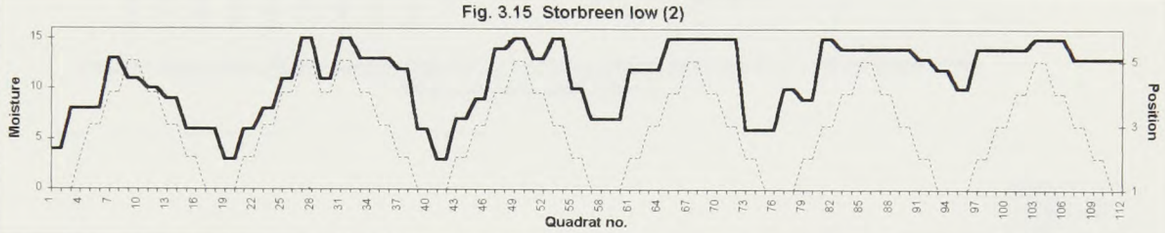


Fig. 3.16 Svellnosbreen.

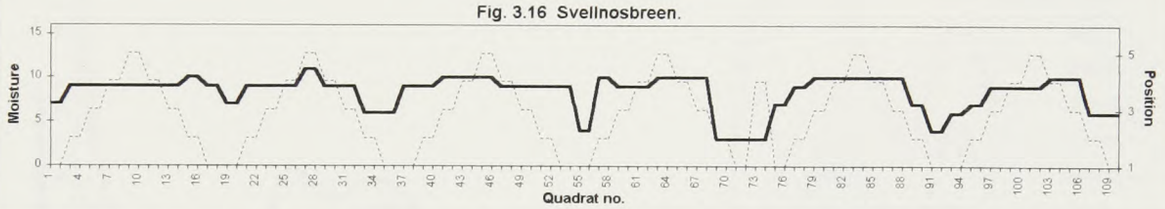


Fig. 3.17 Storbreen high.

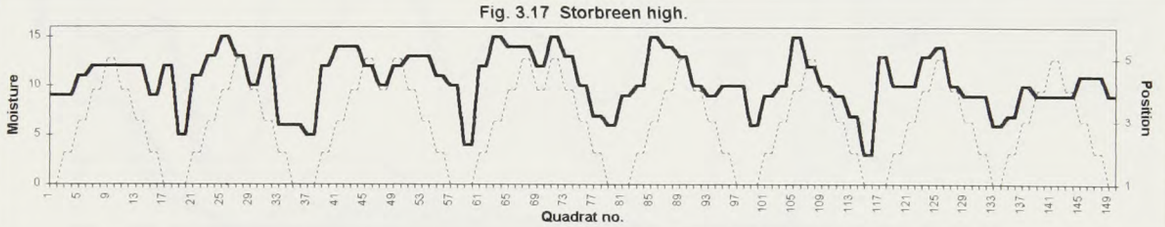


Fig. 3.18 Høgvaglbreen.

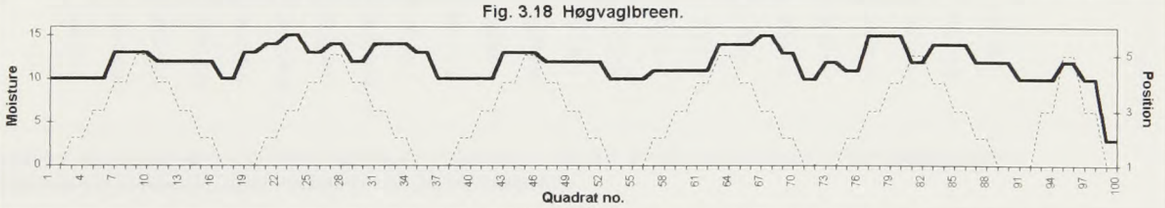
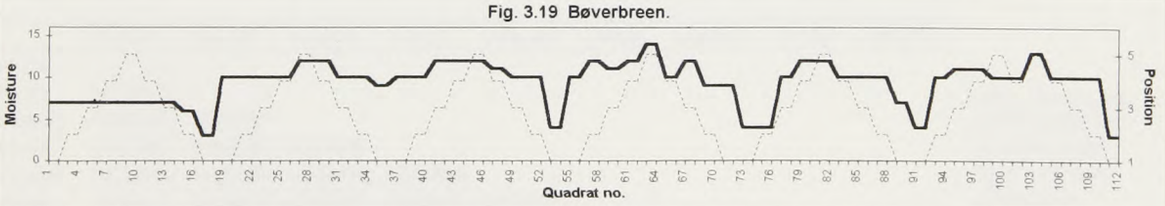


Fig. 3.19 Bøverbreen.



Key:

——— = Finger test measurements

------ = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Fig. 3.20 Thermistor (1) temperature means, taken twice daily over 15 day periods, emplaced 26.8.89 to 19.8.90 on the proximal slope of the 1750 moraine, Storbreen foreland (1100m), Norway.

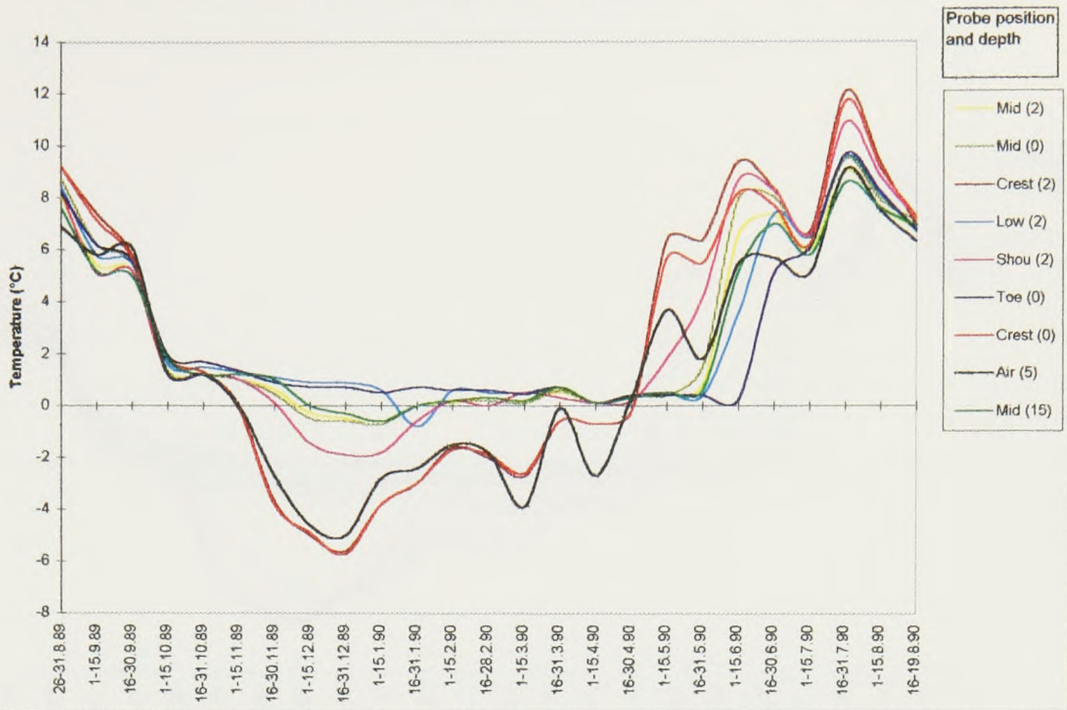


Fig.3.21 Thermistor (1) standard deviations (n-1) of temperature means on the proximal slope of the 1750 moraine, 1.9.89 - 15.8.90.

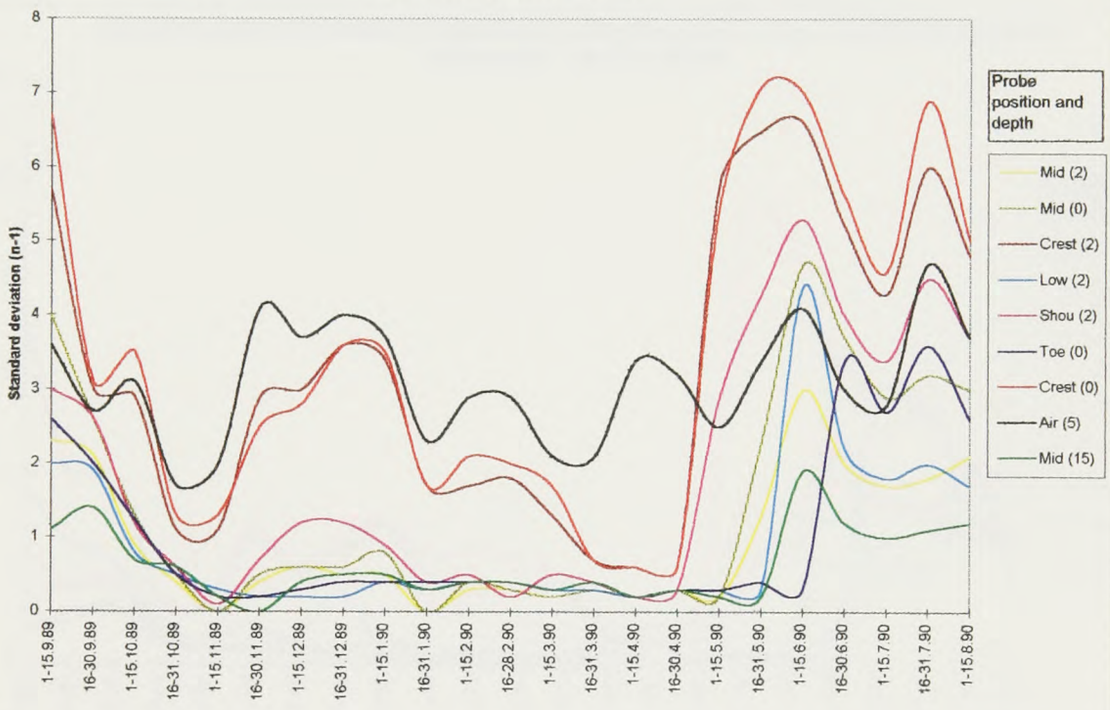


Table 3.7 Correlation matrix to show relative correspondence between temperatures at proximal positions on the 1750 moraine, Storbreen, taken 26.8.89 to 19.8.90, (thermistor 1)

	Mid (2)	Mid (0)	Crest(2)	Low (2)	Shou (2)	Toe (0)	Crest (0)	Air (5)	Mid (15)
Mid (2)	1								
Mid (0)	0.996148	1							
Crest (2)	0.882165	0.89833	1						
Low (2)	0.955068	0.947395	0.819139	1					
Shou (2)	0.949112	0.964456	0.947942	0.909834	1				
Toe (0)	0.851301	0.839877	0.736485	0.953143	0.821371	1			
Crest (0)	0.86242	0.883615	0.98569	0.834225	0.951654	0.783301	1		
Air (5)	0.845775	0.864968	0.935321	0.853065	0.922897	0.833379	0.973059	1	
Mid (15)	0.87879	0.893747	0.814848	0.932942	0.919423	0.915318	0.874919	0.918574	1

Note: Refer to Fig. 2.6 for positioning of probes in the figures and table on this page.

Fig. 3.22 Thermistor (2) temperature means, taken twice daily over 15 day periods, emplaced 26.8.89 to 17.8.90 on distal positions across the 1750 moraine, Storbreen (1100m), Norway.

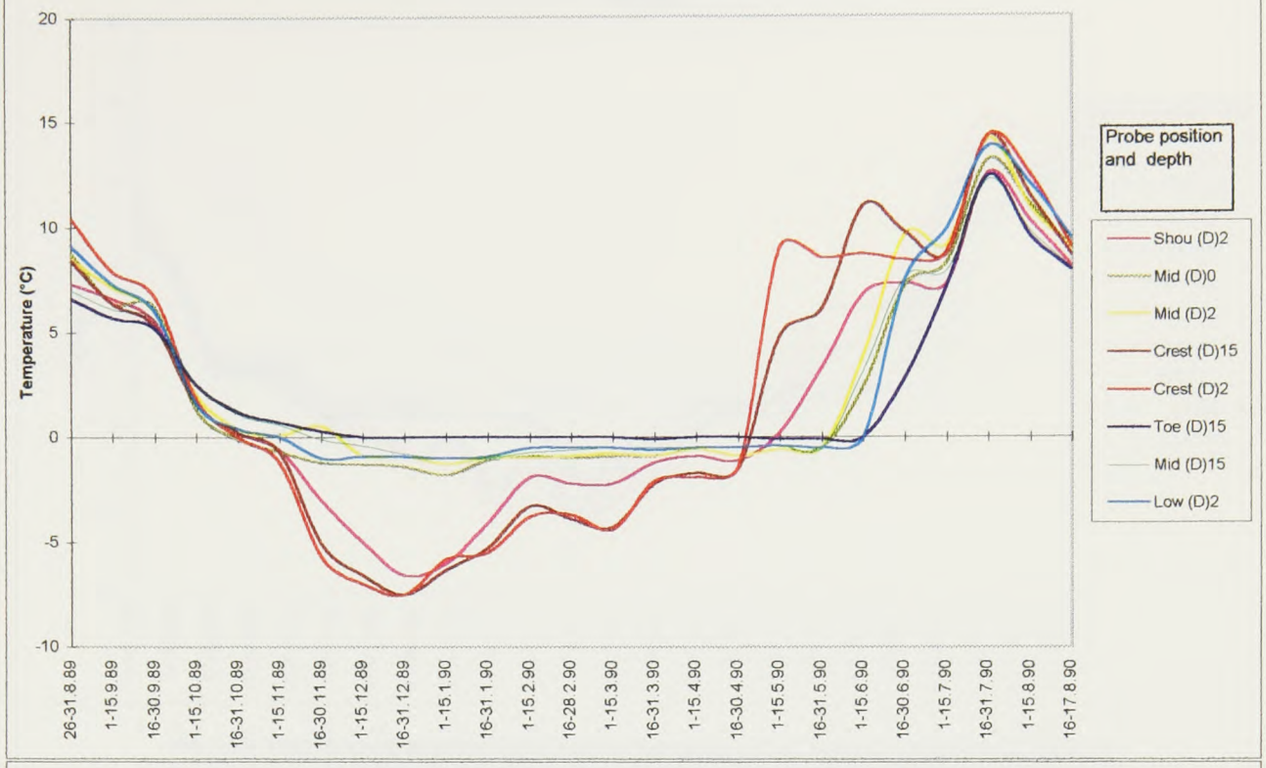


Fig. 3.23 Thermistor (2) standard deviations (n-1) of the temperature means on the distal slope of the 1750 moraine, 1.9.89. to 15.8.90.

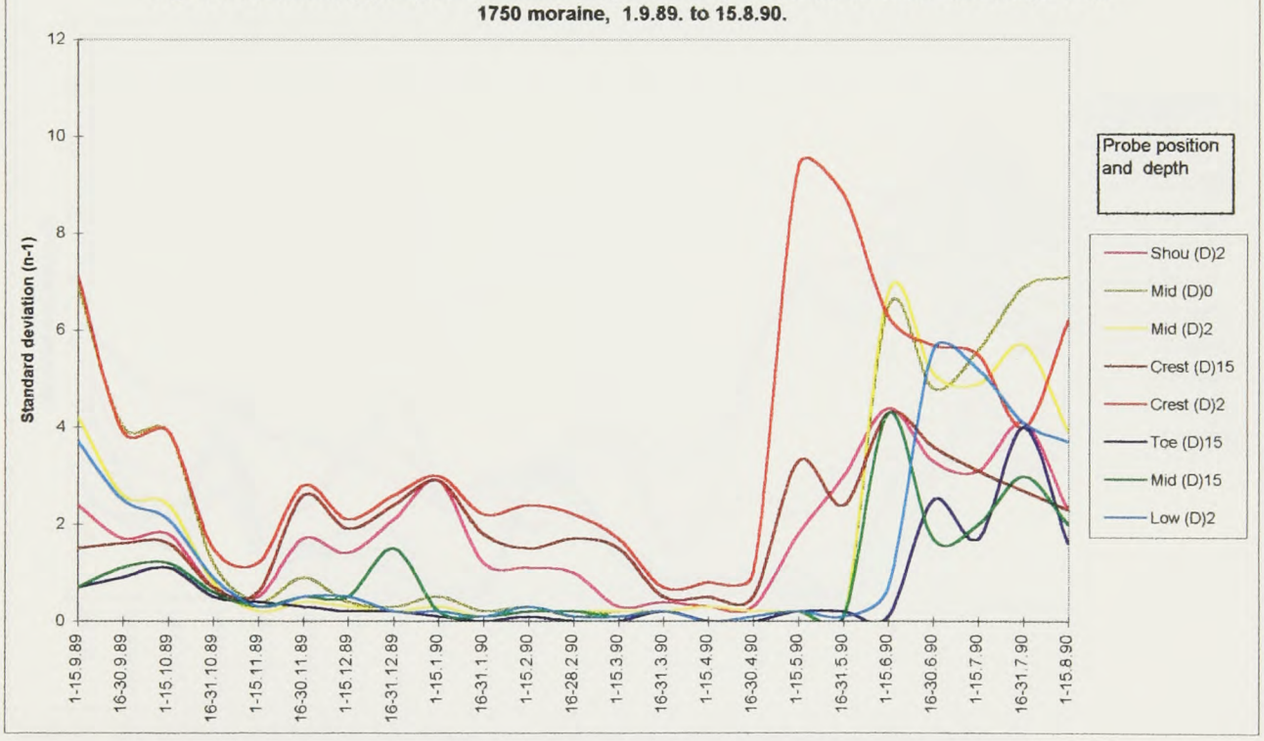


Table 3.8 Correlation matrix to show the relative correspondence between temperatures, found at distal positions across the 1750 moraine, Storbreen, taken 26.8.89 to 17.8.90, (thermistor 2)

	Shou (2)	Mid (0)	Mid (2)	Crest (15)	Crest (2)	Toe (15)	Mid (15)	Low (2)
Shou (2)	1							
Mid (0)	0.924867	1						
Mid (2)	0.923141	0.990827	1					
Crest (15)	0.975648	0.861438	0.865588	1				
Crest (2)	0.949377	0.838497	0.82821	0.983834	1			
Toe (15)	0.845163	0.962059	0.937979	0.759535	0.752167	1		
Mid (15)	0.92546	0.992515	0.996627	0.864269	0.828558	0.95192	1	
Low (2)	0.88709	0.990795	0.977468	0.813476	0.799528	0.974704	0.981691	1

Note 1: Refer to Fig. 2.6 for positioning of probes in the figures and table on this page.

Note 2: Thermistor 2 started having problems from May 1st 1990 so that fewer temperatures were recorded in each 15 day period (n = < 28). This means that the Standard deviations are higher than they might be.

Fig. 3.24 Thermistor (3) temperature means, taken twice daily over 15 day periods, emplaced 24.8.90 to 14.8.91 on distal (D), proximal (P) and crest positions across the 1900 moraine, Storbreen (1100m), Norway.

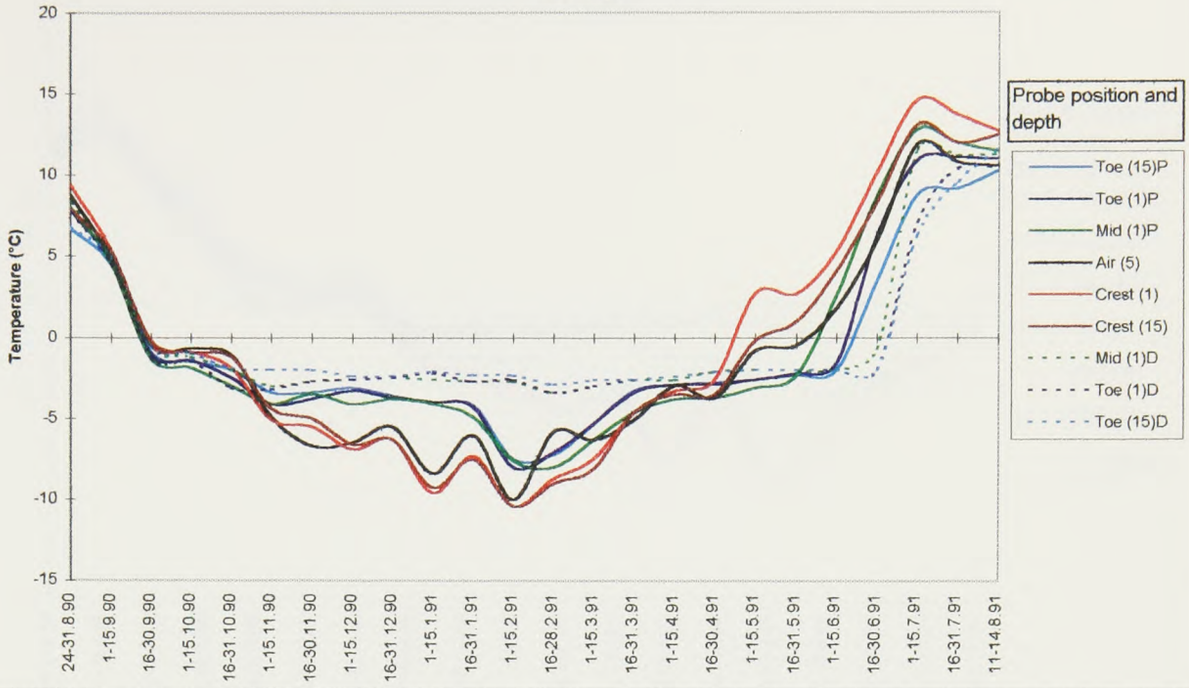


Fig. 3.25 Thermistor (3) standard deviations (n-1) of temperature means for distal (D), proximal (P) positions on the 1900 moraine, Storbreen, taken 1.9.90 to 14.8.91.

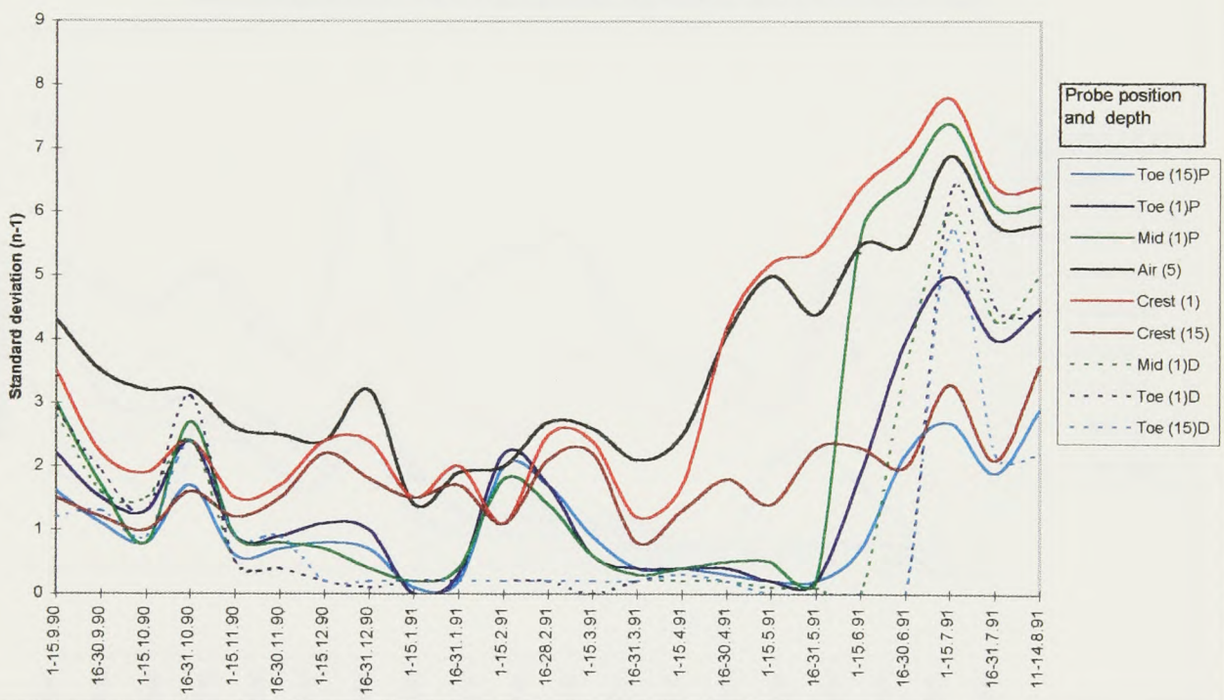


Table 3.9 Correlation matrix to show the relative correspondence between temperatures, taken 26.8.89 to 17.8.90, found on distal (D), proximal (P) and top positions, across the 1750 moraine, Storbreen (1100m), Norway.

	Toe (15)P	Toe (1)P	Mid (1)P	Air (5)	Crest (1)	Crest (15)	Mid (1)D	Toe (1)D	Toe (15)D
Toe (15)P	1								
Toe (1)P	0.994937	1							
Mid (1)P	0.973088	0.985169	1						
Air (5)	0.956997	0.963284	0.962417	1					
Crest (1)	0.928944	0.940225	0.955639	0.982808	1				
Crest (15)	0.948244	0.953852	0.966737	0.987305	0.994727	1			
Mid (1)D	0.948299	0.936712	0.905048	0.894183	0.841863	0.860048	1		
Toe (1)D	0.929569	0.911966	0.873683	0.862485	0.809281	0.826862	0.986397	1	
Toe (15)D	0.922708	0.897784	0.856547	0.847586	0.788899	0.814519	0.976547	0.992685	1

Note 1: Refer to Fig. 2.7 for positioning of probes in the figures and table on this page.

Note 2: Standard deviation for 1-15.2.91 (Top, air 5 cms) was estimated due to very low temperatures. Also toe (15cm) distal, for November.

Fig. 3.26 Thermistor (4) temperature means, taken twice daily over 15 day periods, emplaced 21.8.90 to 31.5.91 on distal (D), proximal (P) and crest positions across 1750 moraine, Storbreen foreland (1100m), Norway.

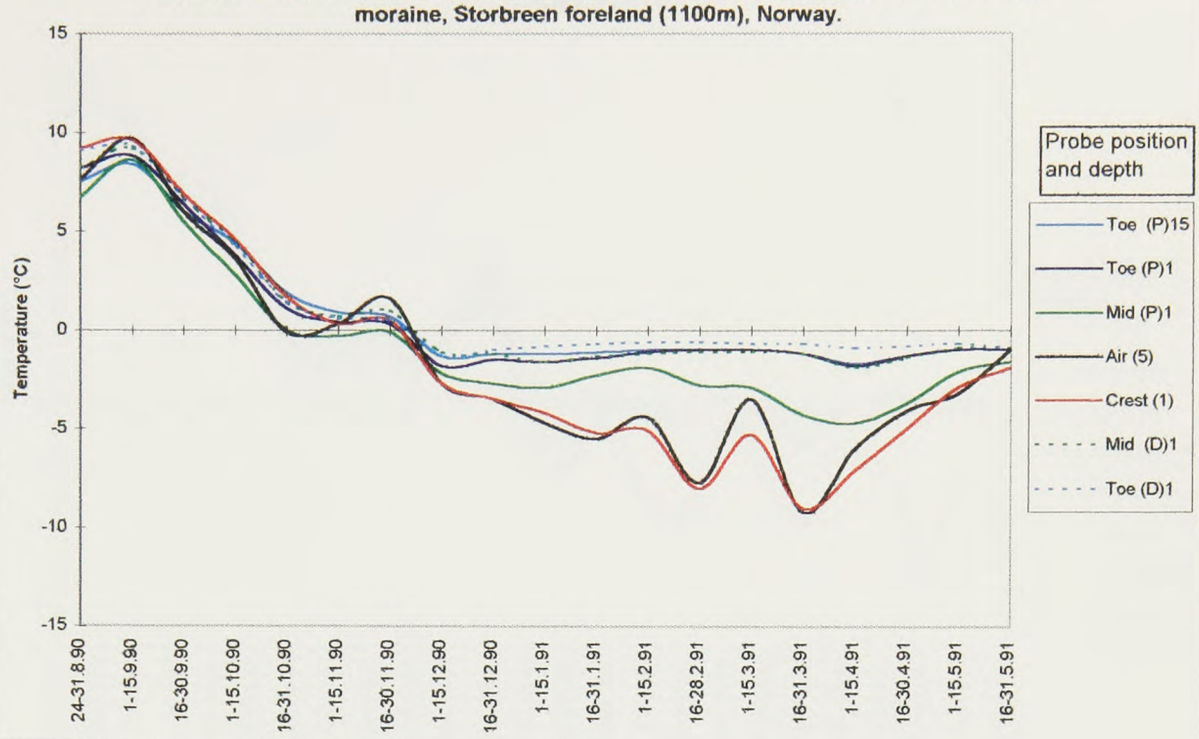


Fig. 3.27 Thermistor (4) standard deviations of temperature means at proximal (P) and distal (D) positions on the 1750 moraine, Storbreen, taken 21.8.90 to 31.5.91

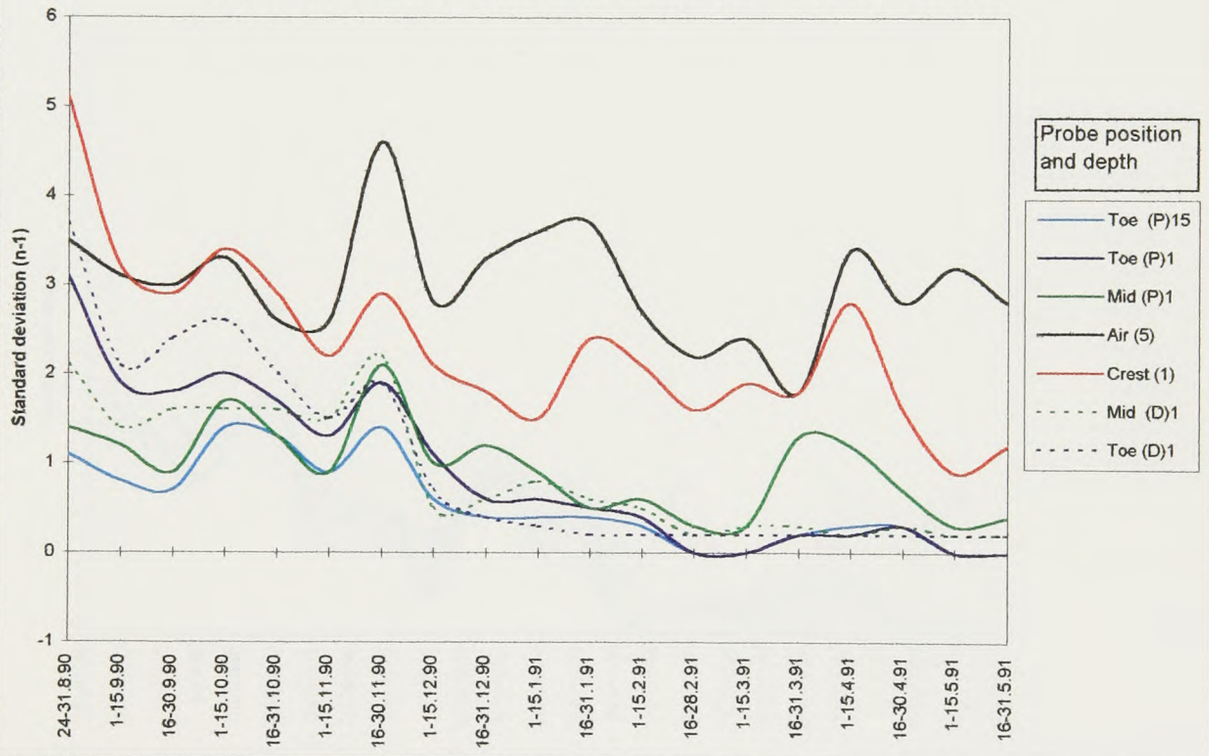


Table 3.10 Correlation matrix to show relative correspondence between temperatures, taken 24.8.90 to 31.5.91, found on the distal (D), proximal (P) positions, across the 1750 moraine, Storbreen (1100m), Norway.

	Toe (P)15	Toe (P)1	Mid (P)1	Air (5)	Crest (1)	Mid (D)1	Toe (D)1
Toe (P)1	1						
Toe (P)1	0.99544	1					
Mid (P)1	0.98282	0.97864	1				
Air (5)	0.92674	0.91341	0.95471	1			
Crest (1)	0.9438	0.92567	0.96274	0.98786	1		
Mid (D)1	0.99792	0.99718	0.9855	0.93013	0.94273	1	
Toe (D)1	0.99175	0.99783	0.97037	0.89913	0.91413	0.993	1

Note 1: Refer to Fig. 2.8 for positioning of probes in the figures and table on this

Note 2: After May battery appears to have failed.

Fig. 3.28 Thermistor (5) temperature means, taken six times daily over five day periods, emplaced 21.8.90 to 20.12.90 on distal (D), proximal (P) positions across the 1750 moraine, Storbreen foreland (1100m), Norway.

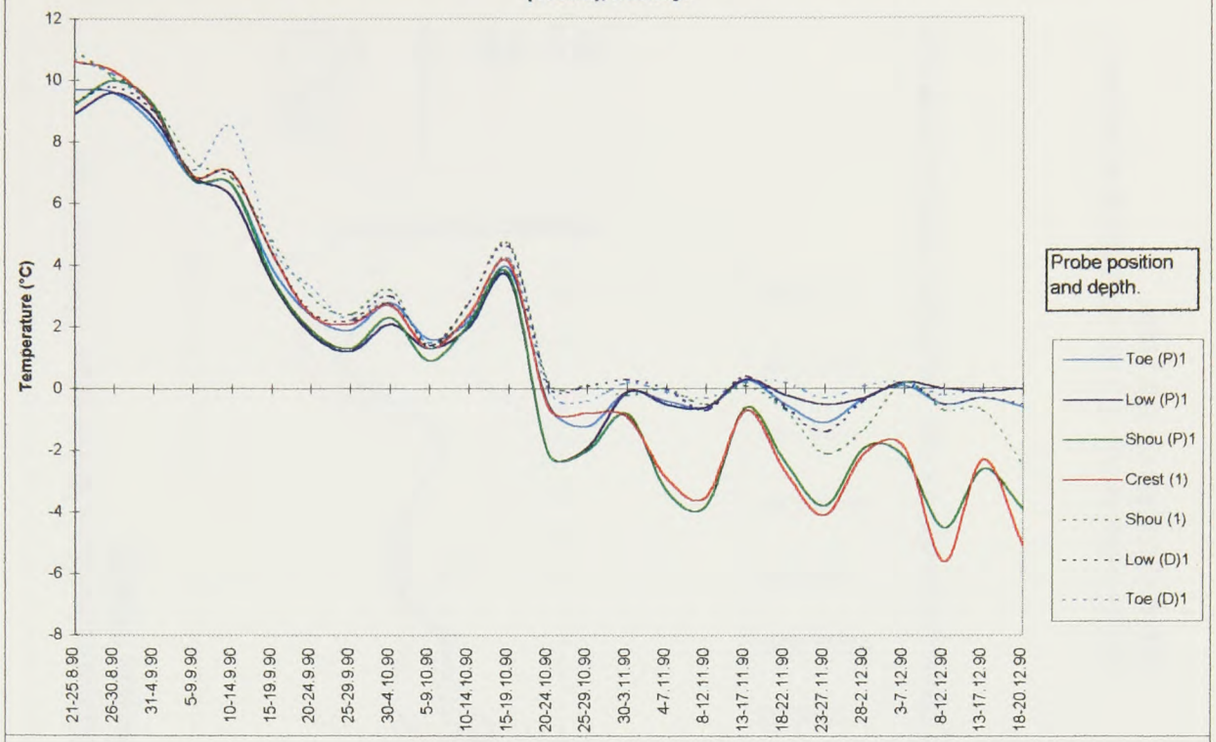


Fig. 3.29 Thermistor (5) standard deviations (n-1) of temperature means (taken six times daily over a 5-day period) for positions on the 1750 moraine, Storbreen (1100), emplaced 21.8.90 to 20.12.90.

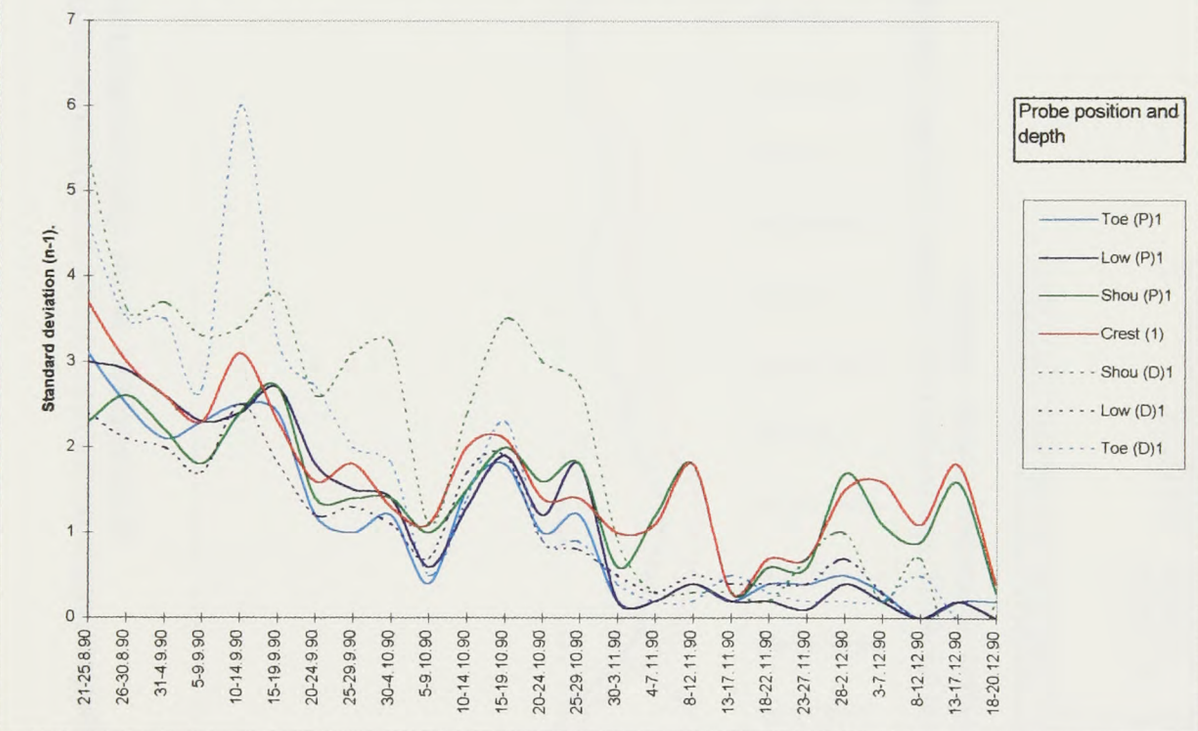


Table 3.11 Correlation matrix to show the relative correspondence between temperatures, taken 21.8.90 to 20.12.90 six times daily over a five day period, at positions across the 1750 moraine, Storbreen (1100m), Norway.

	Toe (P)1	Low (P)1	Shou (P)1	Crest (1)	Shou (1)	Low (D)1	Toe (D)1
Toe (P)1	1						
Low (P)1	0.989608	1					
Shou (P)1	0.980704	0.957758	1				
Crest (1)	0.964089	0.925733	0.992005	1			
Shou (1)	0.98657	0.960328	0.979744	0.979027	1		
Low (D)1	0.99451	0.977853	0.98646	0.974565	0.991378	1	
Toe (D)1	0.994131	0.983002	0.972026	0.9566	0.979741	0.989663	1

Note: Refer to Fig. 2.8 for positioning of probes in the figures and table on this page.

Fig. 3.30 Comparison of the temperature means and standard deviations (SD) derived from thermistors (T1) and (T2), at 2 cm depth, on the 1750 moraine crest, Storbreen, 1989/90.

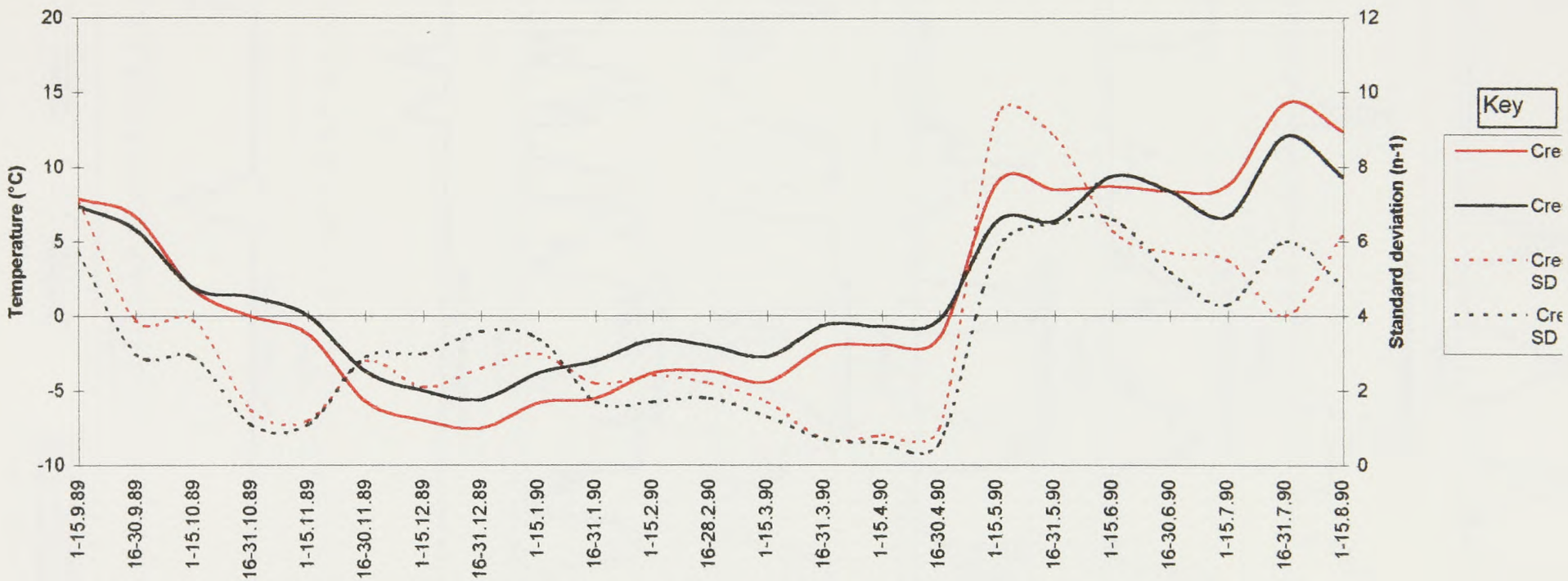


Table 3.12 Correlation matrix to compare the temperature means, and their standard deviations, recorded by two thermistor probes emplace same position on the 1750 moraine, Storbreen, during 1989/90.

	TOP DIS	*TOP PRX*	*TOP (D)SD*	*TOP(P)SD*
TOP DIS	1			
TOP PRX	0.991077	1		
TOP (D)SD	0.749469	0.714087	1	
TOP(P)SD	0.738124	0.72737	0.900733	1

Note: Refer to Fig. 2.6 for positioning of probes in figure and table on this page.

Figs. 3.31 to 3.38 Frequency (1/25) of frost evidence in quadrats across moraines, of decreasing age, on selected glacier forelands.

Fig. 3.31 Austerdalsbreen.

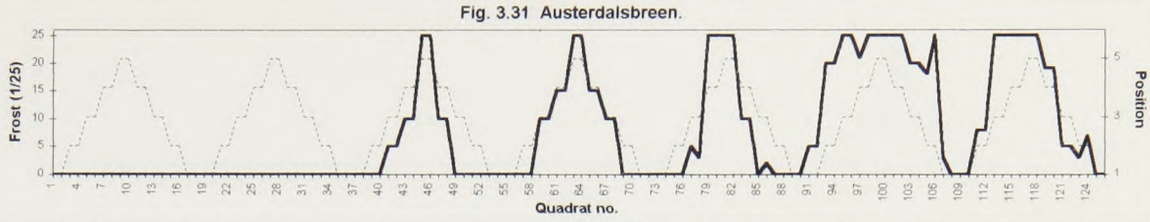


Fig. 3.32 Fåbergstølsbreen.

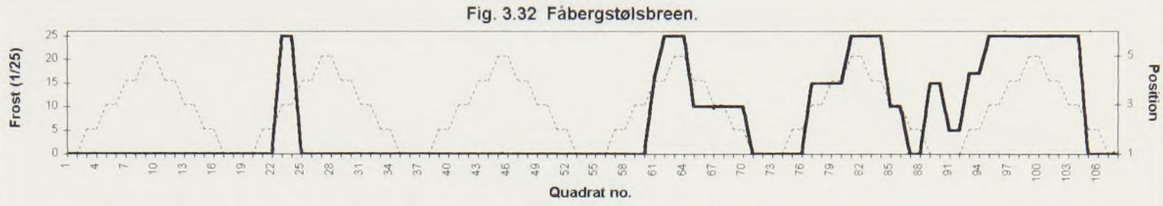


Fig. 3.33 Storbreen low (1)

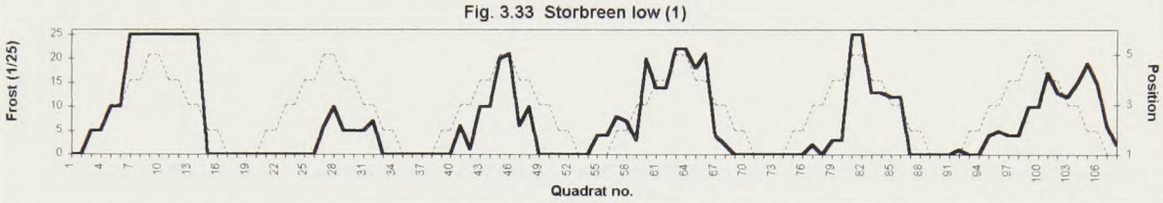


Fig. 3.34 Storbreen low (2)

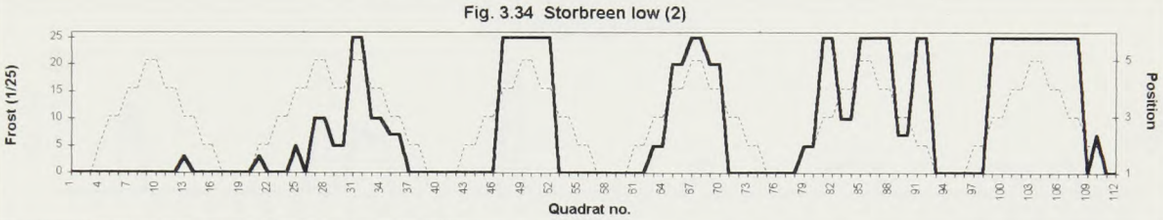


Fig. 3.35 Svellnosbreen

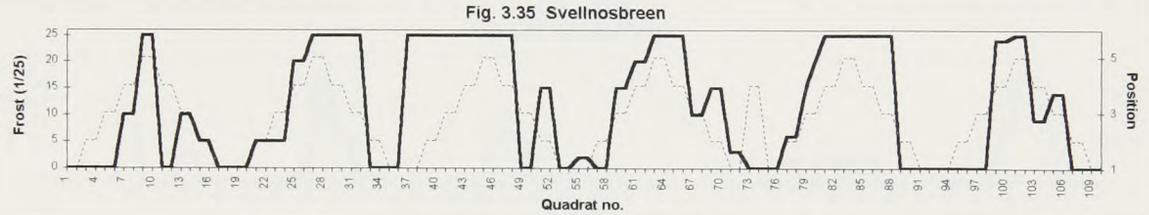


Fig. 3.36 Storbreen high.

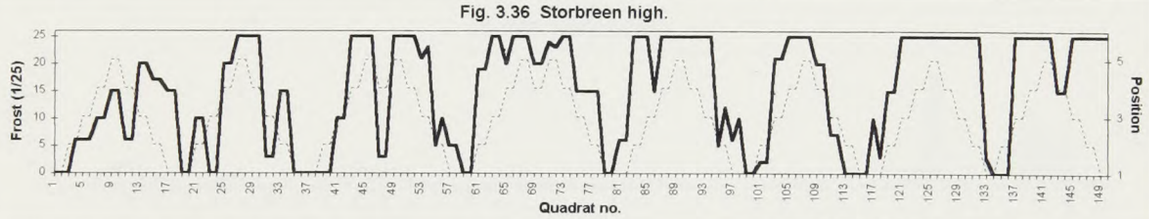


Fig. 3.37 Høgvaglbreen

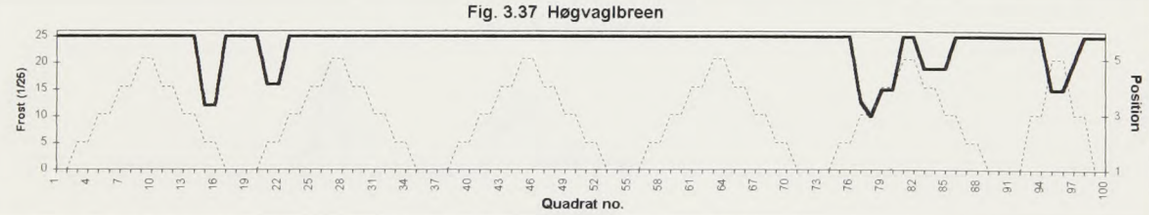
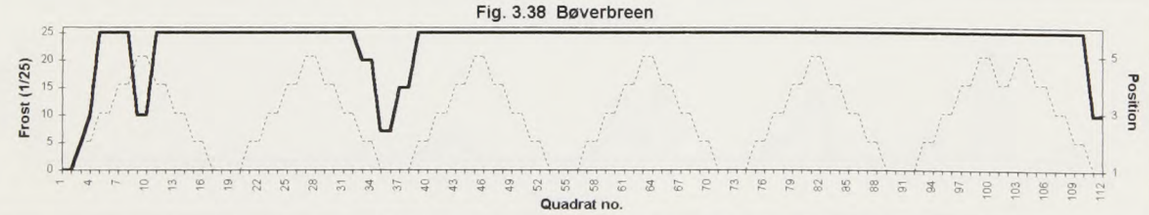


Fig. 3.38 Bøverbreen



Key:

——— = Frequency (1/25) of frost

..... = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.39 to 3.46 Mean dowel heave (of nine dowels) at sites across moraines, of decreasing age, on selected glacier forelands.

Fig. 3.39 Austerdalsbreen

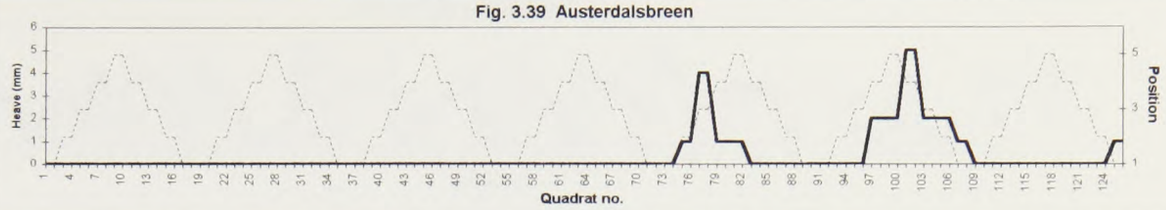


Fig. 3.40 Fåbergstølsbreen.

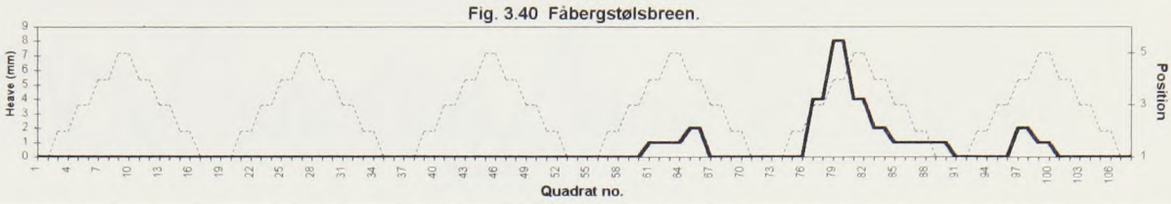


Fig. 3.41 Storbreen low (1)

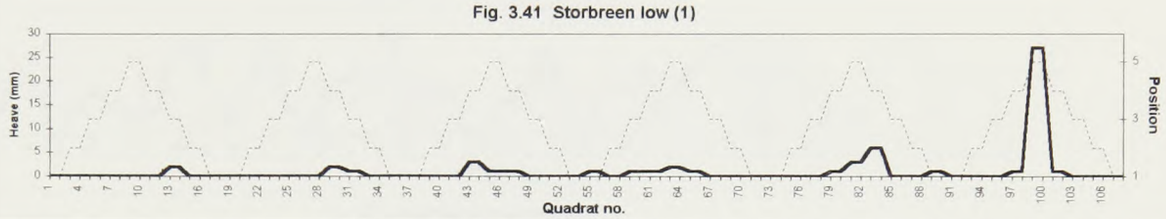


Fig. 3.42 Storbreen low (2)

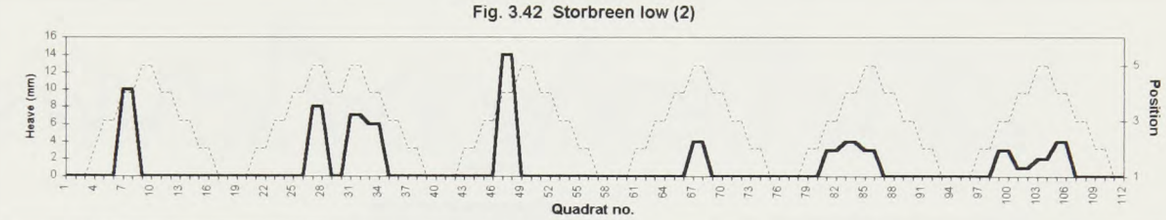


Fig. 3.43 Svellnosbreen

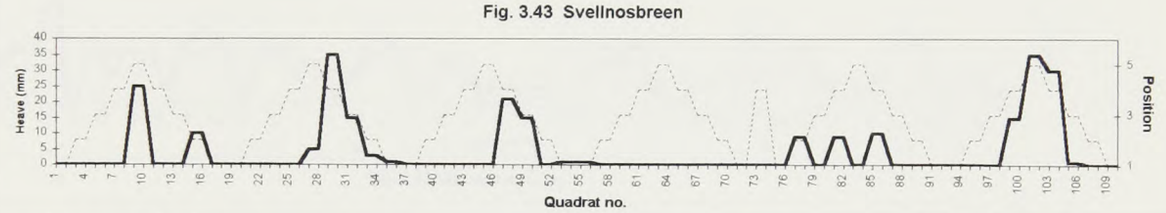


Fig. 3.44 Storbreen high.

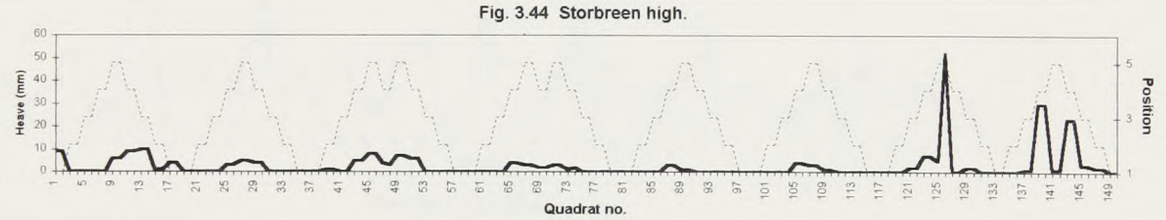


Fig. 3.45 Høgvaglbreen

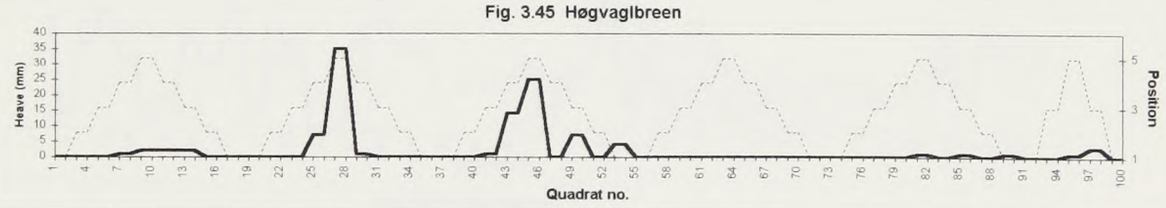
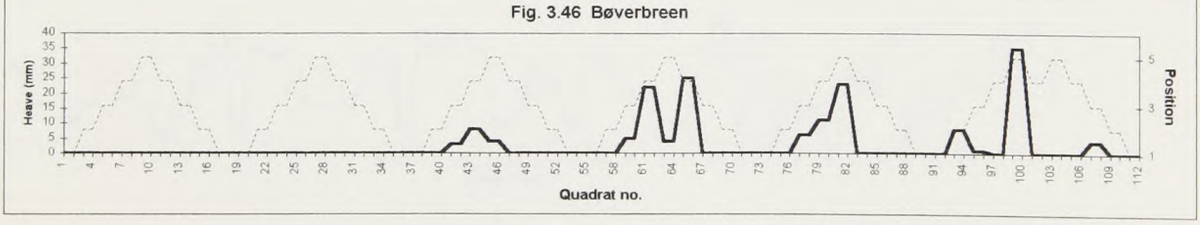


Fig. 3.46 Bøverbreen



Key:

——— = Mean dowel heave (mm)

..... = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.47 to 3.54 Relationship between slope angle (°), and solifluction frequency (1/25) , across moraines, of decreasing age, on selected glacier forelands.

Fig. 3.47 Austerdalsbreen.

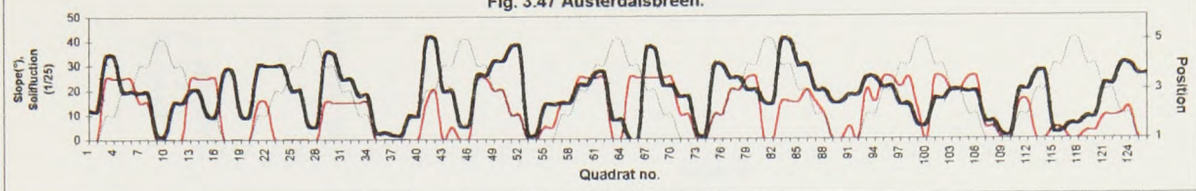


Fig. 3.48 Fåbergstølsbreen.

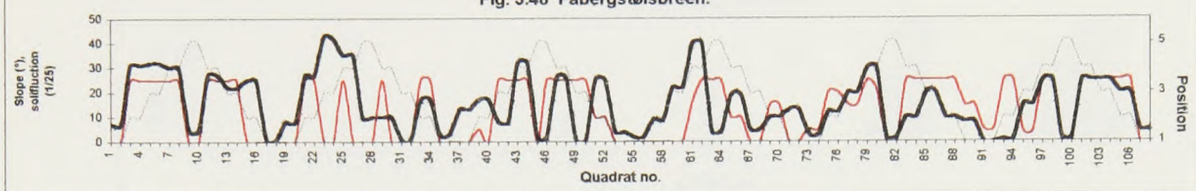


Fig. 3.49 Storbreen low (1).

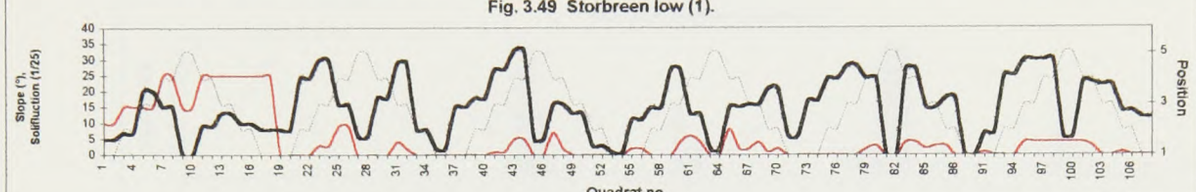


Fig. 3.50 Storbreen low (2).

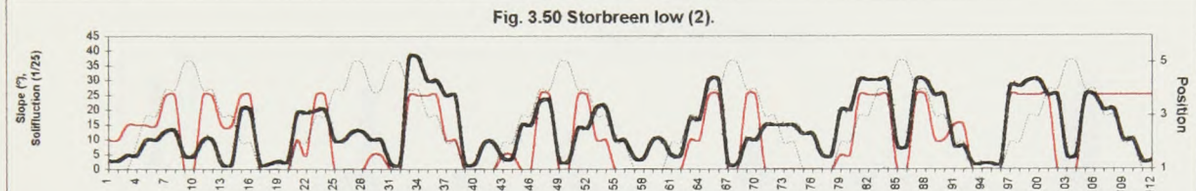


Fig. 3.51 Svellnosbreen.

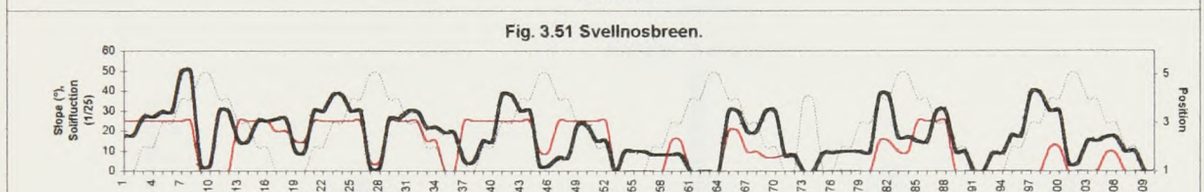


Fig. 3.52 Storbreen high.

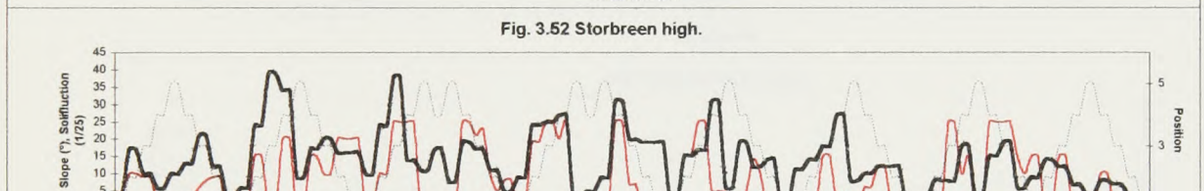


Fig. 3.53 Høgvaglbreen.

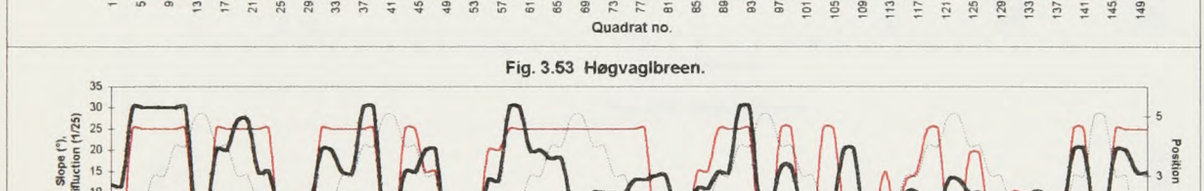
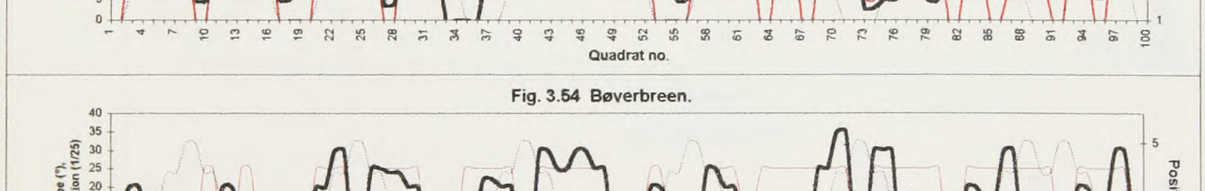


Fig. 3.54 Bøverbreen.



Key:

= Frequency (1/25) of solifluction

= Slope (°)

= Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.55 to 3.62 Frequency (1/25) of fluvial activity in quadrats across moraines, of decreasing age, on selected glacier forelands.

Fig. 3.55 Austerdalsbreen.

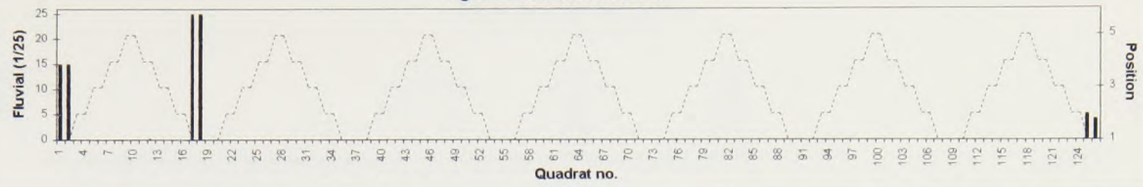


Fig. 3.56 Fåbergstølsbreen.

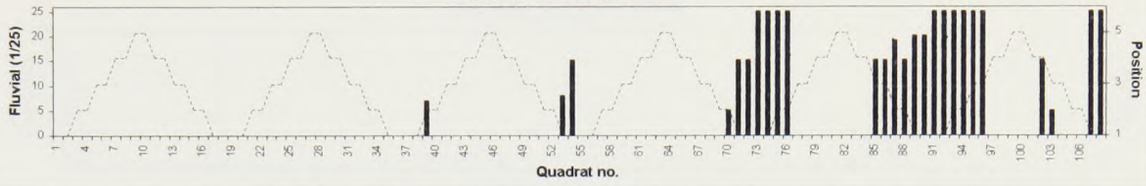


Fig. 3.57 Storbreen Low (1).

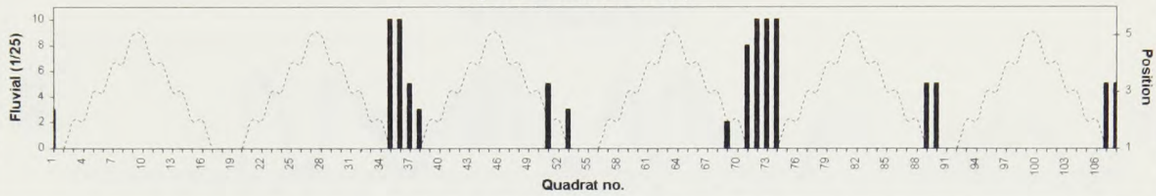


Fig. 3.58 Storbreen low (2).

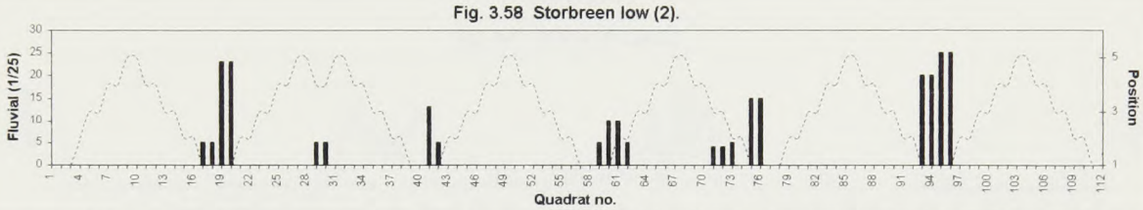


Fig. 3.59 Svellnosbreen.

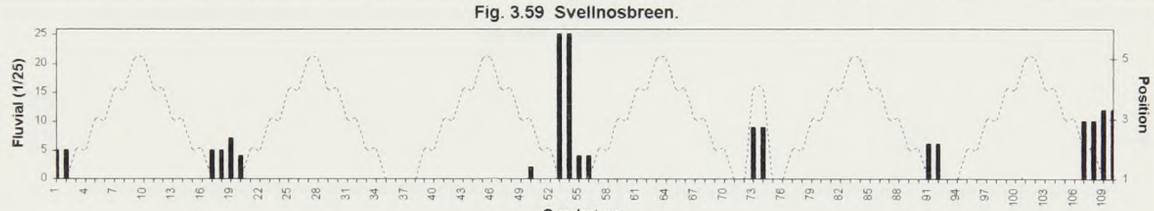


Fig. 3.60 Storbreen high.

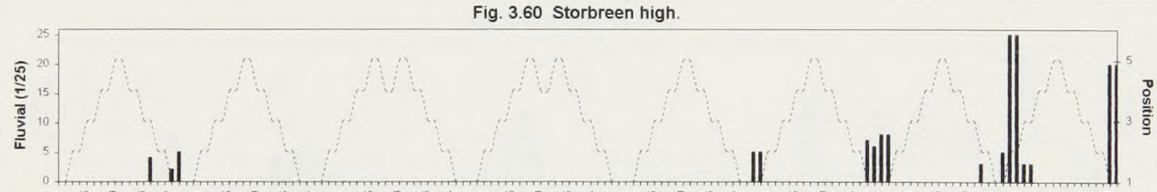


Fig. 3.61 Høgvaglbreen.

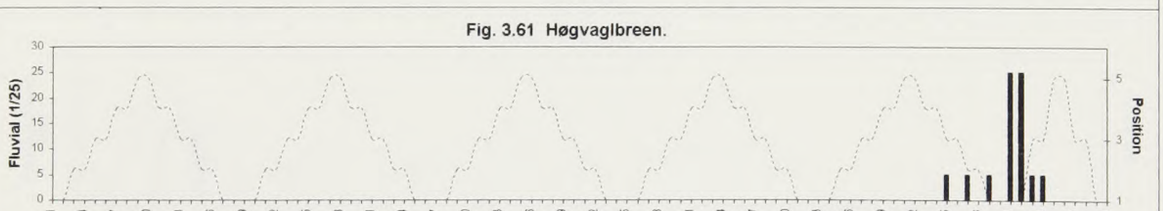
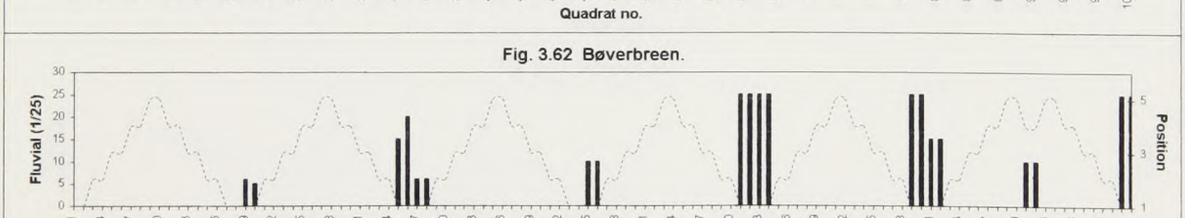


Fig. 3.62 Bøverbreen.



Key: | = Frequency of fluvial activity ..... = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.63 to 3.70 Frequency (1/25) of trampling and grazing in quadrats across moraines, of decreasing age, on selected glacier forelands.

Fig. 3.63 Austerdalsbreen.

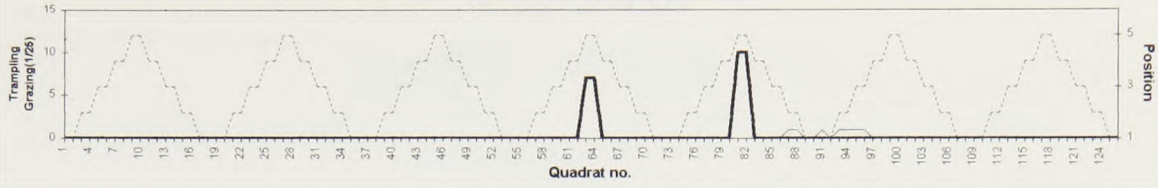


Fig. 3.64 Fåbergstølsbreen.

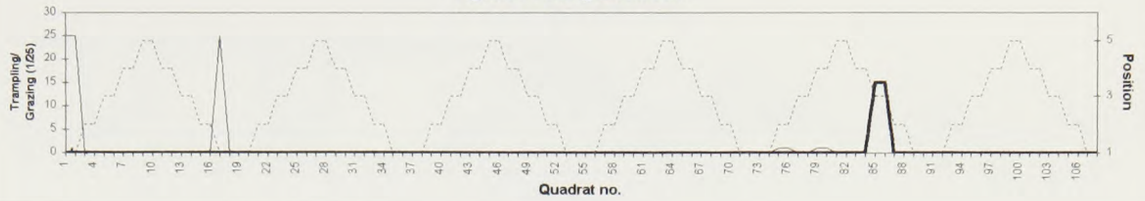


Fig. 3.65 Storbreen low (1).

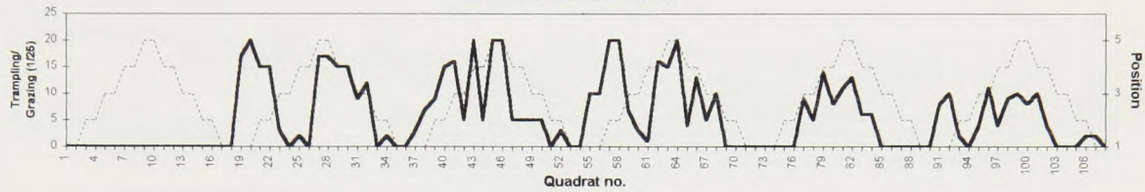


Fig. 3.66 Storbreen low (2)

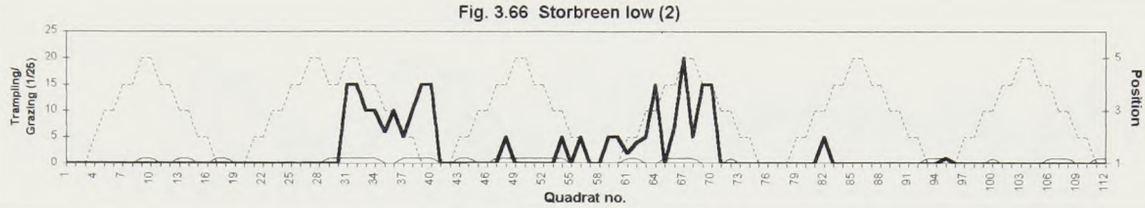


Fig. 3.67 Svellnosbreen.

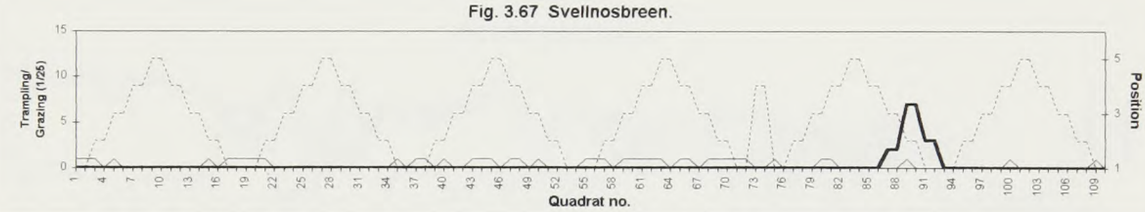


Fig. 3.68 Storbreen high.

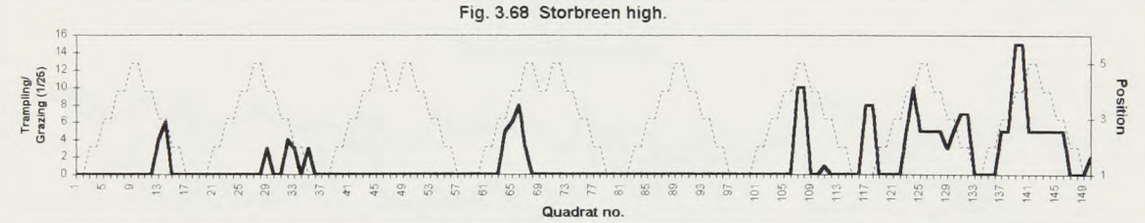


Fig. 3.69 Høgvaglbreen.

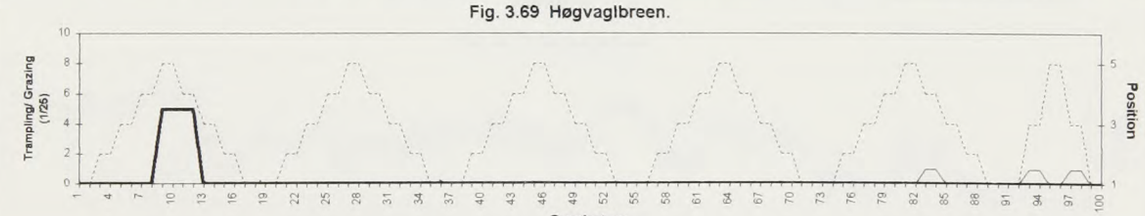
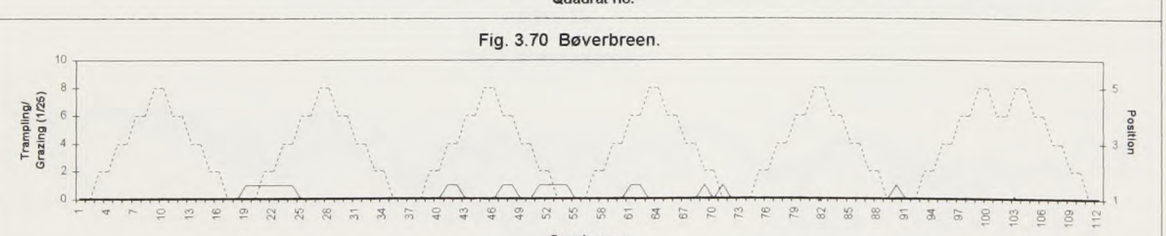


Fig. 3.70 Bøverbreen.



Key:

= Frequency (1/25) of trampling

= Frequency (1/25) of grazing

= Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.71 to 3.78 Percentage of total vegetation cover and total bryophyte cover in quadrats across moraines, of decreasing age, on selected forelands.

Fig. 3.71 Austerdalsbreen.

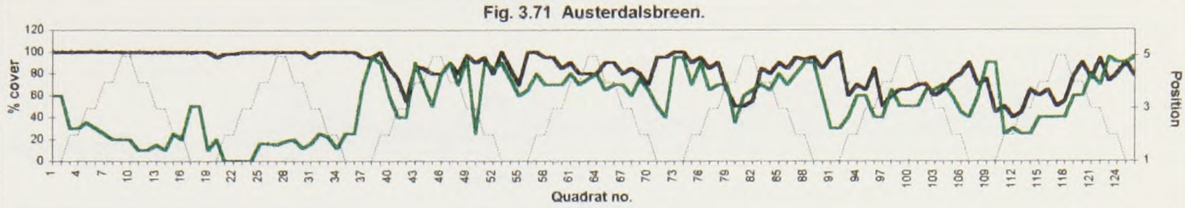


Fig. 3.72 Fåbergstølsbreen.

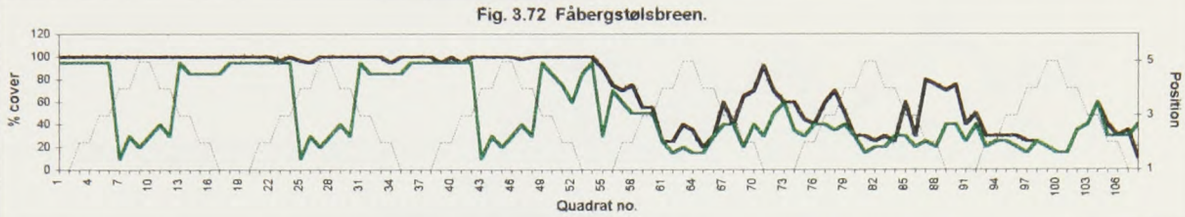


Fig. 3.73 Storbreen low (1).

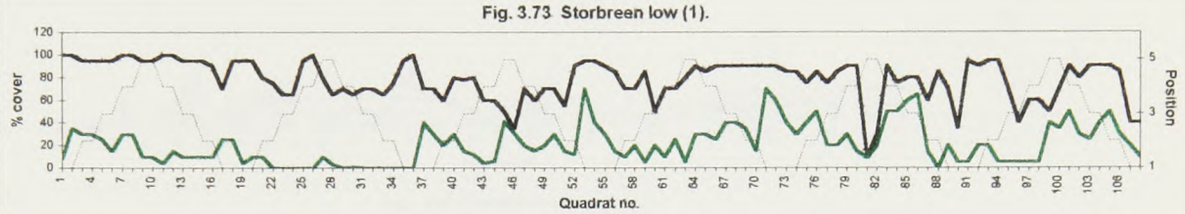


Fig. 3.74 Storbreen low (2)

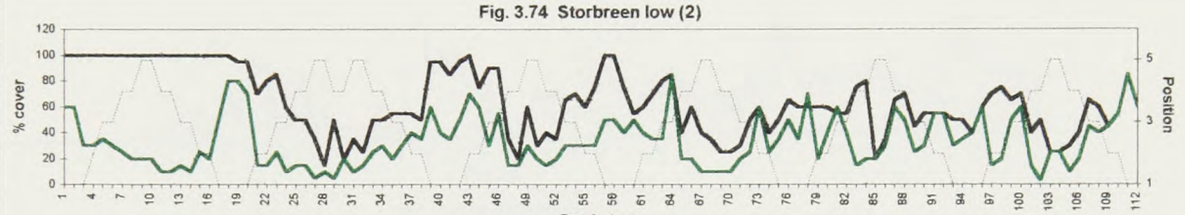


Fig. 3.75 Svellnosbreen.

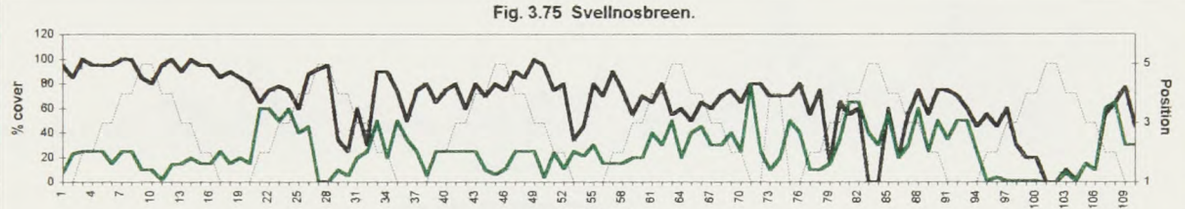


Fig. 3.76 Storbreen high.

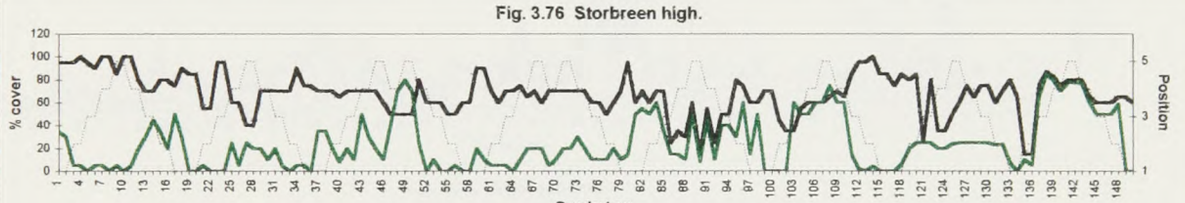


Fig. 3.77 Høgvaglbreen.

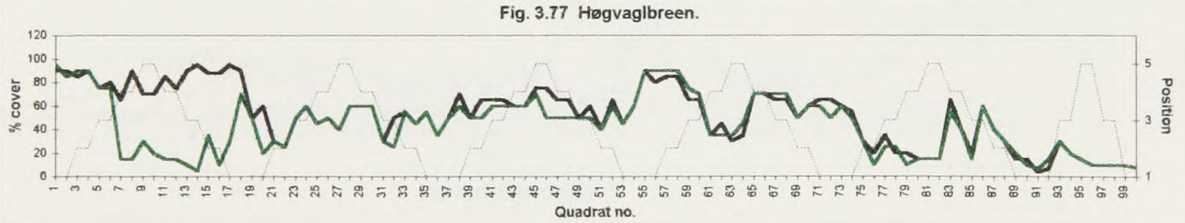
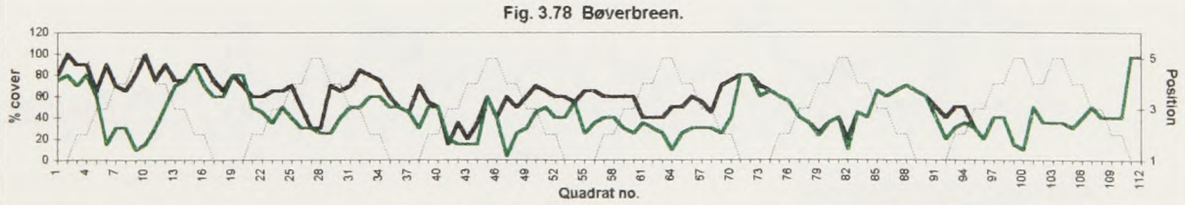


Fig. 3.78 Bøverbreen.



Key:

——— = % cover of total vegetation

——— = % cover of total bryophytes

——— = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.79 to 3.86 Percentage cover of fines, gravels and boulders in quadrats across moraines, of decreasing age, on selected forelands.

Fig. 3.79 Austerdalsbreen.

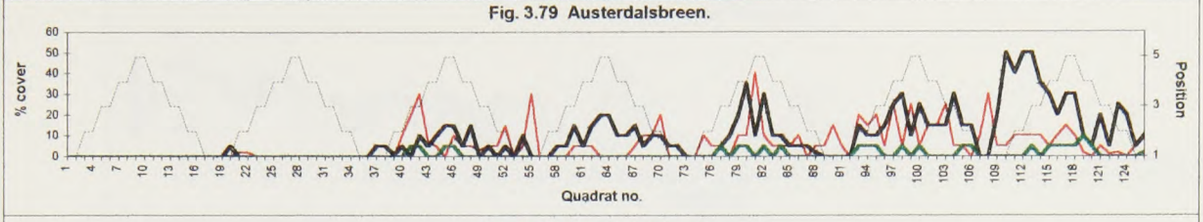


Fig. 3.80 Fåbergstølsbreen.

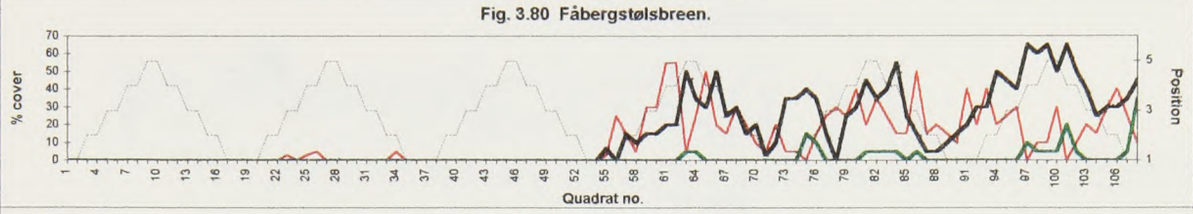


Fig. 3.81 Storbreen low (1).

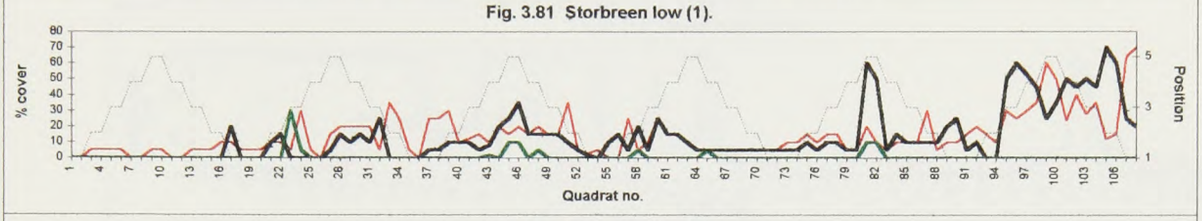


Fig. 3.82 Storbreen low (2).

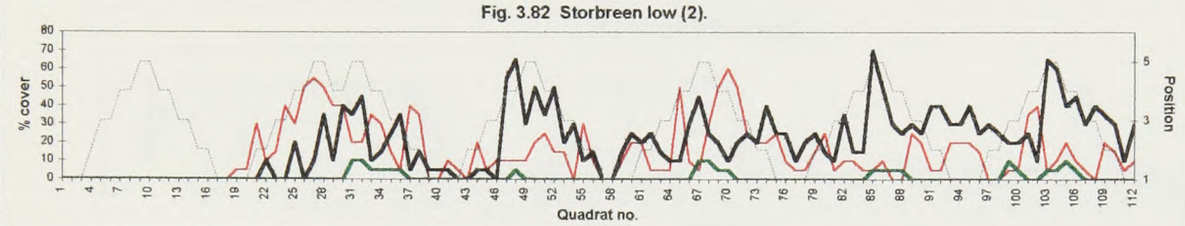


Fig. 3.83 Svellnosbreen.

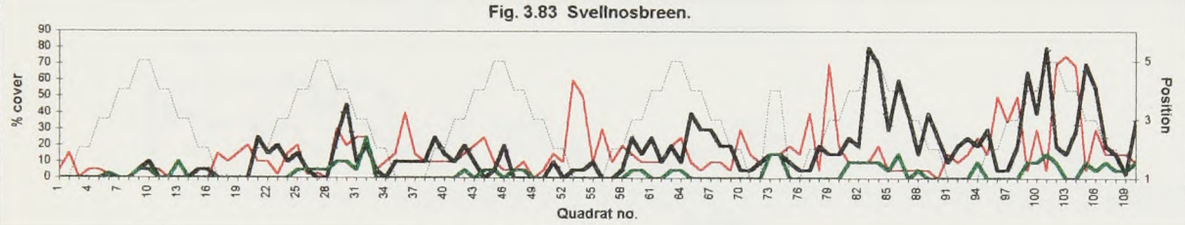


Fig. 3.84 Storbreen high.

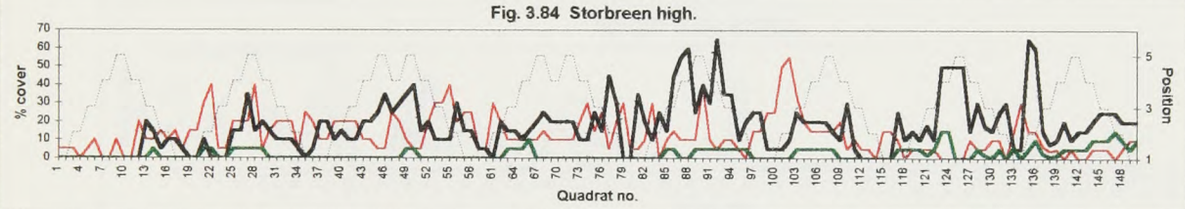


Fig. 3.85 Høgvaglbreen.

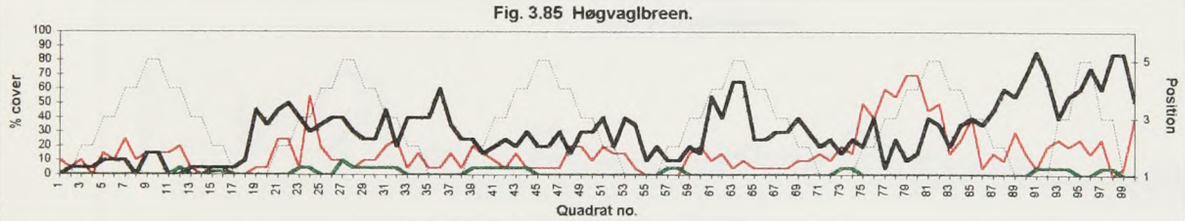
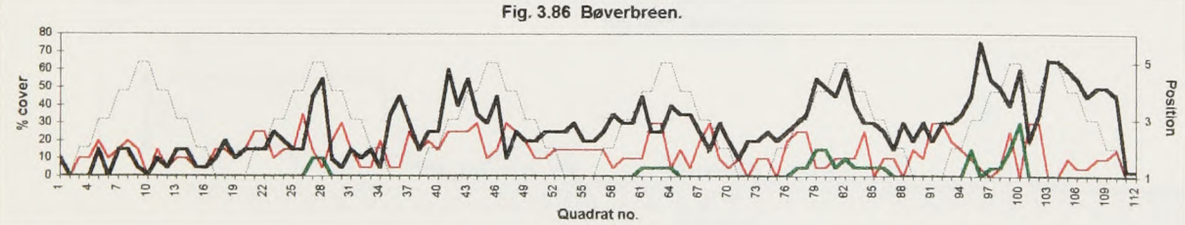


Fig. 3.86 Bøverbreen.



Key:

= % cover of fines

= % cover of gravels

= % cover of boulders

= Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.87 to 3.94 Representative soil and root depth in quadrats across moraines, of decreasing age, on selected forelands. *(depth measured to a maximum of 150 mm)*

Fig. 3.87 Austerdalsbreen.

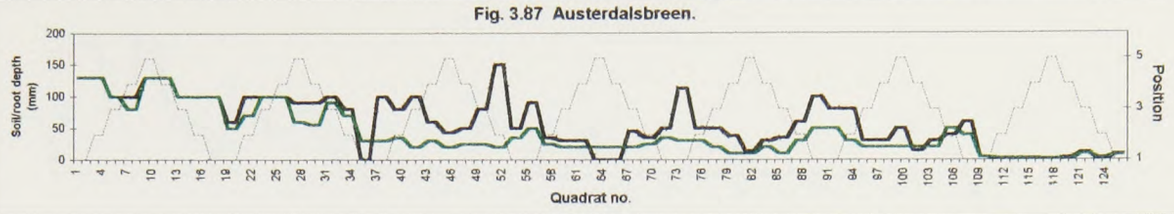


Fig. 3.88 Fåbergstølsbreen

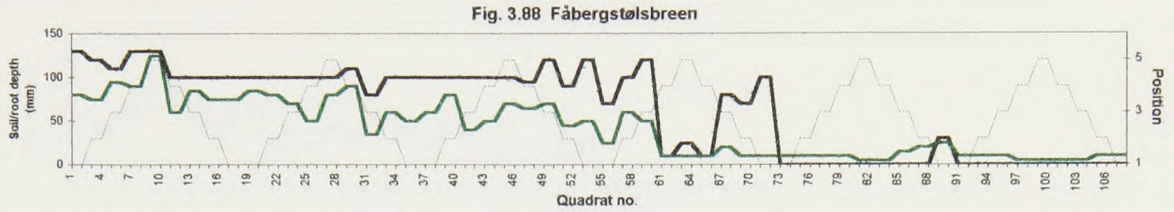


Fig. 3.89 Storbreen low (1)

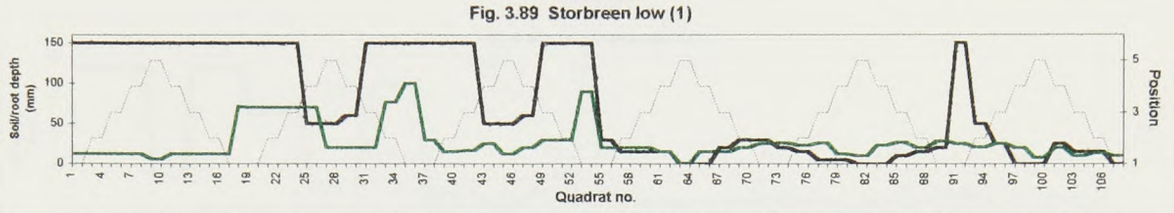


Fig. 3.90 Storbreen low (2)

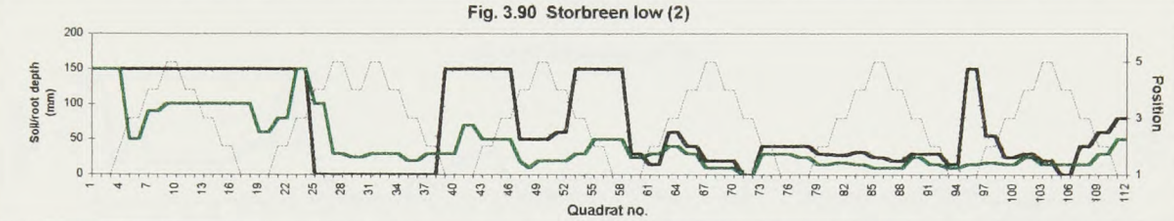


Fig. 3.91 Svellnosbreen

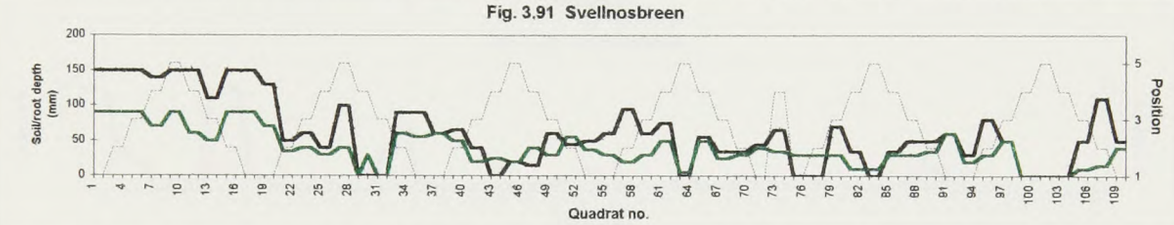


Fig. 3.92 Storbreen high.

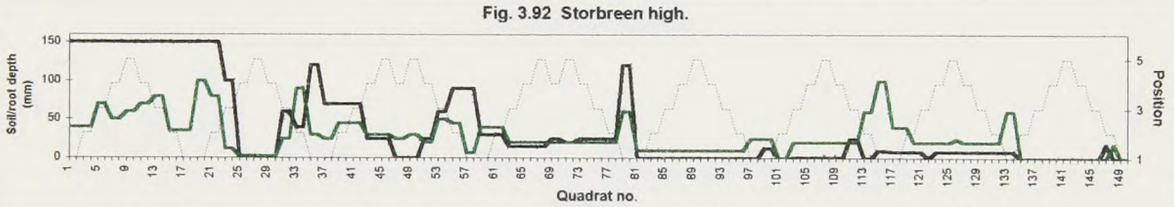


Fig. 3.93 Høgvaglbreen.

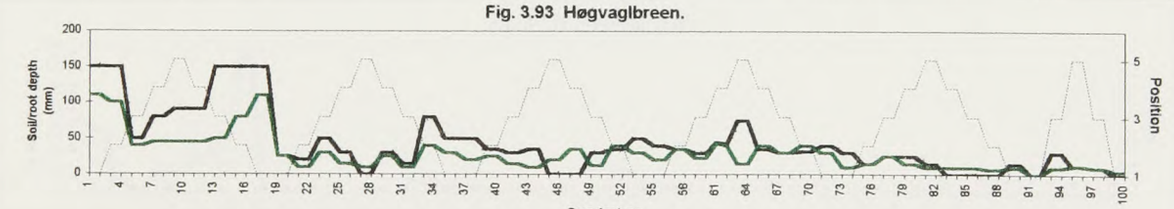
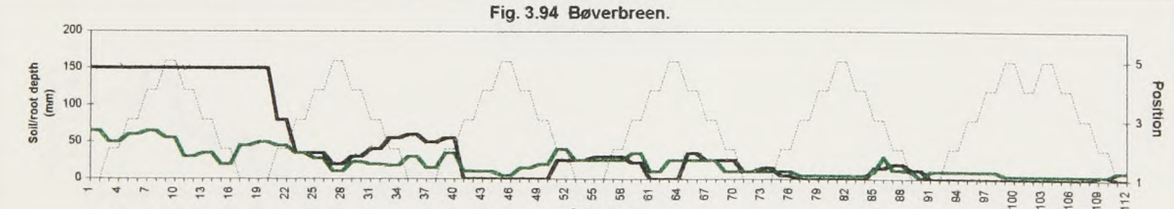


Fig. 3.94 Bøverbreen.



Key: —— = Soil depth —— = Root depth ····· = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.95 to 3.102 Representative humus depth in quadrats across moraines, of decreasing age, on selected forelands. *depth measured to a maximum of 150 mm)*

Fig. 3.95 Austerdalsbreen

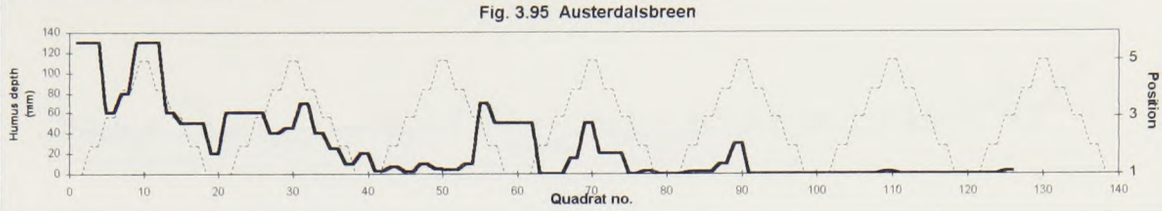


Fig. 3.96 Fåbergstølsbreen

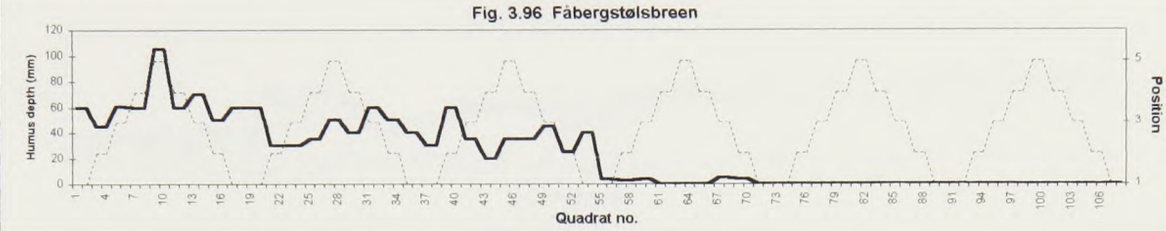


Fig. 3.97 Storbreen low (1)

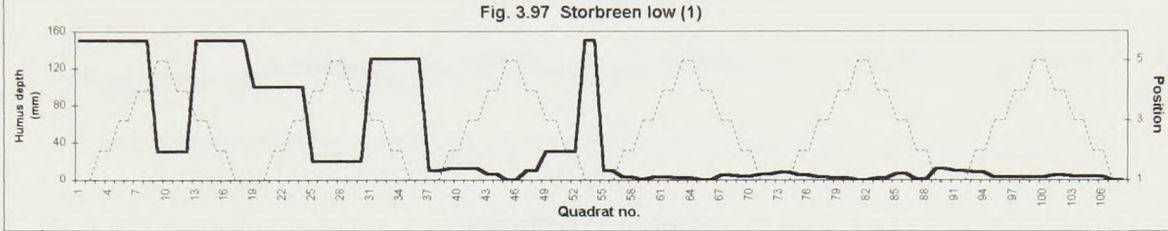


Fig. 3.98 Storbreen low (2)

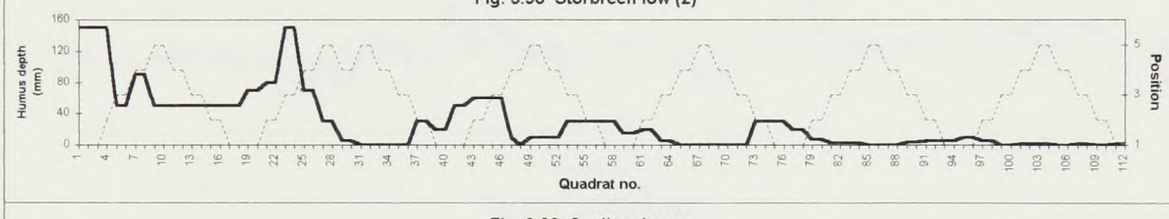


Fig. 3.99 Svellnosbreen

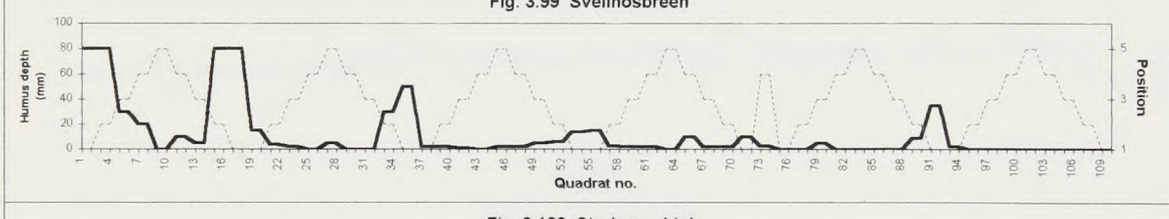


Fig. 3.100 Storbreen high

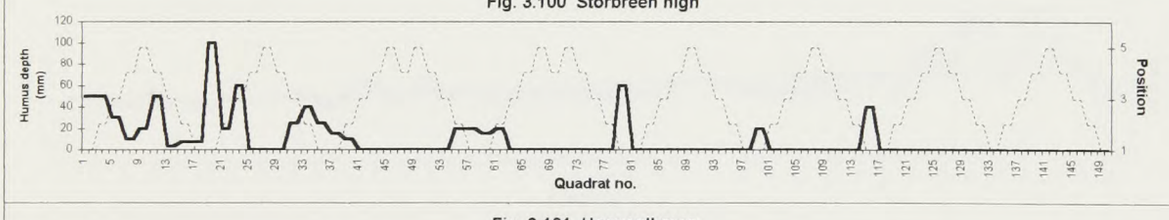


Fig. 3.101 Høgvaglbreen

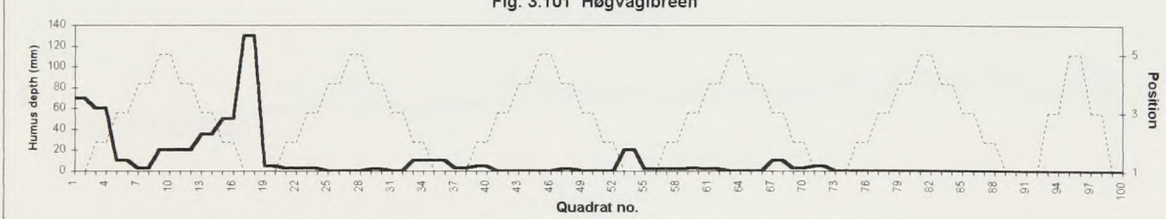
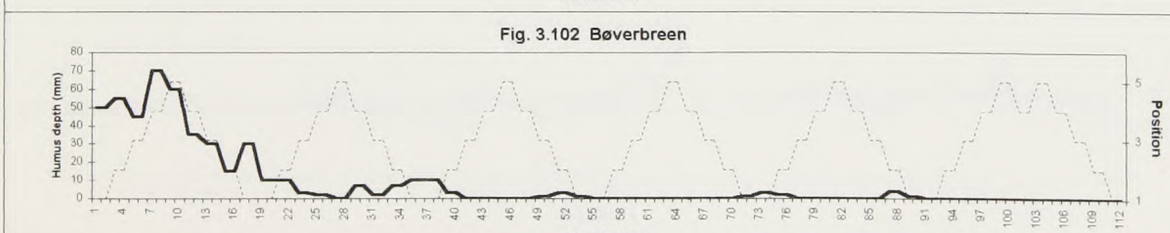


Fig. 3.102 Bøverbreen



Key: —— = Humus depth ..... = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs. 3.103 to 3.110 Soil pH in quadrats across moraines, of decreasing age, on selected forelands.
(pH trend line represents change of pH with moraine age)

Fig. 3.103 Austerdalsbreen.

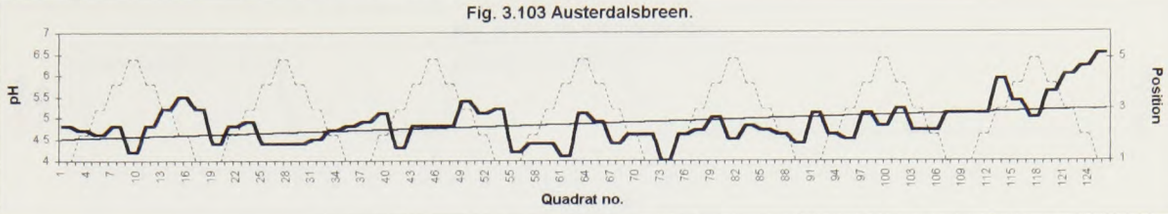


Fig. 3.104 Fåbergstølsbreen.

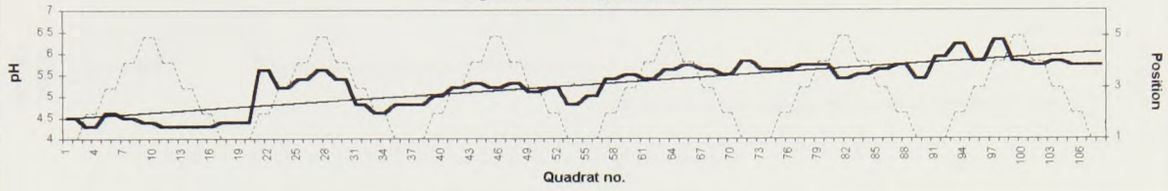


Fig. 3.105 Storbreen low (1).

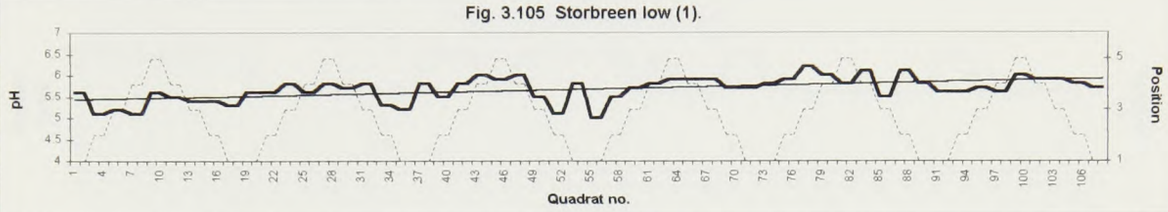


Fig. 3.106 Storbreen low (2).

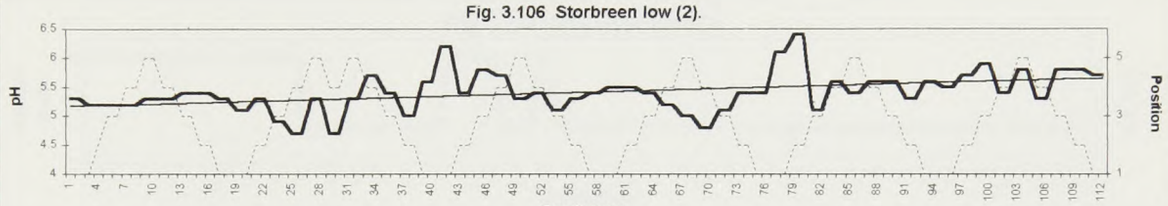


Fig. 3.107 Svellnosbreen.

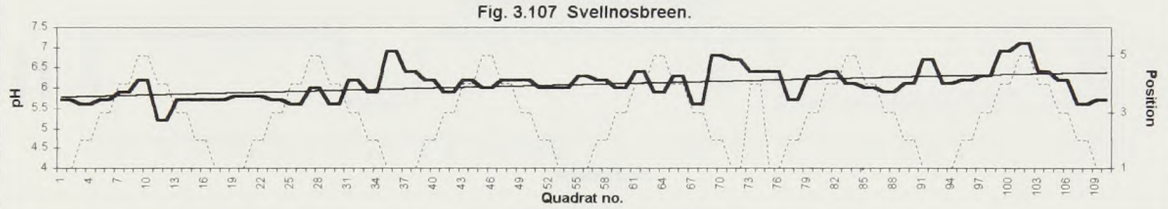


Fig. 3.108 Storbreen high.

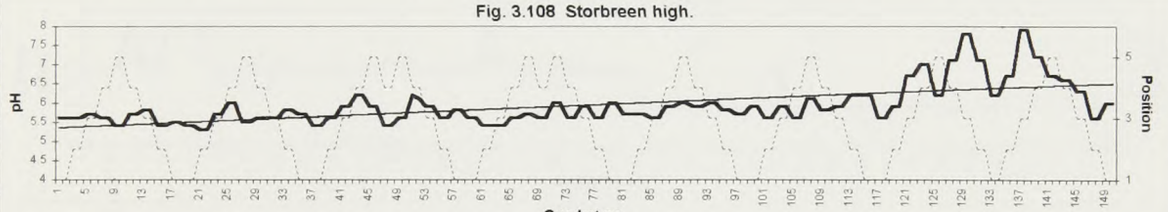


Fig. 3.109 Høgvaglbreen.

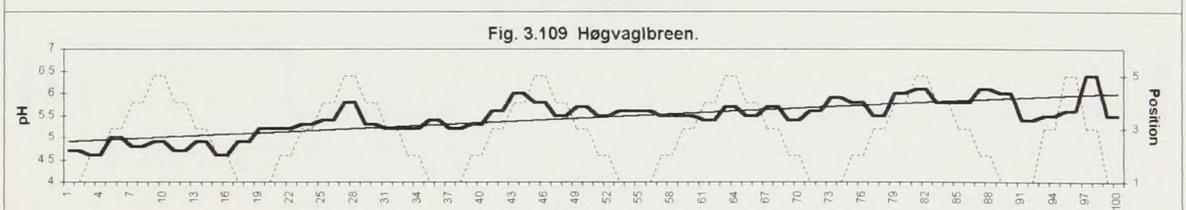
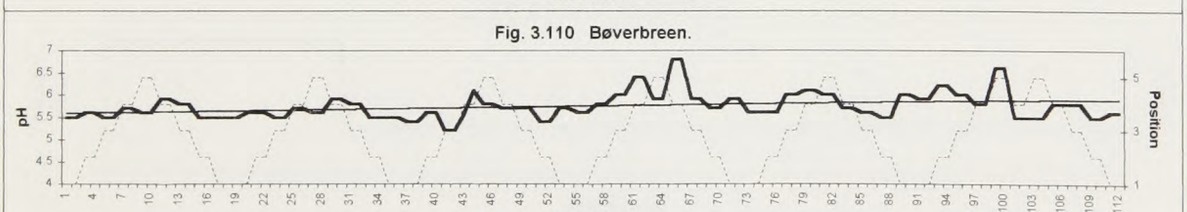


Fig. 3.110 Bøverbreen.



Key: —— = pH —— = pH trend line ------ = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Figs 3.111 to 3.118 Soil texture across moraines, of decreasing age, on selected glacier forelands. *(scale 1 = Sand; 2= Loamy sand; 3 = Sandy loam; 4 = Loam.)*

Fig. 3.111 Austerdalsbreen.

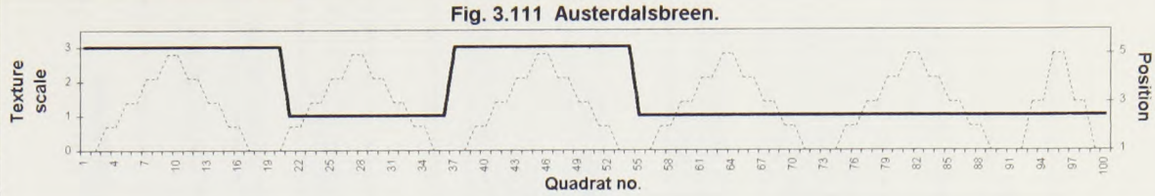


Fig. 3.112 Fåbergstølsbreen.

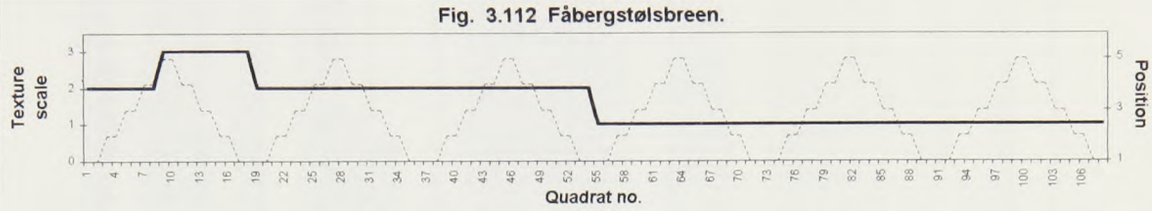


Fig. 3.113 Storbreen low (1)

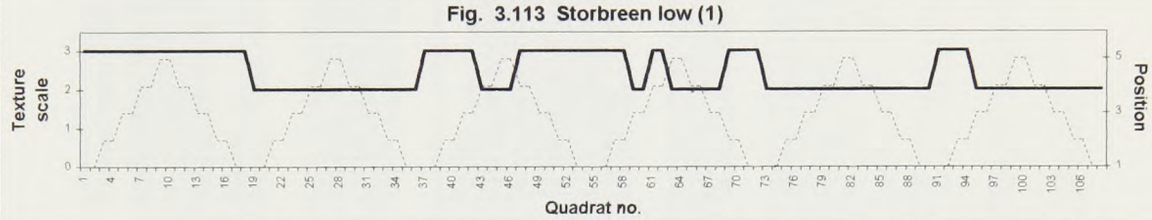


Fig. 3.114 Storbreen low (2).

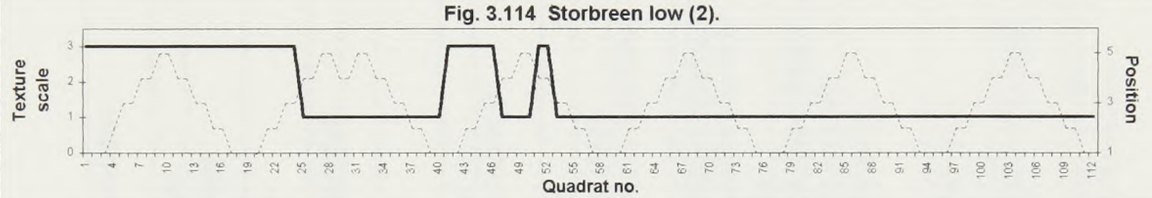


Fig. 3.115 Svellnosbreen.

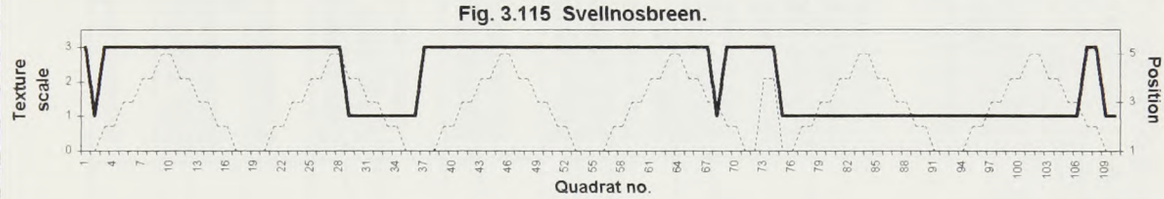


Fig. 3.116 Storbreen high.

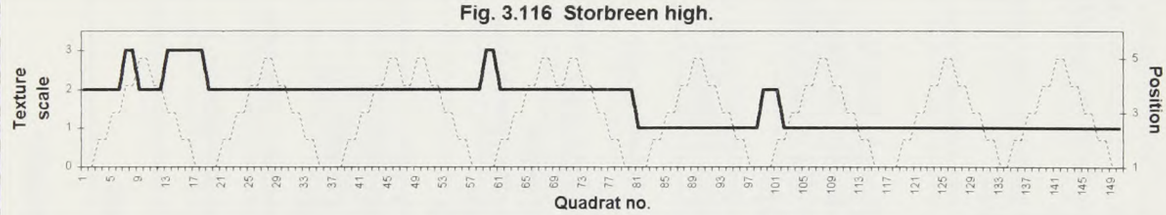


Fig. 3.117 Høgvaglbreen.

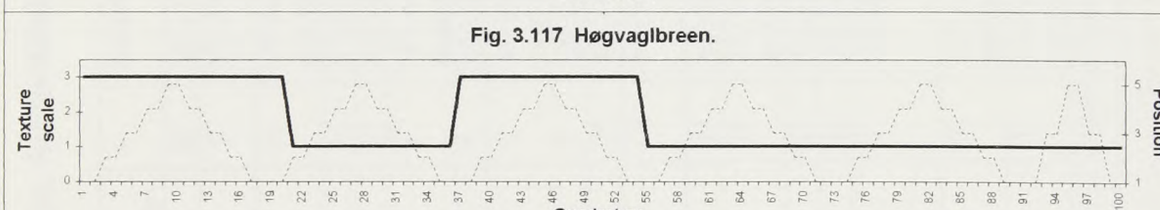
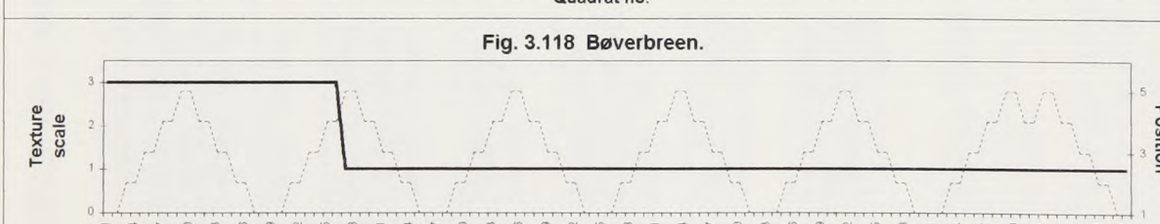


Fig. 3.118 Bøverbreen.



Key: ——— = Texture scale ····· = Moraine profile representation

Note: the lowest quadrat numbers belong to the oldest moraines, and the highest numbers belong to the youngest moraines, in each sequence.

Table 4.1 TWINSPAN site groups, Austerdalsbreen.

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species
2	2 (0.447)	Bet pub - Cal vul	89	M3 - 7	Early intermediate	Sol cro, Cla por, Ste alp, Sal phy, Cla bel, Cla chl
	3 (0.447)	Vac myr - Des fle	37	M1-2 (+ low-slope M7)	Mature assemblages	Mel syl, Vac uli, Des fle, Des alp, Cor sue, Sal gla, Fes ovi, Sal her, Ath dis
3	4 (0.431)	Ste alp - Car spp	14	M7 Proximal + high-slope positions	Exposed pioneer	Car spp, Phl alp, Oxy dig, Ste bot, Gal gla, Ste ves, Sax ste, Ant odo
	5 (0.431)	Bet pub - Cal vul	75	M3-6, low-slope M7	Early intermediate heath	Vac myr, Phy cae, Emp nig, Sol cro, Cla por, Cet isl, Vac uli
	6 (0.566)	Cor sue - Sal gla	32	M2, high-slope M1	Mature heath	Cor sue, Emp nig, Sal her, Fes ovi
	7* (0.566)	Ath dis - Pot cra	5	M1 low-slope +1 proximal quadrat	Mature meadow	Vio bif, Jun fil, Tri eur, Ant odo
4	8* (0.566)	Ste alp - Ste ves	7	M7 crest	Exposed pioneer	Ste spp
	9* (0.566)	Car spp - Phl alp	7	M7 proximal low-slope + distal shoulder	Exposed pioneer snowbed	Emp nig, Sal gla, Ste bot, Oxy dig, Sal phy, Vac myr, Phy cae, Sax ste, Pin vul, Sal her, Pyr, Phl alp, Des fle, Ver alp, Cla cer
	10* (0.295)	Sal phy - Sal her	2	M7 distal toe-slope	Pioneer snowbed	Sal her, Pyr nor, Phl alp, Des fle, Ver alp, Cla cer
	11 (0.295)	Emp nig - Cal vul	73	M3 - M6	Early intermediate heath	Vac myr, Bet pub, Emp nig, Phy cae, Sol cro, Cla por, Cet isl
	12 (0.489)	Sal gla - Sal her	18	M2 (+ 1 proximal M1)	Late intermediate heath with low birch cover	Des alp, Phy cae, Bet nan, Fes ovi, Lyc sel
	13* (0.489)	Des fle - Vac myr	14	M1 mid- to high-slope	Mature heath with high birch cover	Cor sue, Pot cra, Vac uli, Bet pub, Nar str, Mel syl, Ath dis
5	22* (0.240)	Vac myr- Bet pub	16	M5-6 (low-slope), M4 & M7 (toe-slope)	Early intermediate heath on moist and sheltered sites	Sal phy, Des fle, Des ces, Sal gla,Fes ovi, Ant odo, Vac uli, Pin vul
	23 (0.240)	Cal vul - Sol cro	57	M3-6 (older or high-slope)	Early intermediate lichen heath	Sol cro, Cla por, Cla bel, Cla dig, Ste alp, Cla gra, Cet isl
	24* (0.381)	Des alp - Phy cae	13	M2 proximal + low distal	Late intermediate snowbed	Fes ovi, Sal her, Bet nan, Alc alp, Cet isl, Mel syl, Cla con, Cla por
	25* (0.381)	Vac myr - Vac uli	5	M2 high-slope positions	Late intermediate heath	Vac myr, Vac uli, Sal gla, Emp nig, Sal phy, Bet pub, Sol vir, Tri eurCla por, Vac myr, Phy cae, Cla gra, Cla bel, Cla ama, Ste alp, Cet isl
6	46* (0.221)	Emp nig - Bet pub	20	M3-4 low-slope and older positions	Intermediate lichen heath - moist/sheltered	Cla por, Vac myr, Phy cae, Cla gra, Cla bel, Cla ama, Ste alp, Cet isl
	47* (0.221)	Sol cro	37	M3-6 high-slope and younger terrain	intermediate lichen heath - (more exposed)	(Sol cro - only preferential and indicator species)

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
*Note 2: **n** indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.2)

Table 4.2 TWINSPAN site groups, Fåbergstølsbreen

Level	Group (and eigenvalue)	Assemblage name (Primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species.
2	2 (0.832)	Bet pub- Vac myr	73	M1 to 4 (+ 1 crest quadrat M6)	Older terrain - higher *Betula pubescens* cover	Bet pub, Vac myr, Des fle, Cal vul, Phy cae, Emp nig, Vac vit, Gym dry
	3 (0.832)	Agr ten - Des alp	35	M5 to M6	Pioneer assemblages	Des alp, Epi als, Phl alp, Lot cor, Oxy dig, Gna nor, Cer cer
3	4 (0.601)	Vac myr - Des fle	34	M1 to M2	Mature woodland	Luz arc, Bet pub, Vac myr, Des fle, Gym dry, Cor sue, Luz arc, Sor auc
	5 (0.601)	Cal vul - Emp nig	39	M3-4; 1 distal site M2	Early intermediate heath	Emp nig, Cla ran, Vac uli, Cla por, Cla arb, Cla gra
	6 (0.355)	Agr ten - Phl alp	24	Mostly M5, low-slope M6	Pioneer/snowbed	Des alp, Lot cor, Luz spi, Oxy dig, Gna nor, Cer cer, Des alp, Lot cor, Gna sup, Sal her
	7* (0.355)	Des fle - Epi als	11	Proximal + crest M6	Exposed pioneer snowbed	Epi als, Sax ste, Cla arb
4	8 (0.370)	Vac myr - Gym dry	23	M1; low-slope distal M2	Mature birch woodland	Cor sue, Tri eur, Par pal, Pot cra, Ger syl, Ant odo
	9* (0.370)	Phy cae - Emp nig	11	Proximal + high-slope M2	Birch woodland heath	Vac vit, Luz arc, Mel syl, Vac uli, Pel pol
	10 (0.448)	Bet pub - Cal vul	33	M3; low-slope M4	Early intermediate heath	Phy cae, Emp nig, Cla ran, Mel syl, Vac vit, Vac myr, Vac uli, Cla por, Cla arb
	11* (0.448)	Cla chl - Cla fim	6	High-slope sites M4	Lichen heath	Cla chl, Cla fim, Sol cro, Cla pyx, Ste alp, Cla con, Cla ver, Ste bot, Cla coc
	12* (0.293)	Lot cor - Sal phy	7	Low-slope sites M5	Pioneer snowbed	Gna nor, Phl alp, Ulm gla, Sag sag, Hie spp, Sal her, Sal gla
	13 (0.293)	Luz spi - Oxy dig	17	Mostly high-slope M5-6	Pioneer	Luz spi, Oxy dog, Sax ste, Ste alp, Gym dry
5	16* (0.269)	Pot cra - Mel syl	5	4 toe-slope M1; 1 M2 quadrats	Grazed mature meadow	Des fle, Ant odo, Sel syl, Nar str, Luz arc, Par pal, Vac uli, Car spp, Pol viv
	17* (0.269)	Bet pub - Gym dry	18	M1; low-slope M2	Mature birch woodland	Gym dry, Cor sue, Sor auc, Sol vir, Tri eur, Ger syl, Vac vit
	20* (0.257)	Emp nig - Sal phy	12	Proximal toe-slope M2; low-slope M4	Atypical snowbed	Emp nig, Sal phy, Vac uli, Ste alp, Sal her, Sal gla, Des fle
	21* (0.257)	Vac vit - Cla ran	21	M3; 2 quadrats M4	Lichen heath	Cla ran, Mel syl, Cla por, Cla arb, Cla gra, Luz arc
	26* (0.327)	Phl alp - Lot cor	5	Distal M5	Later pioneer	Lot cor, Oxy dig, Cry cri, Gna sup, Gna nor, Car spp, Ath dis, Gym dry, Des fle
	27* (0.327)	Des alp - Sax ste	12	High-slope M5; low-slope M6	Exposed pioneer	Des alp, Sax ste, Sol vir

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
Note 2: **n** *indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.3)

Table 4.3 TWINSPAN site groups, Storbreen low (1)

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species.
2	2 (0.349)	Bet nan - Cla ran	43	M1; low-slope M2-4	Older heath on low-slope sites	Vac myr, Car spp, Sal her, Fes ovi, Cet isl, Cla gra, Cla por, Jun tri, Cla arb
	3 (0.349)	Sol cro - Cet niv	65	High-slope M2-4; and all M5-6	Younger heath and high-slope sites	Ste alp, Cla chl, Cas hyp, Pso hyp, Poa alp, Luz spi
3	4* (0.357)	Sal gla - Ant odo	15	Low-slope M2; and distal low-slope M3	Late intermediate snowbed	Sol vir, Ran acr, Luz arc, Tof pus, Pel pol, Cla unc
	5 (0.357)	Bet nan - Cet niv	28	M1; mainly proximal low-slope M2,3 & 4.	Heath	Sal her, Vac myr
	6 (0.325)	Sal gla - Sal herb	40	Low-slope M4-5; M6	Early intermediate snowbed	Ste con, Ste bot, Cas hyp, Phy cae, Tri spi, Poa alp, Luz spi, Cla ver, Fes ovi, Ant odo
	7 (0.325)	Cet niv - Cet cuc	25	High-slope M2,3,5; distal M4	Lichen heath	Ale och, Cet isl, Cla por, Ste con, Cla cer, Arc alp, Cor acu
4	10*(0.294)	Fes ovi - Sal her	16	Low-slope, mid-, and shoulder-slope M1	Mature late-snow heath or atypical snowbed	Vac myr, Cet isl, Cla gra, Cla ran, Jun tri, Car spp
	11*(0.294)	Vac uli - Sal lan	12	Crest M1; low- to mid-slope M2-4	Late-snow early int' heath	Vac uli, Sal lan, Sal gla, Ste alp, Tof pus, Cla unc, Bar alp, Pin vul
	12*(0.193)	Emp nig - Ste alp	32	Mainly low-slope M4-5; most M6	Late-snow younger early int' heath	Cla por, Phy cae, Sol cro, Sal lan, Cet isl, Cla chl, Pso hyp, Pin vul, Vac uli, Cla gra, Cas hyp
	13*(0.193)	Sal gla - Sal her	8	Crest, mid- M6; low-slope proximal M5	Exposed early int' snowbed	Ant odo, Car bel, Cer cer, Car pet, Poa alp, Ver alp, Ste con, Des cae
	14*(0.290)	Phy cae - Cla por	14	Shoulder-slope M2, M3; distal M4	Early int' lichen heath	Cla arb, Sol cro, Cet isl, Cla arb, Ste alp, Arc alp, Cet eri, Cla gra
	15*(0.290)	Ale och - Cet cuc	11	Crest M2,3 & 5	Exposed lichen heath	Cla cri, Cor div, Fes ovi

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
Note 2: **n** *indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.4)

Table 4.4 TWINSPAN site groups, Storbreen low (2)

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species
2	2 (0.420)	Cla por - Bet nan	42	M1; distal low-slope M2,3; a few low-slope proximal M2-4	Mature/late intermediate heath	Vac myr, Cla gra, Cet isl, Ste bot, Des fle, Cla ran, Cla arb, Car spp,
	3 (0.420)	Sol cro - Cet niv	70	High-slope + proximal M2-3 and all M4-6	Early intermediate lichen heath	Cla chl, Cas hyp, Cla ver, Cla pix, Ale och
3	4* (0.464)	Sal her - Ran acr	11	Distal M2; 2 proximal toe-slope M1 & M4	Late intermediate snowbed	Sal gla, Sol vir, Car spp, Ant odo, Rum ace, Gna nor, Tri eur
	5 (0.464)	Ste alp - Cla por	31	M1; low-slope M2-4	Late-snow late intermediate heath	Cet isl, Emp nig, Bet nan, Cla gra, Ste bot, Des fle, Vac nyr, Vac uli, Phy cae
	6 (0.345)	Ste alp - Sal her	50	Low-slope M2 & M4-M6	Late-snow early intermediate heath	Phy cae, Sol cro, Cet isl, Cla por, Cas hyp, Cla ver, Cla cet, Cla pix, Poa alp
	7* (0.345)	Cet niv - Ale och	20	Shoulder &/or crest M2-6	Exposed lichen heath	Cet eri, Cor auc, Cet cuc, Ale nig
4	10* (0.322)	Sal gla- Vac uli	13	Low-slope M3; toe-slope M1, M2+4	Late-snow late intermediate heath	Phy cae, Sal her, Bar alp, Pol viv, Ped lap
	11* (0.322)	Cla arb - Cet eri	18	M1 + 2 sites low-slope M3	Mature lichen heath	Ste bot, Emp nig, Bet nan, Vac myr, Cla gra, Cla ste, Cla unc, Cla ran, Cla por
	12* (0.210)	Cas hyp - Sal her	28	Low-slope M4-6 & proximal toe-slope M2	Early intermediate snowbed	Phy cae, Sal phy, Poa alp
	13* (0.210)	Cla chl - Cet niv	22	High-slope M4-6 & proximal M2	Exposed early intermediate lichen heath	Sol cro, Cla cer, Cet eri, Cet cuc, Pso hyp, Car pet, Cer alp.

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
Note 2: **n** *indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.5)

Table 4.5 TWINSPAN site groups, Svellnosbreen.

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species.
2	2 (0.433)	Emp nig - Ste alp	104	All moraines excluding low-slope proximal M6	Early intermediate and mature heath	Phy cae, Cla por, Sal phy, Cet eri, Cet niv, Cla chl
	3* (0.433)	Des alp - Oxy dig	6	Low-slope proximal M6	Pioneer exposed snowbed	Oxy dig, Car pet, Cer cer
3	4 (0.427)	Sal her - Cet isl	21	M1, low-slope distal M2; 2 low-slope distal quadrats M6	Snowbed	Fes ovi, Ant odo, Cla gra, Fes ovi, Gna nor, Bar alp, Vac myr, Sib pro
	5 (0.427)	Cet niv - Sal phy	83	Most M2 - M5; part of M6	Heath	Cet niv, Sal phy, Cla chl, Cla fim, Cet cuc
4	8* (0.449)	Sal gla - Cer cer	2	2 low-slope distal quadrats M6	Pioneer snowbed	Sal gla, Cer cer, Ant odo, Tri spi, Sax ste, Car pet, Cla bel, Cer alp, Oxy dig
	9* (0.449)	Sal her - Emp nig	19	Most M1; low-slope distal M2	Atypical snowbed	Emp nig, Fes ovi, Ste alp, Cla gra, Cla por, Cet isl, Sol cro
	10 (0.437)	Sal gla - Sal phy	51	Low-slope M2-4; all M5; mid-, shoulder- + 2 toe-slope M6	Early intermediate snowbed + pioneer	Sal phy, Bar alp, Car pet, Ste bot, Luz spi
	11 (0.437)	Cet niv - Cet eri	32	Higher M1-4	Lichen heath	Emp nig, Ale och, Cet cuc, Sol cro, Cla por, Arc uva, Arc alp
5	20* (0.308)	Sal gla - Car pet	18	High, mid- + distal proximal toe-slope M5; high-slope M6	Exposed pioneer	Car pet, Cer cer, Tri spi, Des alp, Luz spi, Poa alp, Ant odo
	21* (0.308)	Emp nig - Ste alp	33	Low-slope M1-3 +mostly low-slope M5	Late-snow early intermediate heath or atypical snowbed	Cla por, Phy cae, Cla chl, Sax opp, Sol cro, Bar alp, Vac uli, Cla ver, Cla pyx, Pin vul
	22* (0.298)	Cla por - Phy cae	15	Low-,mid-,shoulder-slope M2-4	Early intermediate heath	Ste alp, Bet pub, Sol cro, Sal lan, Sal gla, Cla chl, Cla gra
	23* (0.298)	Ale och - Cet cuc	17	High-slope M3-4; high-slope proximal M2; crest proximal M1	Lichen heath	Cet niv, Tha ver, Cor acu, Cet eri, Vac vit, Ste con, Cor div, Ale nig.

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
Note 2: **n** *indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.6)

Table 4.6 TWINSPAN site groups, Storbreen high.

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species.
2	2 (0.471)	Phy cae - Sol cro	99	M1-6 (some high-slope)	Heath	Cet niv, Ale och, Cet isl, Emp nig, Cas hyp, Cla gra, Cla arb
	3 (0.471)	Sal gla - Oxy dig	51	M7,8; low-slope distal M2; distal toe-slope M5; low M6	Pioneer + snowbed	Sal gla, Oxy dig, Poa alp, Cer cer, Sag sag, Tri spi, Des alp, Fes ovi,
3	4 (0.391)	Cet niv - Ale och	32	High-slope M1-6	Lichen heath	Tha ver, Cor div, Ale nig
	5 (0.391)	Sal her - Ste alp	67	Low-slope M1-6	Late-snow heath	Ste alp, Cas hyp, Sal gla, Cla gra, Cet isl, Tri spi, Cla unc, Cla por
	6* (0.489)	Sal gla - Sal her	15	Low-slope distal M2; low-slope M6; 1 distal quadrat M7	Early intermediate snowbed	Sal her, Oxy dig, Sal lan, Cer cer, Ant odo
	7 (0.489)	Poa alp - Des alp	36	M7-8; distal toe-slope M5; 1 distal M2	Pioneer	Poa alp, Des alp, Ara alp, Sag sag, Sol cro
4	8* (0.421)	Bet nan - Vac vit	5	High-slope sites M1	Mature lichen heath	Vac vit, Cet eri, Ste alp, Cla por, Cet eri, Cet isl, Ste pas, Car spp, Sal her, Tha ver, Cla gra
	9* (0.421)	Phy cae - Sol cro	27	High-slope sites M2-6	Early intermediate lichen heath	Phy cae, Sol cro, Sal gla, Cla chl, Ste con
	10* (0.291)	Sal gla - Cet niv	43	Low-slope M3-5	Early intermediate late-snow heath	Phy cae, Ste alp, Ste bot
	11* (0.291)	Sal her - Cet isl	24	Low-slope M1,2; a few low-slope M3-M5	Mature late-snow heath	Cla gra, Cla por, Cla unc, Jun tri, Cla squ
	14* (0.451)	Ste alp - Fes ovi	19	M7; high-slope M8; 1 distal quadrat M2	Exposed pioneer	Ste bot, Ara alp, Sag sag, Tri spi, Sol cro
	15* (0.451)	Oxy dig - Des alp	17	Low-slope M8; 1 distal toe-slope quadrat M7 & M5	Pioneer snowbed	Des alp, Poa alp, Cer cer

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
Note 2: **n** *indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.7)

Table 4.7 TWINSPAN site groups, Høgvaglbreen.

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species
2	2 (0.367)	Sal her - Cet eri	76	M1-4; distal low-slope M5	Heath	Ste alp, Cet niv, Cor div, Cla gra, Tha ver
	3 (0.367)	Oxy dig - Poa alp	24	M5,6 excluding distal low-slope M5	Pioneer	Poa alp
3	4* (0.374)	Tha ver - Ale och	14	High-slope M1; M3	Dry lichen heath	Cet niv, Vac uli, Vac vit, Cor div, Cla por, Cet cuc
	5 (0.374)	Cet eri - Ste alp	62	Low-slope M1; M3; M2,4; distal low-slope M5	Late-snow lichen heath	Cet eri, Ste alp, Cla chl, Sph fra, Cas hyp
	6* (0.440)	Sol cro - Oxy dig	18	Low-slope M5; toe-slope or distal M6	Pioneer snowbed	Ste alp, Sal her, Tri spi, Poa alp
	7* (0.440)	Sal gla - Cet niv	6	Crest M5; crest + proximal M6	Exposed pioneer	Cet niv
4	10 (0.247)	Cet niv - Cas hyp	47	Most M2, M4; low-slope M3	Early intermediate late-snow heath	Cet niv, Cas hyp, Cor div, Cor acu, Cet cuc
	11* (0.247)	Cla gra - Sal her	15	Low-slope M1; 1 low-slope quadrat M3; 3 distal quadrats M4	Mature/late intermediate snowbed	Cla squ, Fes ovi, Sph fra, Cla por, Cla arb, Cla chl, Car spp, Jun tri
5	20* (0.238)	Cor acu - Cet niv	13	High-slope M2-4	Early intermediate lichen heath	Sol cro, Cor div, Cla arb, Phl alp, Tha ver, Ale nig, Ale och
	21* (0.238)	Cas hyp - Cla chl	34	Low-slope M2-4; distal toe-slope M5	Early intermediate snowbed	Cla chl, Sph fra, Cla gra, Cla fim, Ste bot, Sal her

*Note 1: * indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
*Note 2: **n** indicates the number of quadrats within each site group Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.8)

Table 4.8 TWINSPAN site groups, Bøverbreen.

Level	Group (and eigenvalue)	Assemblage name (primary indicators)	n	Location	Assemblage description	Non-primary indicators (underlined) and important preferential species
2	2 (0.508)	Cla chl - Sal her	70	Mainly M1-4; 1 proximal shoulder-slope M5	Heath	Ste con, Cla gra, Cet niv,Cet eri, Cla arb, Cla por, Cet isl, Cla unc, Ste alp
	3 (0.508)	Oxy dig - Poa alp	42	Mainly M5-6; 1 proximal toe-slope M4 & M5	Pioneer	Cer cer, Des alp
3	4* (0.334)	Ale och - Cor acu	12	Crest + shoulder-slope M1-3	Exposed lichen heath	Cet niv, Cor div, Tha ver, Ale nig, Cet cuc
	5 (0.334)	Ste alp - Cla gra	58	Low-slope M1-3; all M4	Late-snow lichen heath	Ste alp, Cla gra, Cet eri, Sol cro, Cla por, Cla chl, Sph fra, Cet isl
	6* (0.268)	Cer alp - Cer alp	18	High-slope M5; proximal M6	Exposed pioneer	Ste alp, Sal her, Cer alp
	7* (0.268)	Oxy dig - Poa alp	24	Low-slope M5; distal & crest M6	Pioneer snowbed	Des alp, Cer cer, Tri spi
4	10* (0.235)	Cet isl - Cet eri	30	M1; mid-, shoulder-slope M2; low-slope distal M3	Mature/late intermediate lichen heath	Cla arb, Cla gra, Cet niv, Cla por, Cla chl, Sol cro, Cla unc
	11* (0.235)	Tri spi - Gna sup	28	Mainly low-slope proximal M2 & M3; all M4	Snowbed	Tri spi, Gna sup, Poa alp, Phy cae, Ste alp

Note 1: * *indicates a "final group" - not further divided at higher levels and displayed in the "final site group" summary table (Table 4.9).*
Note 2: **n** *indicates the number of quadrats within each site group* *Note 3: see Appendix 1 for species abbreviations*
Note 4: The coloured boxes represent the colours used for each site group on the profile diagram (Fig 4.9)

Table 4.9 Summary table of individual foreland data set TWINSPAN "final site groups"

Age and position	AUSF	FASF	STLF1	STLF2	SVLF	STHF	HOHF	BOHF
Mature (mainly M1 - M2) Higher positions→	13. Des fle-Vac myr. Birch heath Mid-high M1	17. Bet pub-Gym dry Birch woodland M1 + low M2		11. Cla arb-Cet eri Lichen heath M1+2 mid M3		8. Bet nan-Vac vit Lichen heath High M1	4. Tha ver-Ale och Lichen heath High M1 and M3	4. Ale och-Cor acu Lichen heath High M1-3
Low-slope positions→	7. Ath dis-Pot cra Herb-rich sward Low M1	16. Pot cra-Mel syl Grazed meadow Toe M1, M2	10. Fes ovi-Sal her Late-snow heath M1	10. Sal gla-Vac uli Late-snow heath Low M1-4	9. Sal her-Emp nig Atyp' snowbed M1, low M2	11. Sal her-Cet isl Late-snow heath Low M1-2, (M3-5)	11. Cla gra-Sal her Snowbed Low M1,M3, M4	10. Cet isl-Cet eri Heath LowM1-3,
Late intermediate High-slope positions→	25. Vac myr-Vac uli Heath High M2	9. Phy cae-Emp nig Birch heath High M2	14. Phy cae-Cla por Lichen heath High M2-3,dis M4		23. Ale och-Cet cuc Lichen heath High M1-4			
Low-slope positions→	24. Des alp-Phy cae Snowbed Low M2		4. Sal gla-Ant odo Snowbed Low M2-M3	4. Sal her-Ran acr Snowbed Dis' M2, Low M1,4	21. Emp nig-Ste alp Late-snow heath Low M1-3, M5			
Early intermediate High-slope positions→	47. Sol cro Exp' lichen heath High M3-6	11. Cla chl-Cla fim Lichen heath Crest M4	15. Ale och-Cet cuc Lichen heath Crest M2,3,5	7. Cet niv-Ale och Lichen heath High M2-6		9. Phy cae-Sol cro Lichen heath High M2-6	20. Cor acu-Cet niv Lichen heath High M2-4	
Mixed positions→	46. Emp nig-Bet pub Late-snow lichen heath. Low M3-4	21. Vac vit-Cla ran Lichen heath M3 ,M4	11. Vac uli-Sal lan Late-snow heath Low M2-4; Crest M1		22. Cla por-Phy cae Heath M2-4	10. Sal gla-Cet niv Late-snow heath Low M3-5		
Low-slope positions→	22. Vac myr-Bet pub Late-snow heath Low M4-7.	20. Emp nig-Sal phy Atypical snowbed Toe M2, low M4				6. Sal gla-Sal her Snowbed Low M2, M6, M7	21. Cas hyp-Cla chl Snowbed Low M2-4, M5	11. Tri spi-Gna sup Snowbed Low M2-3, all M4
Pioneer (Youngest ages) Exposed positions→	8 Ste alp-Ste ves Exposed pioneer Crest M7	27. Des alp-Sax ste Exposed pioneer High M5, Low M6	13. Sal gla-Sal her Exposed snowbed Low M5, crest M6	13. Cla chl-Cet niv Exposed lichen heath High M4-6, prx M2	20. Sal gla-Car pet Exposed pioneer High M5-6	14. Ste alp-Fes ovi Exposed pioneer M7, high M8	7. Sal gla-Cet niv Exposed pioneer Crest M5, prx M6	6. Cer alp Exposed pioneer High M5, prx M6
Low-slope positions→	10. Sal phy-Sal her Snowbed Distal low M7	12. Lot cor-Sal phy Snowbed Low M5	12. Emp nig-Ste alp Late-snow heath Low M4,5, all M6	12. Cas hyp-Sal her Snowbed Low M4-6, M2	8. Sal gla-Cer cer Snowbed Low M6	15. Oxy dig-Des alp Snowbed Low M8	6. Sol cro-Oxy dig Snowbed Low M5, M6	7. Oxy dig-Poa alp Snowbed Low M5, crest M6
Proximal positions →	9. Car spp-Phl alp Exposed snowbed M7	7. Des fle-Epi als Exposed snowbed Crest + prx M6	*Note STLF1 M5-6 are not early pioneers	*Note STLF2 M5-6 are not earlypioneer	3. Des alp-Oxy dig Exp' snowbed Low proximal M6			
Distal position →		26. Phl alp-Lot cor Pioneer Distal M5						

Key: Level 2 group; Level 3 group; Level 4 groups ; Level 5 group; Level 6 group.

Note 1: see section 4.2.9 for a discussion of the trends shown in this table.

Note 2: see Appendix 1 for species abbreviations and Appendix 2 for foreland abbreviations. Other abbreviations in summary table include: dis' - distal slope; prx - proximal slope.

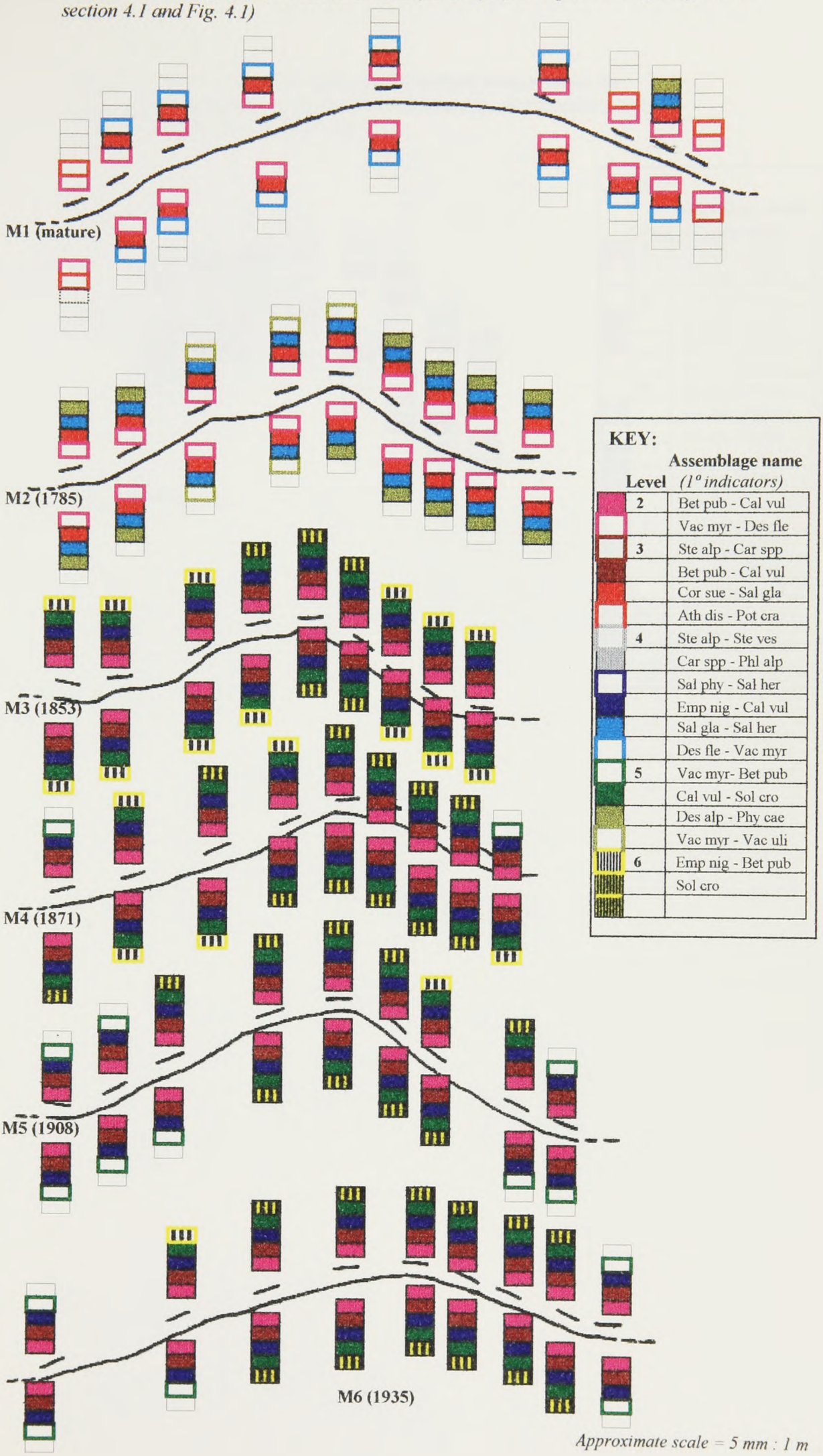
Table 4.10 Summary table of individual foreland TWINSPAN "final species groups" *(for further details of position colour coded key see also section 4.3)*

Austerdalsbreen	Fåbergstølsbreen	Storbreen low 1	Storbreen low 2	Svellnosbreen	Storbreen high	Høgvaglbreen	Bøverbreen
31.Mature heath (.149), M1 (+ M2)	20. Mature heath (0.108), M1-2 (+ M3-4)	8. Mature heath (0.324), M1 (+ M2-6)	14 Mature lichen heath (.253), M1 (+ low M3)	24. Mature late snow heath (0.093), low M1-2 (+ M3-5)	18. Late snow late intermediate heath (0.129), low M1-5	36. Mature heath (0.142), M1 (+ low M2-4)	19. Mature late snow lichen heath (0.105), M1 (+ M2-3)
30. Late intermediate heath (0.149), M2 (+M1)	21 Mature woodland (0.108), 1 (+l 2)	9. Late intermediate snowbed (0.324), Lw M1-3(+1-5)	30. Late int' snowbed (.205), lw M1-2 (+3-4)	25. Mature snowbed (0.093), low M1-2 (+ low 3-5)	38. Late snow early intermediate heath (0.126), low M1-5	39. Mature snowbed (0.078), low M1 (+ low M2-4)	17 Mature late-snow lichen heath (0.178), M1(+dis3)
14. Late intermediate snowbed (0.230), lw M1-2 (+M3-4)	11. Heath (0.224), M1-2 & 5-6	10. Mature late-snow heath (0.310), M1 (+2-4)	31. Late snow late intermediate heath (0.205), low prx M2-3	43. Lichen heath (0.054), crest M1-4	39. Late-snow early intermediate heath (0.126), low M1-4 (+5-6)	38. Early intermediate snowbed (0.159), low M2 (+low M3-4)	36. Early int' snowbed (0.159), low M2-4
6.Widespread snowbed (0.260), M2-7	12. Heath (0.224), M1-2 & 5-6	11. Early intermediate heath (0.310), M1-4 (+high 5-6)	6. Early intermediate snowbed (0.373), low M2-6	13. Widespread snowbed (0.182), low M1-5	16. Widespread heath (0.205), M1-5	37. Late-snow heath (0.142), low M1-4	37. Heath (0.159), M1-4
5. Widespread heath (0.292), M2-6	19.Widespread heath (0.161), 1-4 (+5-6)	12. Widespread snowbed (0.321), low M1-6	11. Widespread heath (0.430), M1-6	11. Early intermediate heath (0.157), M1-5	17. Lichen heath (0.205), crest 1-6	8. Lichen heath (0.275), crest (1-3)	16. Exposed lichen heath (0.178), Top 1-3
9 Early intermediate heath (0.175), M3-6	37. Early intermediate lichen heath (0.076), M3-4	13. Widespread heath (0.321), M1-6	19.Early intermediate snowbed (0.210), low M2-6	42. Early intermediate heath (0.054), mid M2-4 (+1-5)	5. Widespread heath (0.352), M1-6 (+7-8)	5. Widespread heath (0.438), M1-5	6. Snowbed (0.510), low 1-6
35. Early intermediate heath (0.175), M4-7	36. Early intermediate heath (0.076), M3-4 (+M5-6)	31. Exposed lichen heath (0.253), M2-5	16. Exposed lichen heath (0.218), crest M2-6	84. Late snow early intermediate heath (0.070), low M2-5	6. Early intermediate snowbed (0.380), low M 1-7	3. Pioneer (0.503), M5-6	5. Widespread heath (0.274), M1-4 (+5-6)
69. Early intermediate late-snow heath (0.043), M4-7	8. Early intermediate heath (0.194), M3-6	30. Exposed early intermediate snowbed (0.253), M4-6	17 Exposed early intermediate heath (0.218), high M3-6	83. Early int' snowbed (0.070), low M2-4 & M5-6	7. Pioneer (0.380), M 6-8 (+low M1-5)		7. Pioneer (0.510), M 4-6 (+ lw 1-3)
68. Early intermediate heath (0.043), low 3-4 (+3-6)	7. Pioneer snowbed (0.377), M4-6	28. Late snow early intermediate heath (0.299), M4-6 (+M2-3)	18. Early intermediate lichen heath (0.210), high 4-6	40. Early intermediate snowbed (0.085), low M2-4 & M5-6			
8. Pioneer (0.181), M 6-7	26. Pioneer snowbed (0.063), low M5-6	29. Early intermediate snowbed (0.299), M6 (+low M4-5)	10. Exposed early intermediate heath (0.430), high M2; M4-6	4. Pioneer snowbed (0.253), low M2-4; M5-6			
	27. Pioneer (0.063) M5-6			7. Exposed pioneer snowbed, (0.318). M5-6			

NB. Each box has the following information for every "final species group": group no.; group name; eigenvalue; slope position (high, mid or low) and moraine (M1-M8) (locations in brackets comprise lower covers); position colour code.

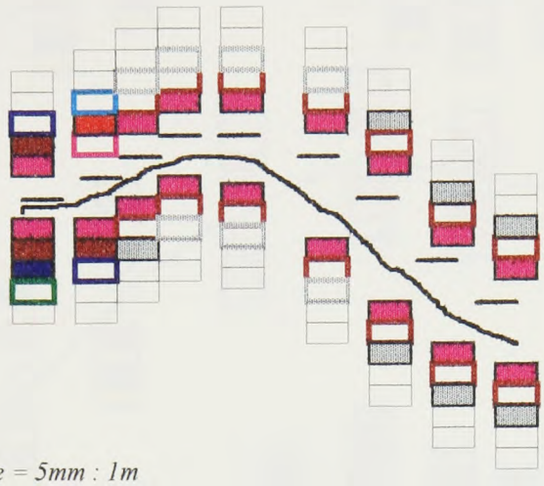
Position Colour Code Key:			
	Low-slope positions mainly on older ground		Any position on early intermediate and young terrain
	Low-slope positions mainly on early intermediate ground		Mainly younger ground
	Low-slope positions		High-slope positions and/or exposed young terrain
	Any positions mainly on older ground		High-slope positions of any age
	Any positions mainly on early intermediate ground		Widespread, any positions

Fig. 4.2 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Austerdalsbreen (sheet 1). *(For explanation of diagram see section 4.1 and Fig. 4.1)*



Approximate scale = 5 mm : 1 m

Fig. 4.2 Profile diagram to display the individual foreland data for TWINSPAN site groups, Austerdalsbreen (sheet 2). *(For explanation of diagram see section 4.1 and Fig. 4.1)*



Approximate scale = 5mm : 1m

KEY:

Level	Assemblage name (1° indicators)
2	Bet pub - Cal vul
	Vac myr - Des fle
3	Ste alp - Car spp
	Bet pub - Cal vul
	Cor sue - Sal gla
	Ath dis - Pot cra
4	Ste alp - Ste ves
	Car spp - Phl alp
	Sal phy - Sal her
	Emp nig - Cal vul
	Sal gla - Sal her
	Des fle - Vac myr
5	Vac myr- Bet pub
	Cal vul - Sol cro
	Des alp - Phy cae
	Vac myr - Vac uli
6	Emp nig - Bet pub
	Sol cro

Fig. 4.3 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Fåbergstølsbreen. *(For explanation of diagram see section 4.1 and Fig. 4.1)*

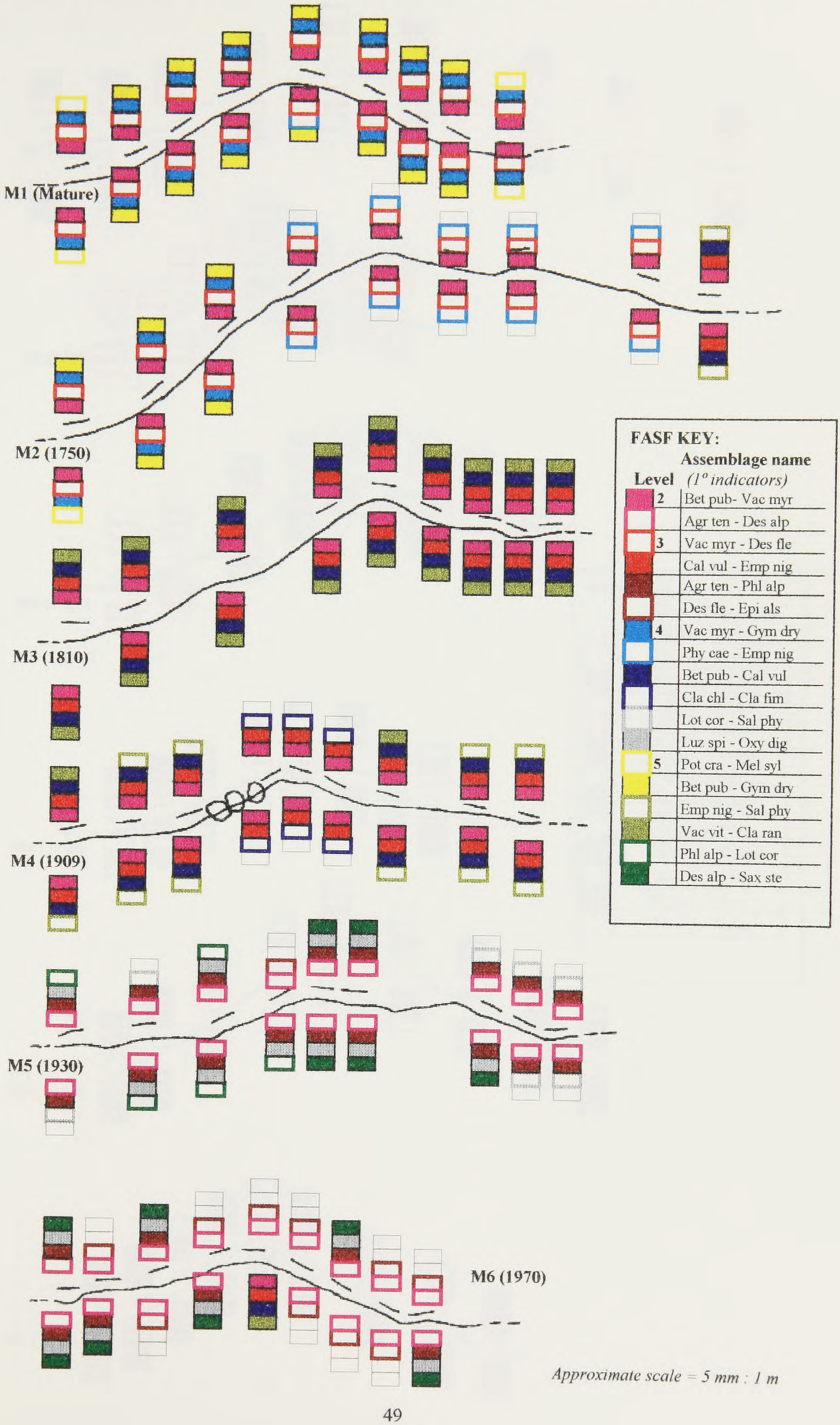


Fig 4.4 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Storbreen low (1). *(For explanation of diagram see section 4.1 and Fig. 4.1)*

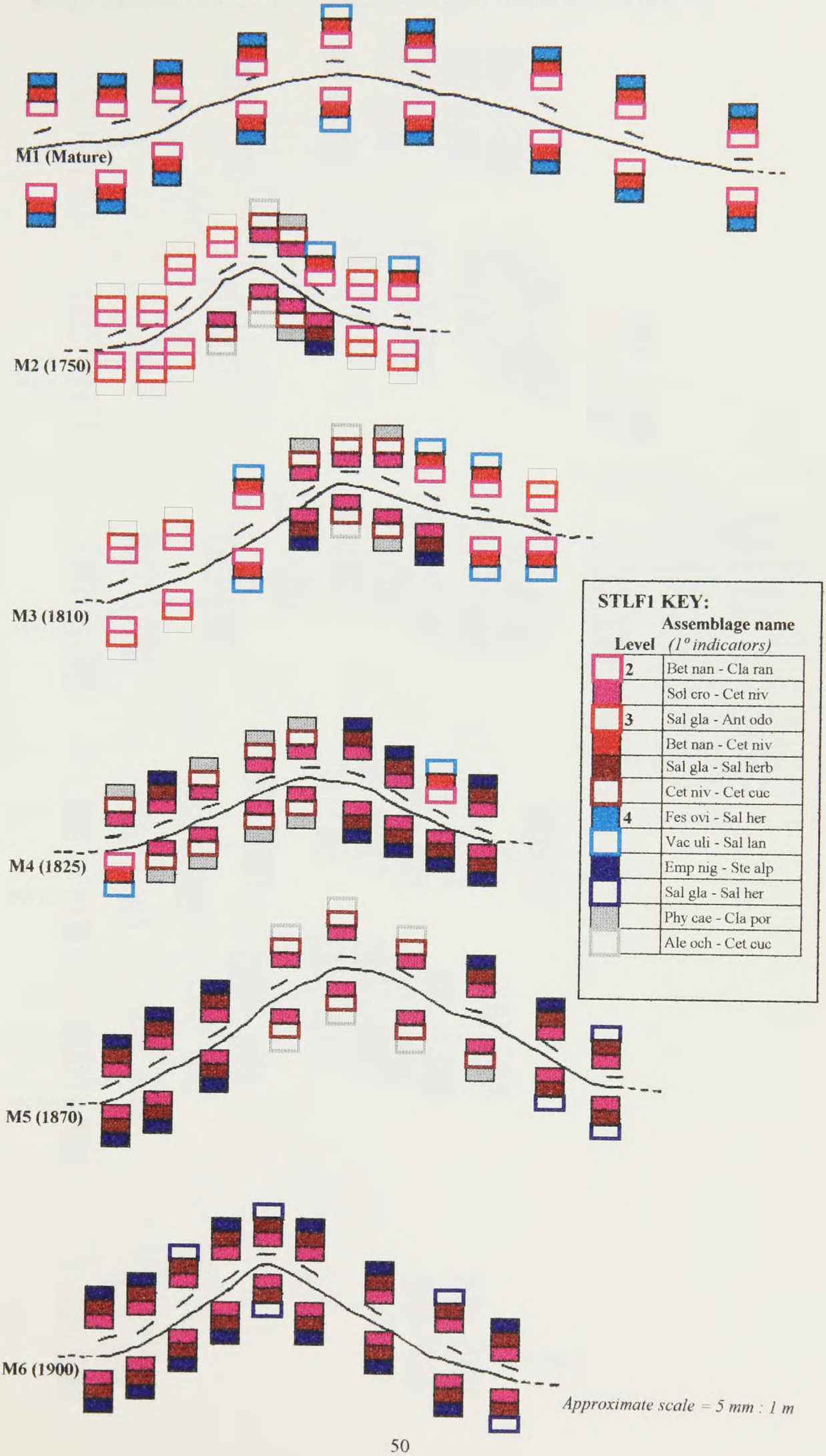
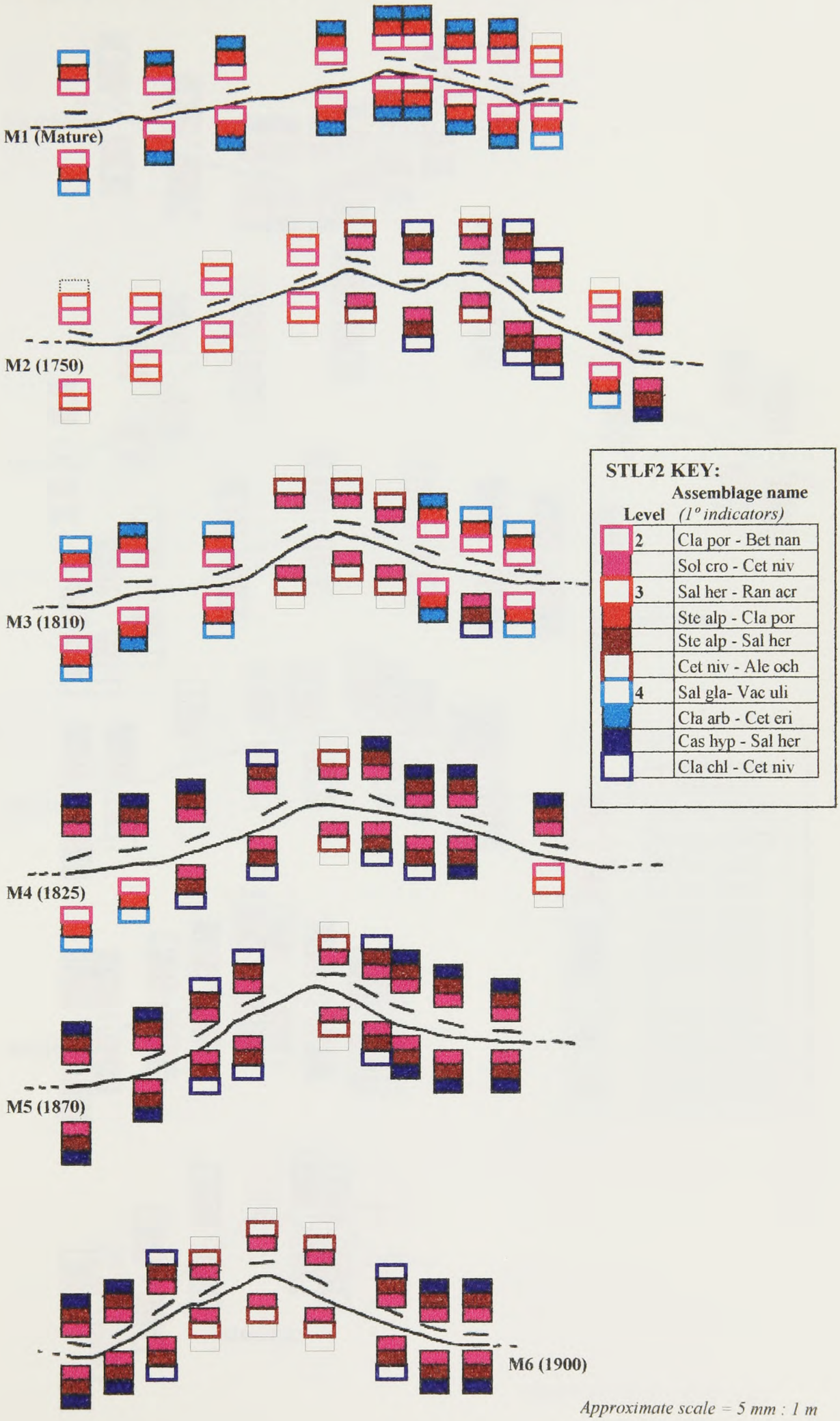


Fig. 4.5 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Storbreen Low (2). *(For explanation of diagram see section 4.1 and Fig. 4.1)*



Approximate scale = 5 mm : 1 m

Fig. 4.6 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups across Svellnosbreen. *(For explanation of diagram see section 4.1 and Fig. 4.1)*

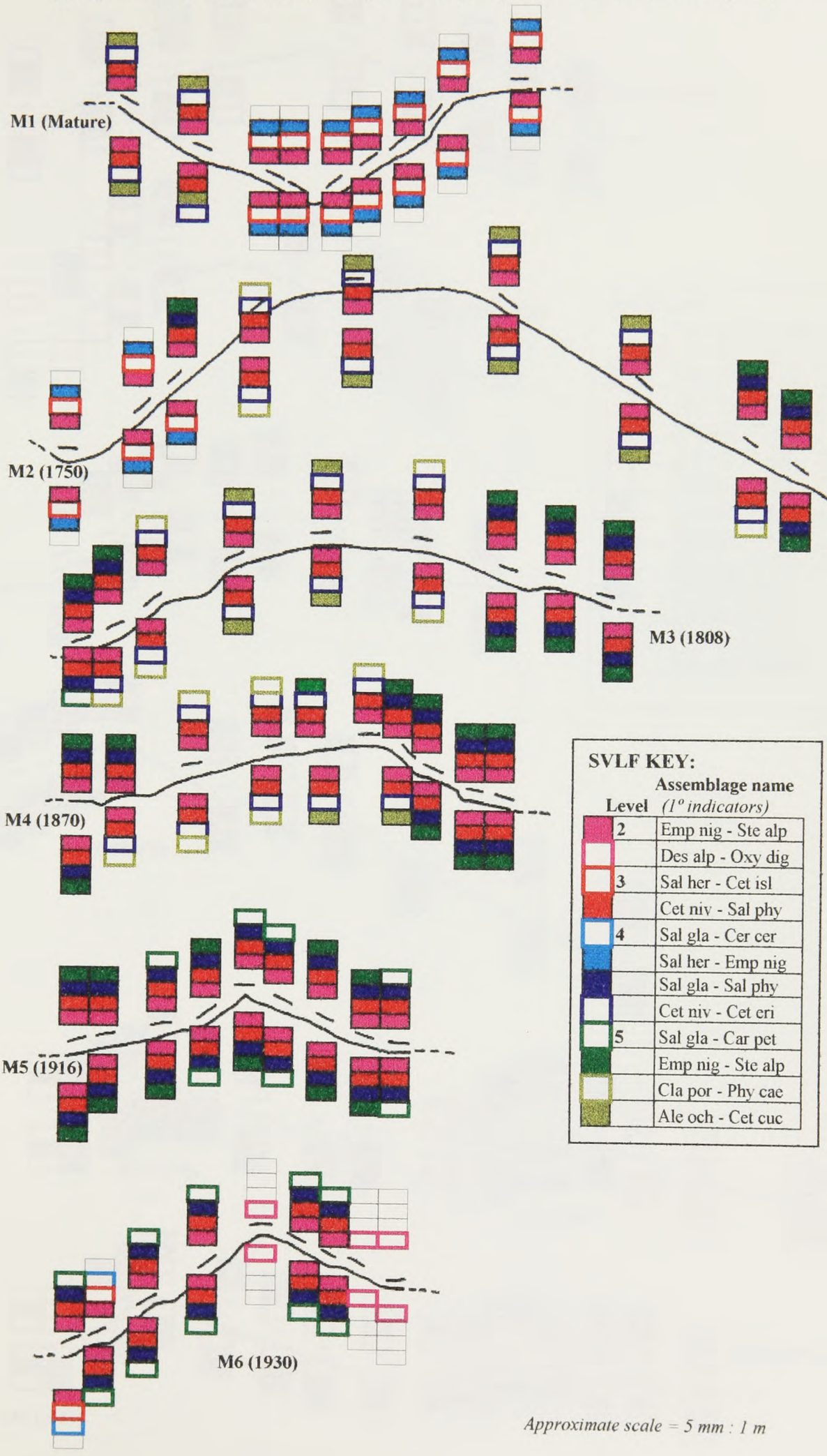


Fig. 4.7 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Storbreen high . *(For explanation of diagram see section 4.1 and Fig. 4.1)*

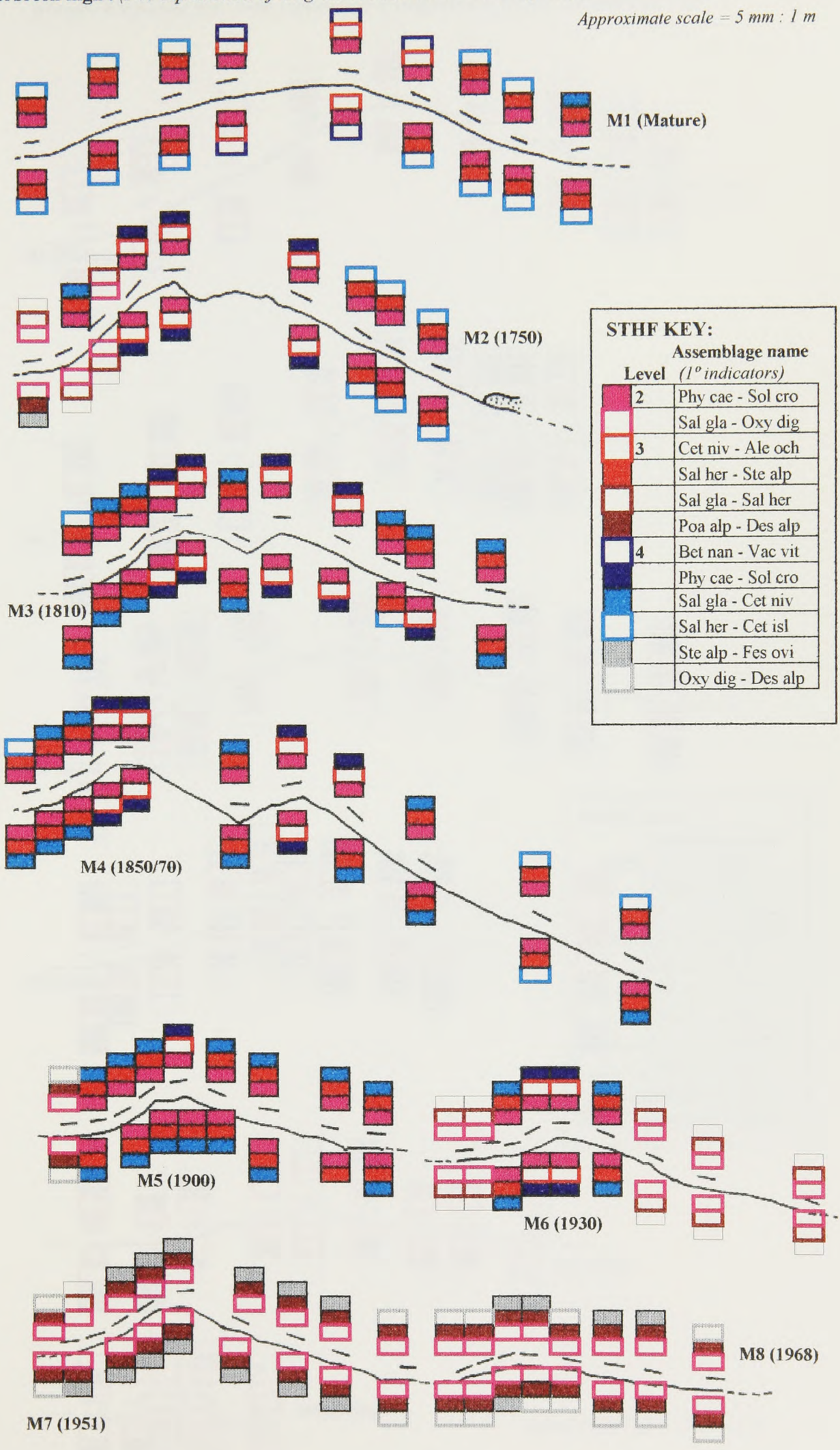


Fig. 4.8 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Høgvaglbreen. *(For explanation of diagram see section 4.1 and Fig. 4.1)*

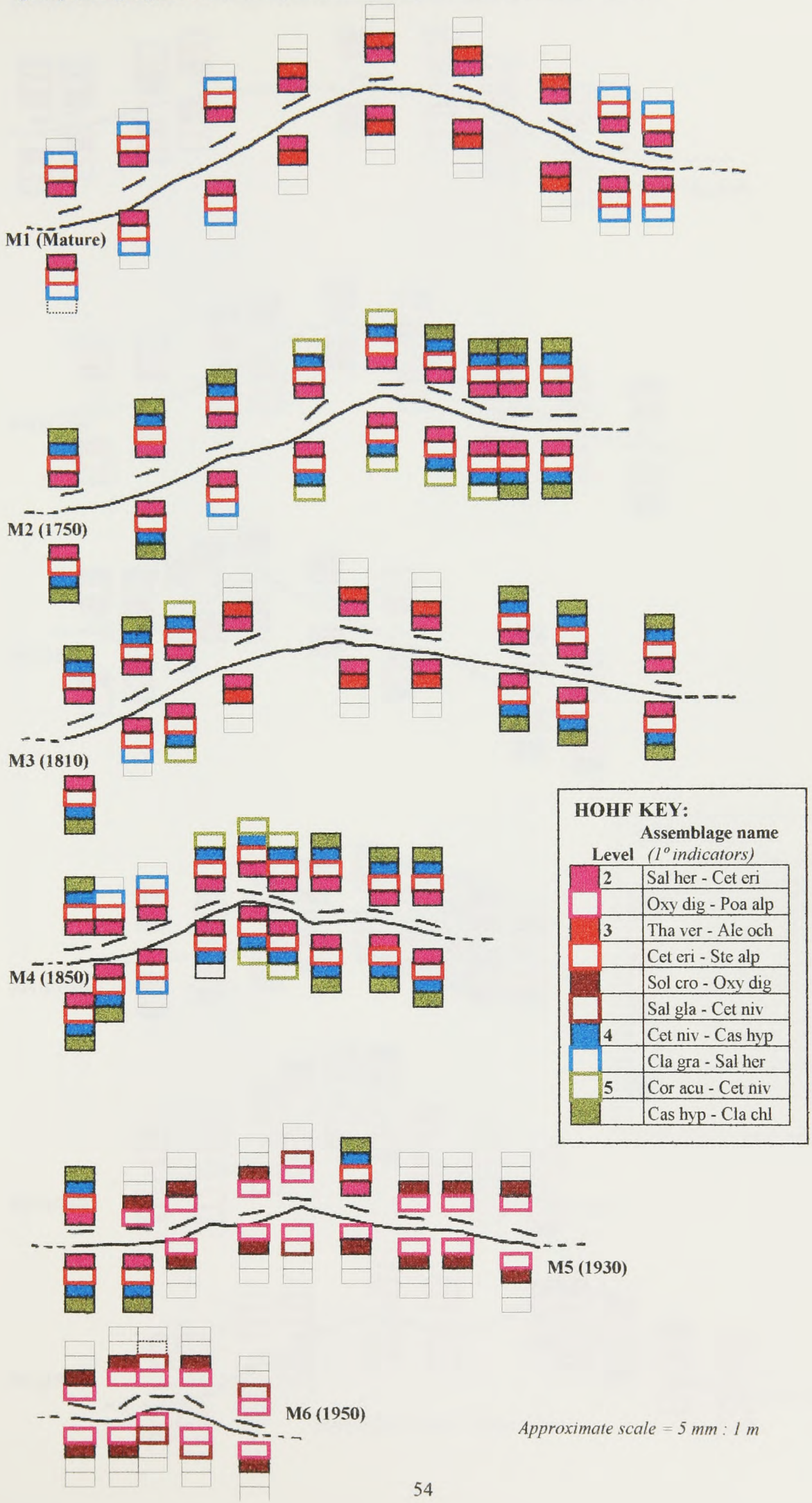


Fig. 4.9 Moraine profile diagram to display the individual foreland data for TWINSPAN site groups, Bøverbreen. *(For explanation of diagram see section 4.1 and Fig. 4.1)*

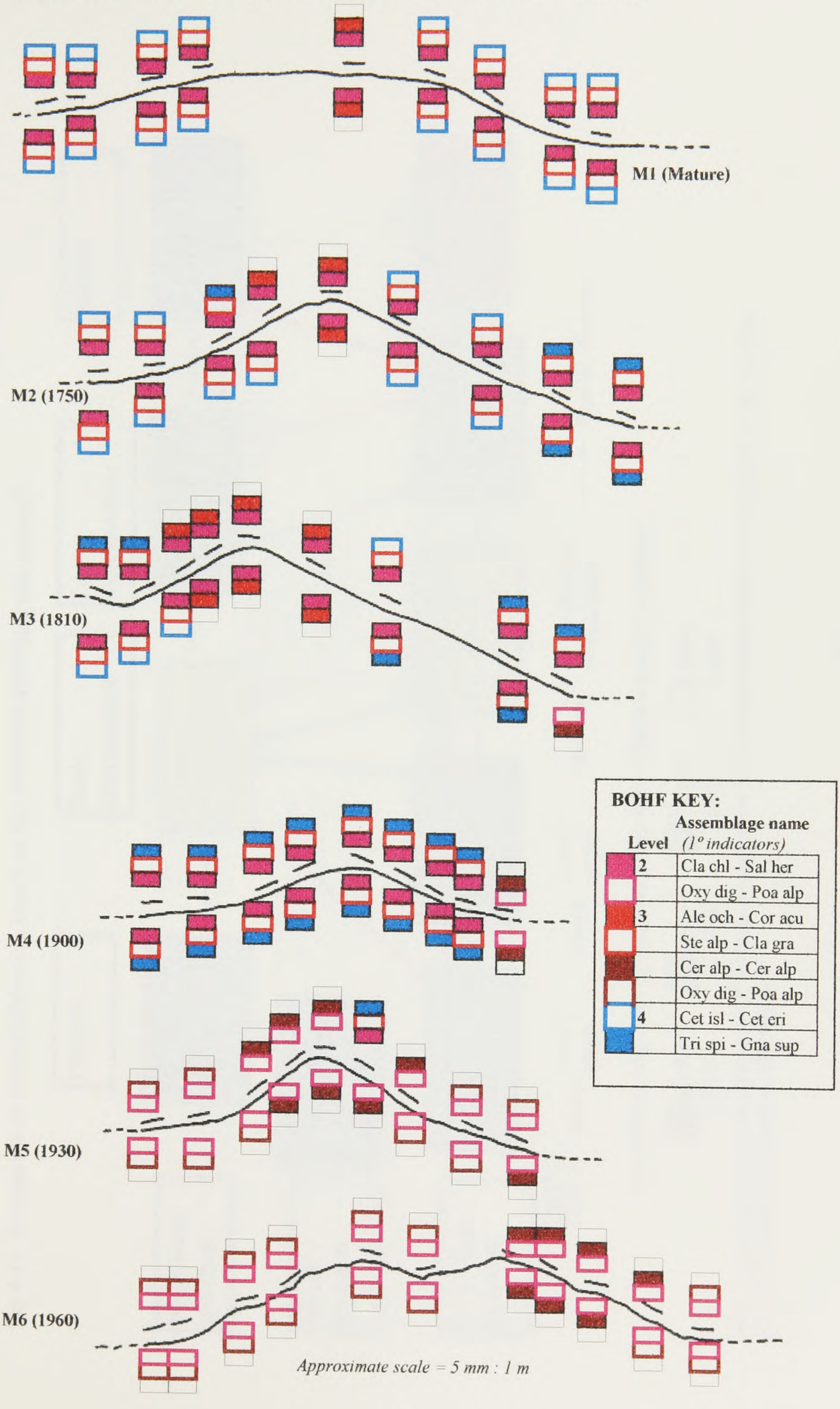
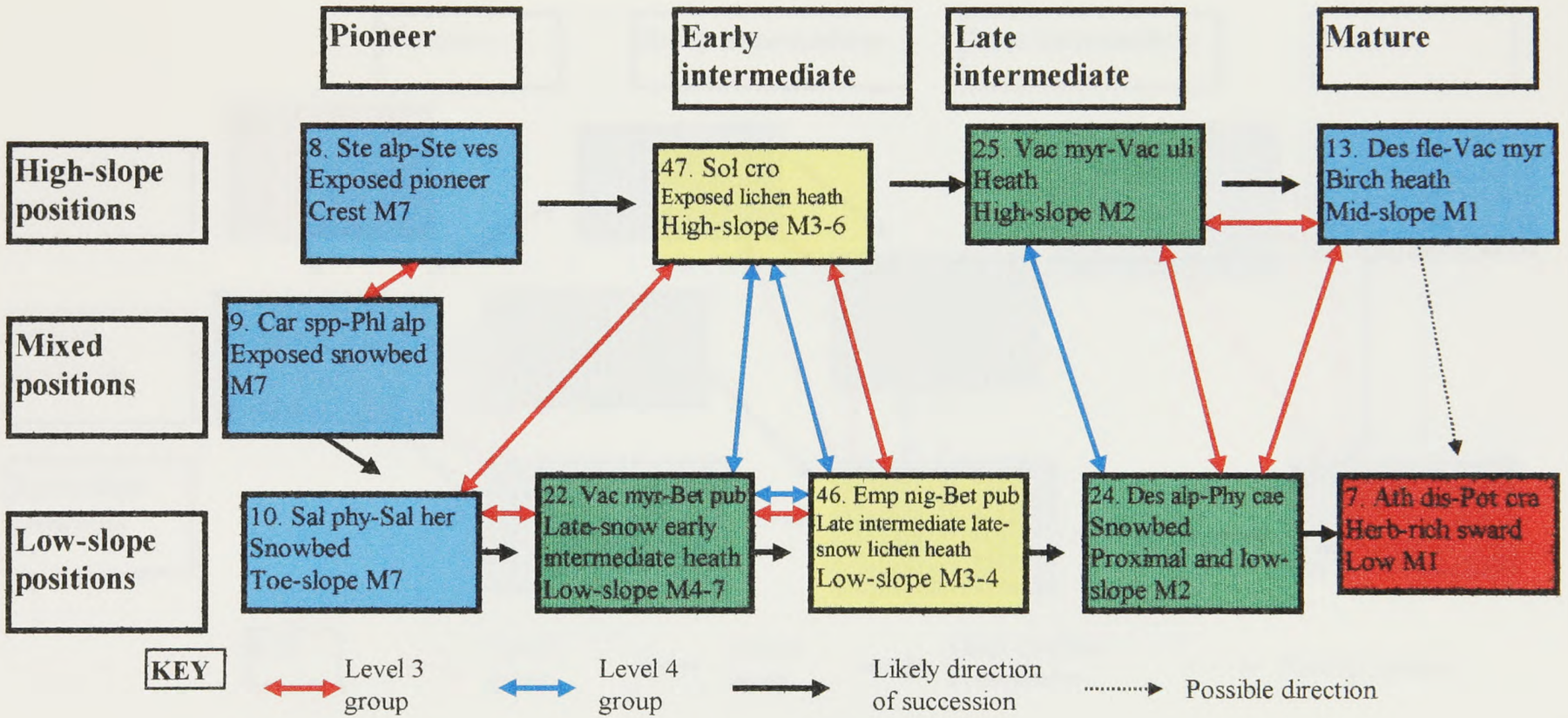


Fig 4.10 Succession at Austerdalsbreen, based on the TWINSPAN "final site groups".

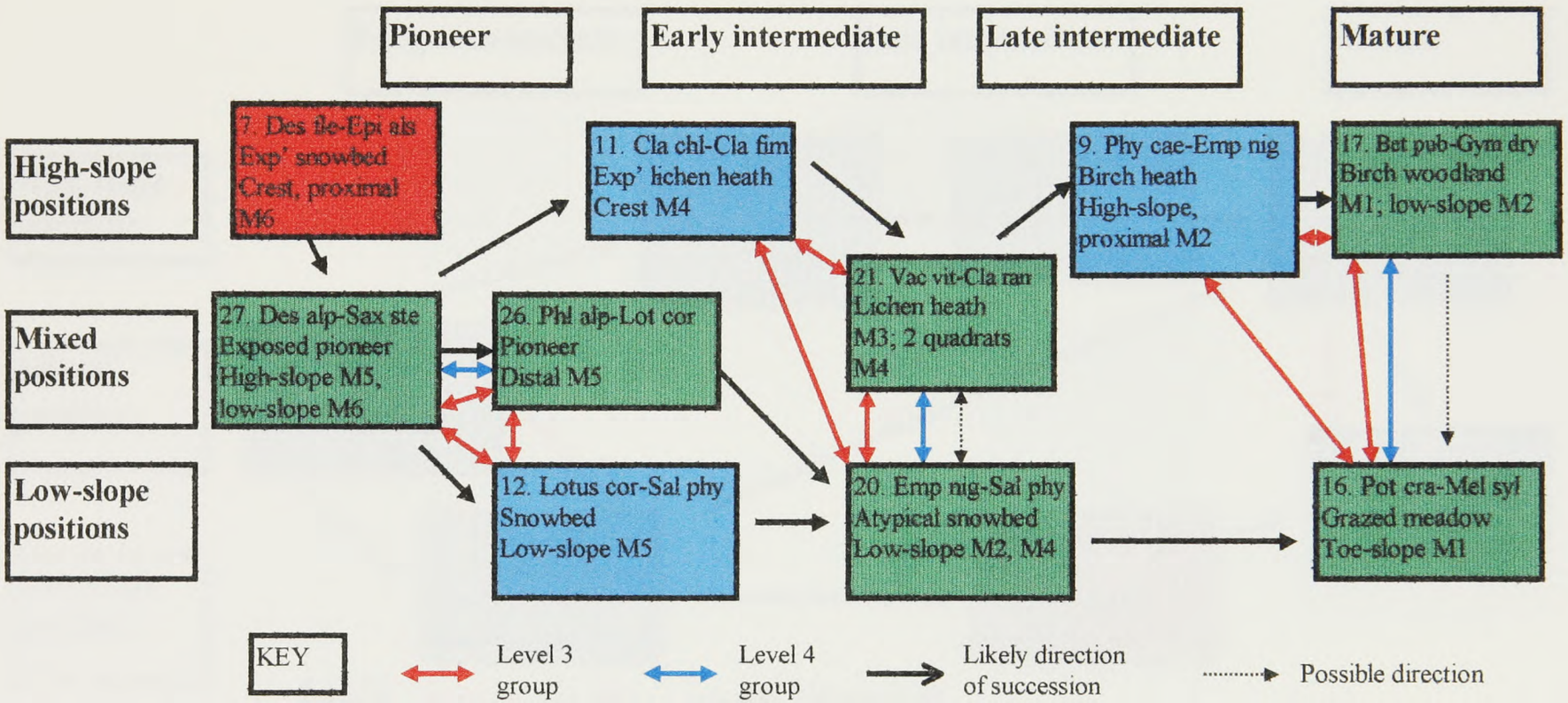


The colours in the boxes represent the levels of the "final site groups", as follows:

Level 3 group | Level 4 group | Level 5 group | Level 6 group

Note 1: See section 4.2 for an explanation of the diagram and section 4.2.1 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.11 Succession at Fåbergstølsbreen, based on the TWINSPAN "final site groups".



The colours in the boxes represent the levels of the "final site groups", as follows:

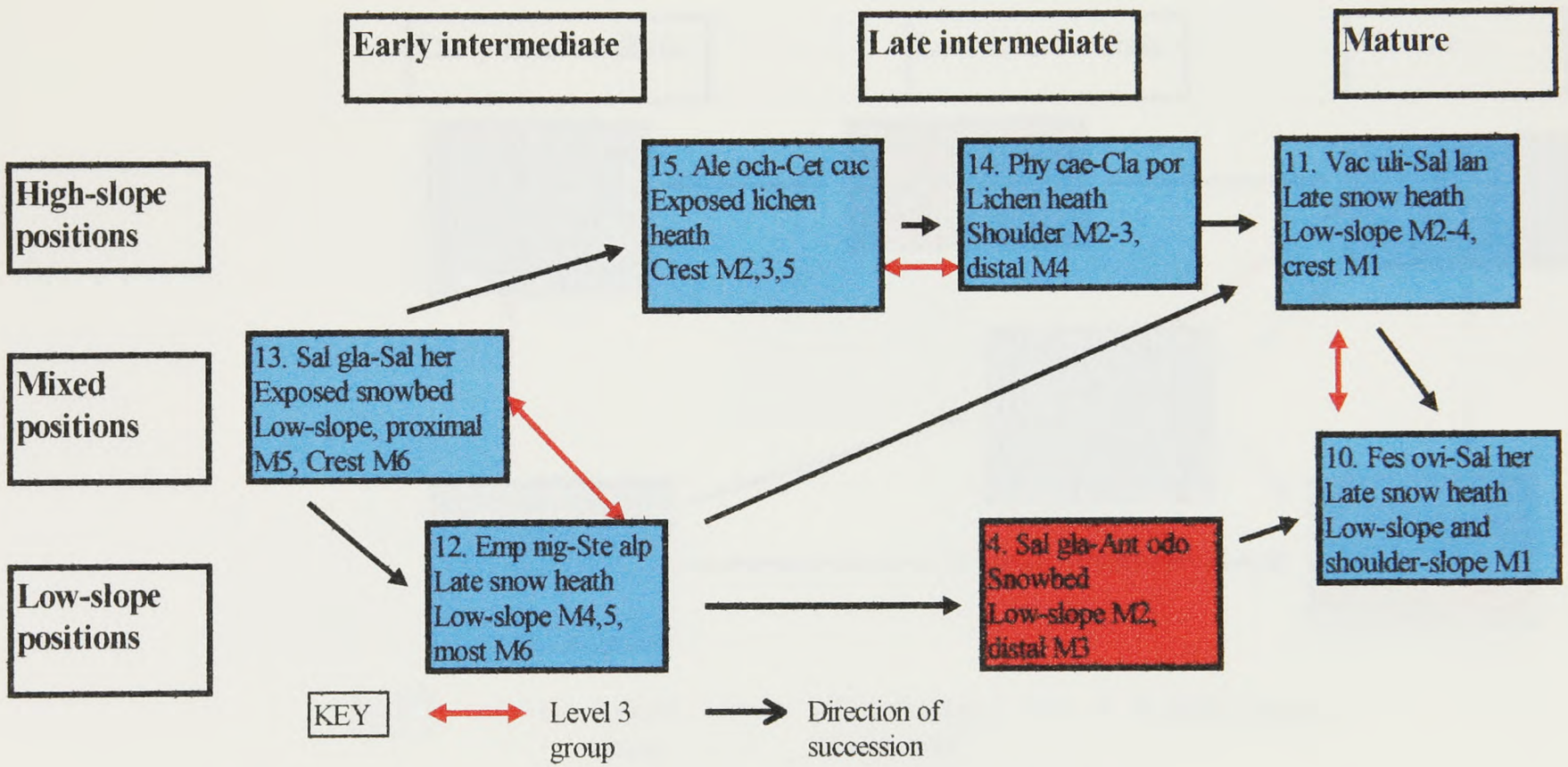
Level 3 group

Level 4 group

Level 5 group

Note 1: See section 4.2 for an explanation of the diagram and section 4.2.2 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.12 Succession at Storbreen low (1), based on the TWINSPAN "final site groups".

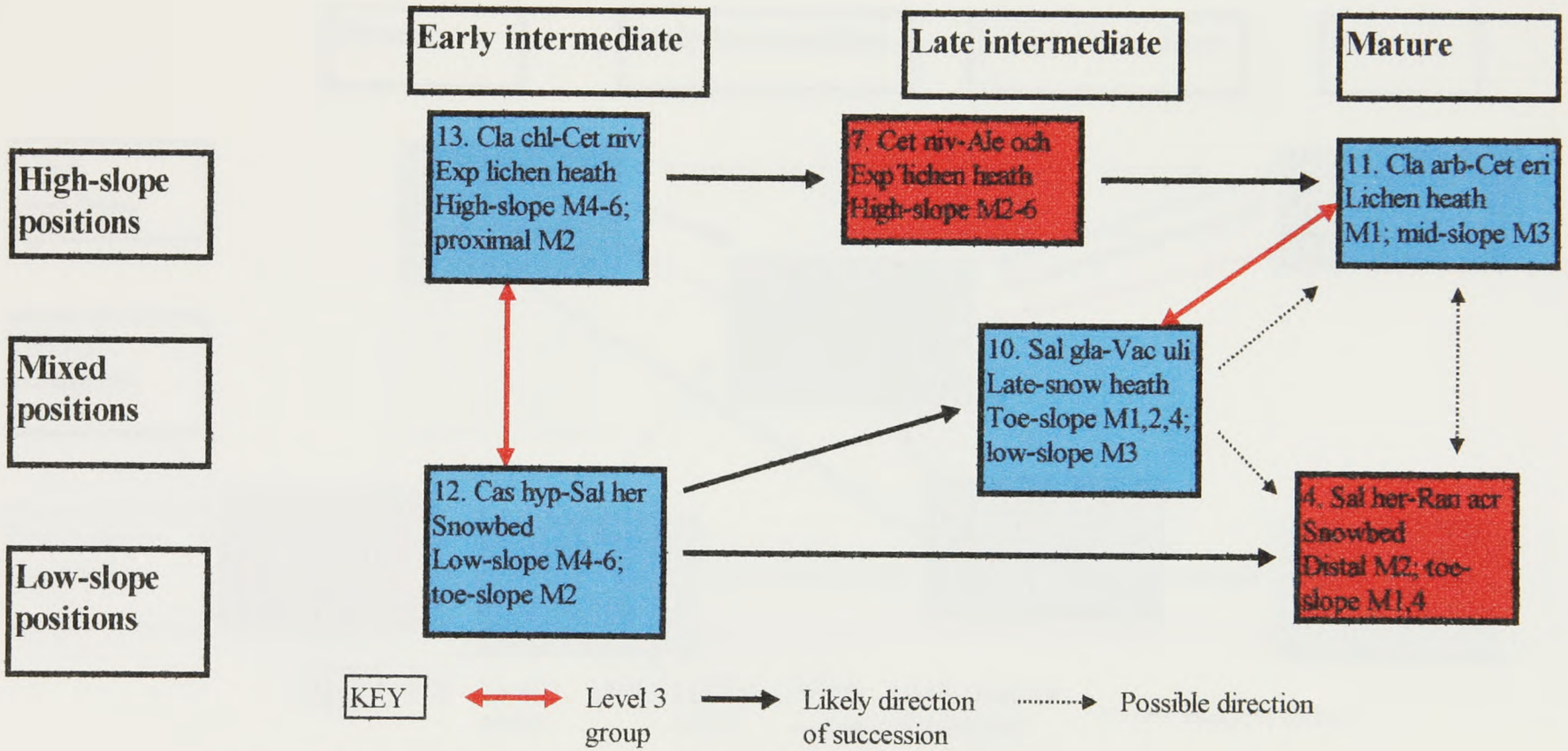


The colours in the boxes represent the levels of the "final site groups", as follows:

Level 3 group Level 4 group

Note 1: See section 4.2 for an explanation of the diagram and section 4.2.3 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.13 Succession at Storbreen low (2), based on the TWINSPAN "final site groups".



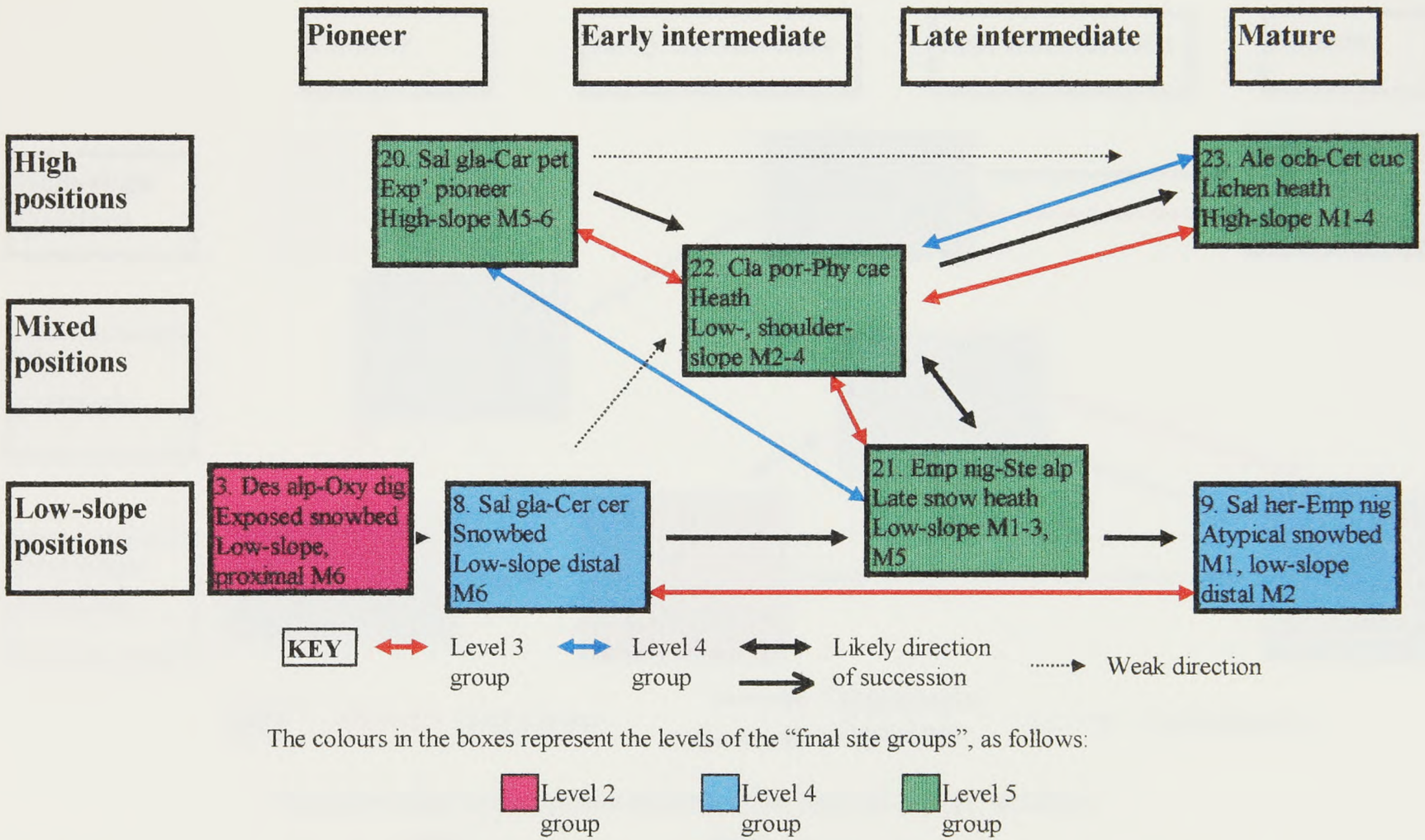
The colours in the boxes represent the levels of the "final site groups", as follows:

Level 3 group

Level 4 group

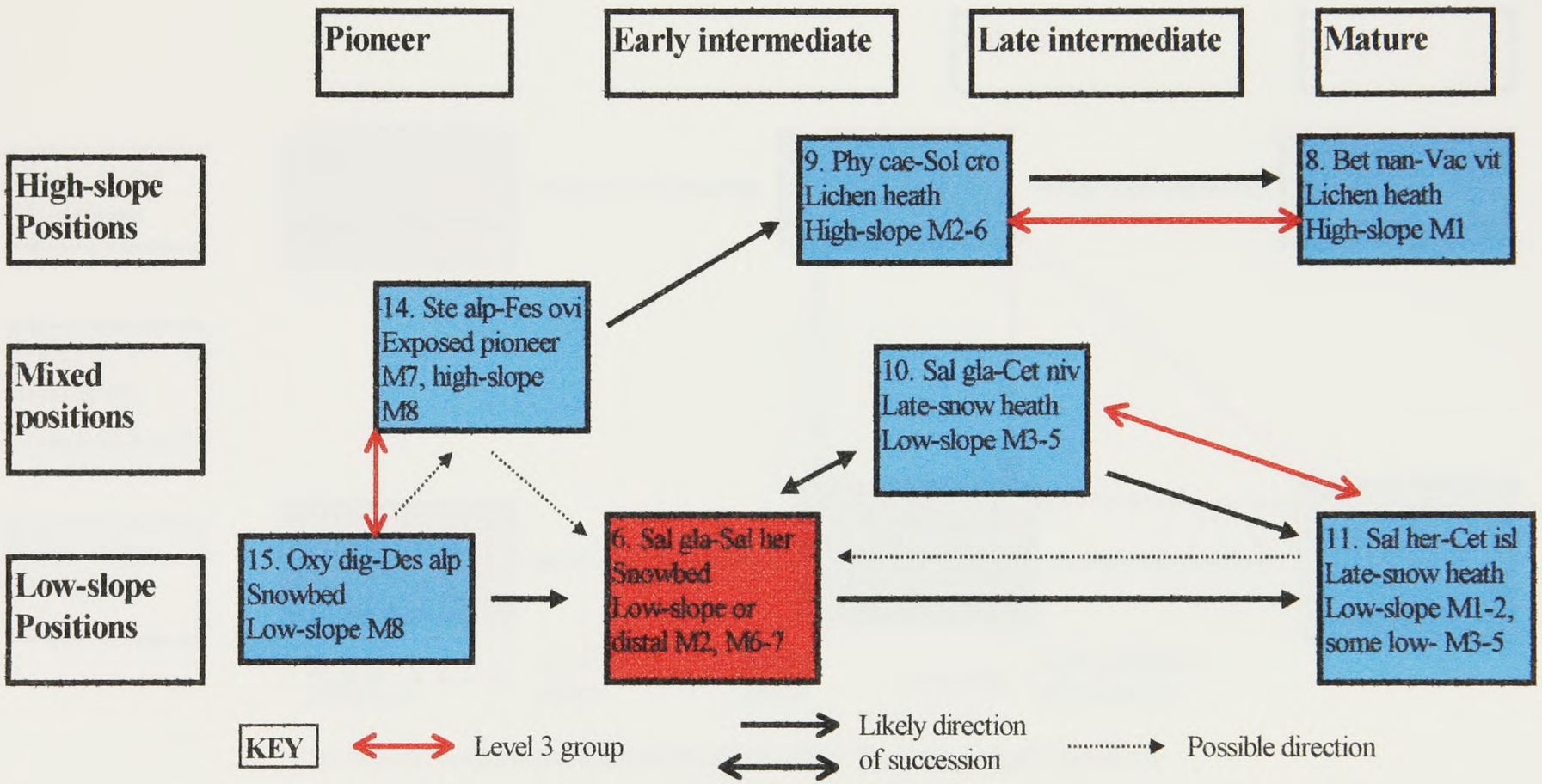
Note 1: See section 4.2 for an explanation of the diagram and section 4.2.4 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.14 Succession at Svellnosbreen, based on the TWINSPAN "final site groups".



Note 1: See section 4.2 for an explanation of the diagram and section 4.2.5 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.15 Succession at Storbreen high, based on the TWINSPAN "final site groups".

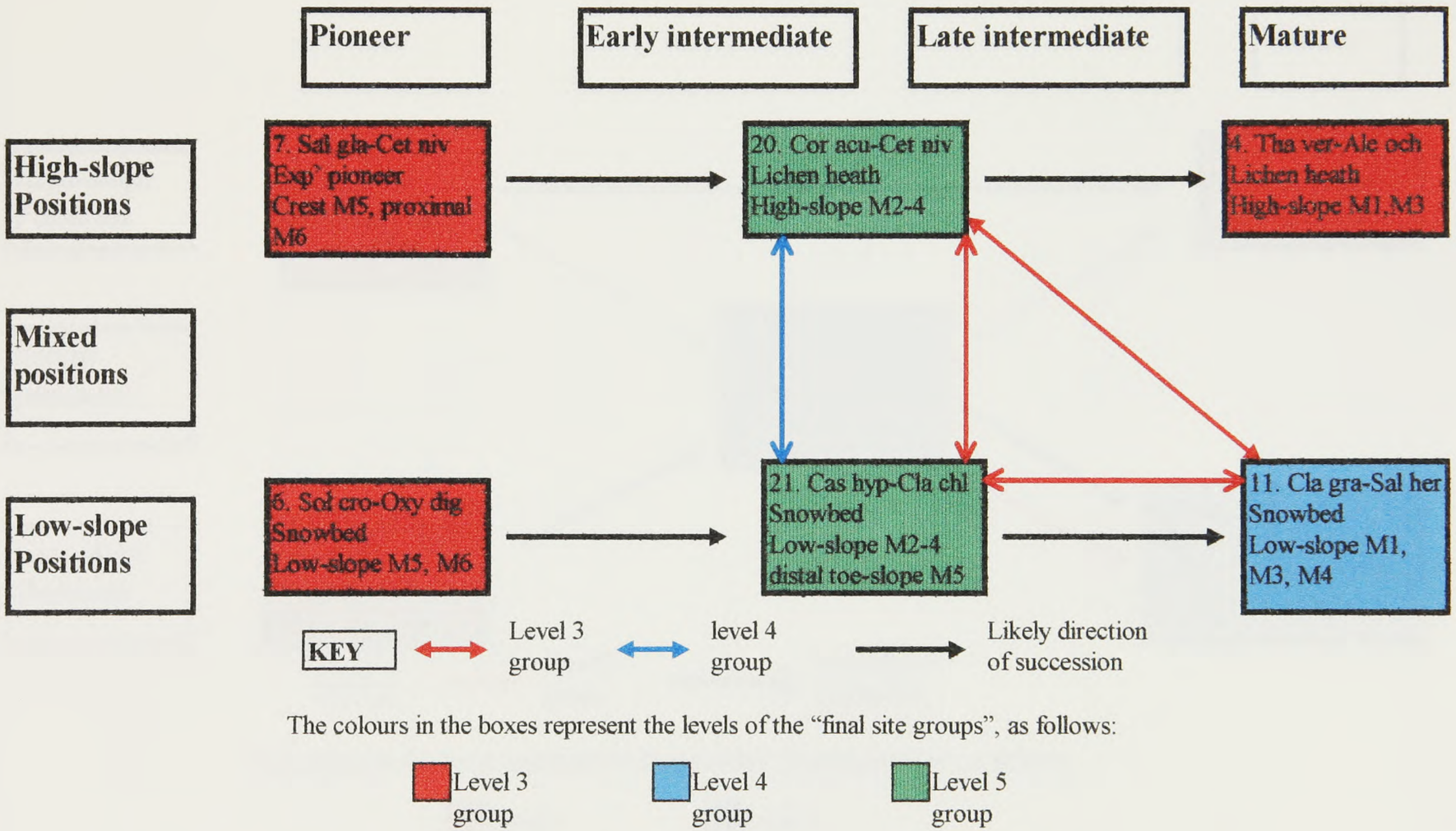


The colours in the boxes represent the levels of the "final site groups", as follows:

Level 3 group Level 4 group

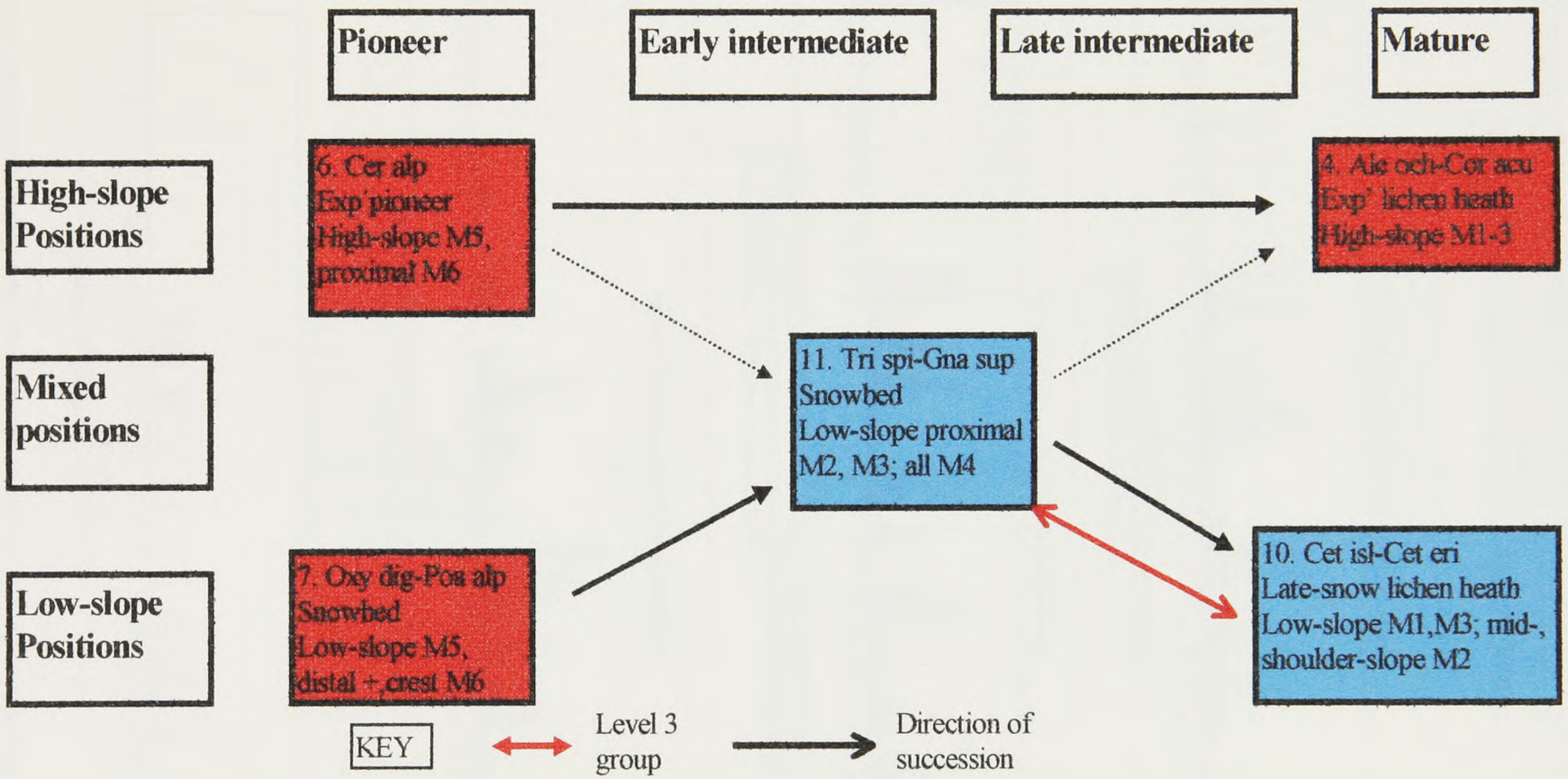
Note 1: See section 4.2 for an explanation of the diagram and section 4.2.6 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.16 Succession at Høgvaglbreen, based on the TWINSPAN "final site groups".



Note 1: See section 4.2 for an explanation of the diagram and section 4.2.7 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

Fig 4.17 Succession at Bøverbreen, based on the TWINSPAN "final site groups".



The colours in the boxes represent the levels of the "final site groups", as follows:

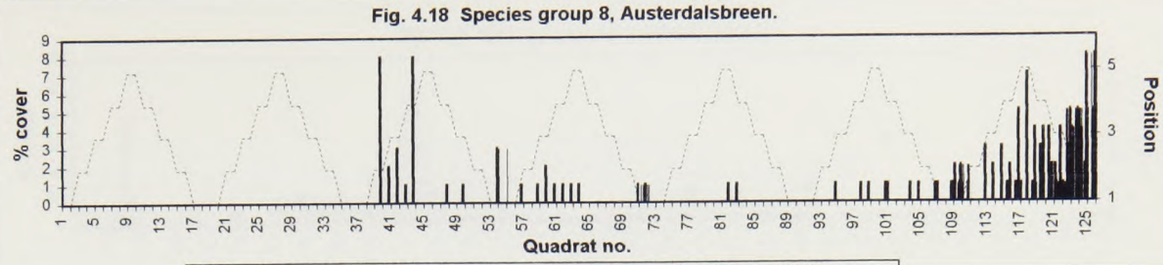
Level 3 group

Level 4 group

Note 1: See section 4.2 for an explanation of the diagram and section 4.2.8 for a discussion of the trends as shown by this diagram.
Note 2: See Appendix 1 for species abbreviations

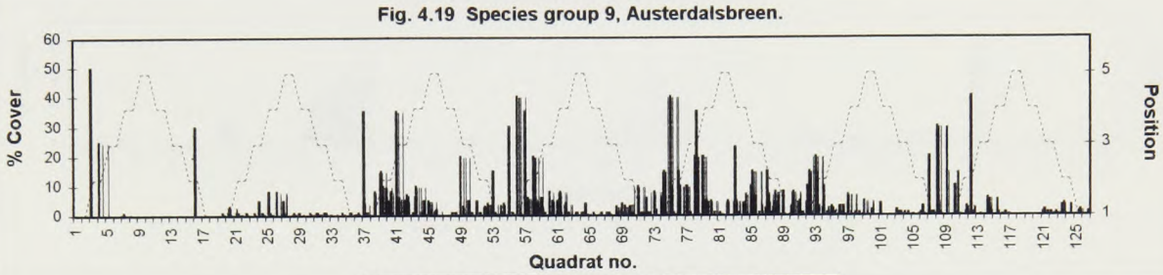
Figs. 4.18 to 4.22 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Austerdalsbreen. *(dashed line represents moraine profiles)*

Fig. 4.18 Species group 8, Austerdalsbreen.



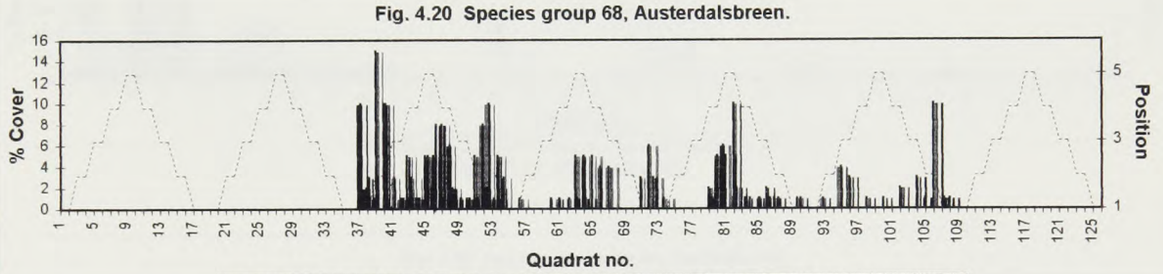
Species: 58 Car spp; 81 Ste bot; 83 Phl alp; 84 Sax ste; 85 Sax aiz; 86 Ste ves; 44 Ste alp.

Fig. 4.19 Species group 9, Austerdalsbreen.



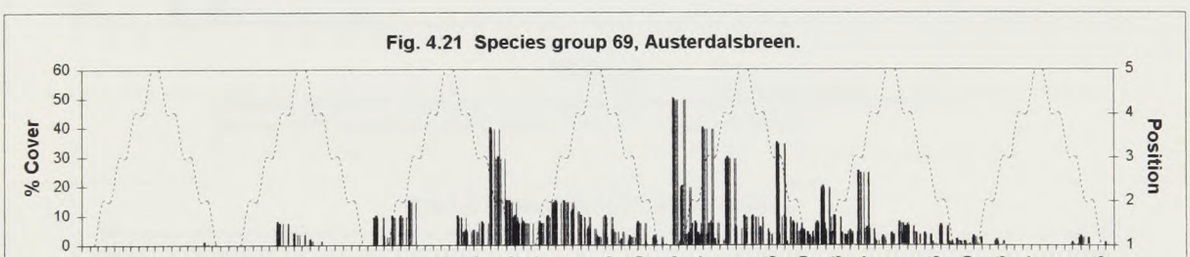
Species: 5 Bet pub; 27 Cla gra; 45 Cla por; 46 Cla chl; 42 Sal phy; 80 Ath dis; 82 Oxy dig.

Fig. 4.20 Species group 68, Austerdalsbreen.



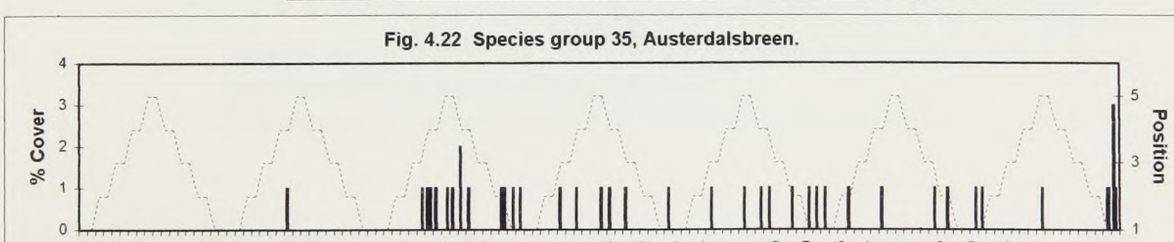
Species: 51 Eup hel; 55 Vac vit; 57 Arc alp; 59 Cet eri; 60 Ste con; 61 Lou pro; 62 Cla car; 64 Cla ver; 65 Sol cro; 66 Cla ran; 67 Cla arb; 68 Cla def; 69 Cla pix; 70 Cla ama; 71 Cla bel; 72 Cla sul; 73 Cla ple; 74 Cla cri; 75 Pel pol.

Fig. 4.21 Species group 69, Austerdalsbreen.



Species: 3 Cal vul; 52 Lis cor; 53 Lyc ann ; 54 Jun tri; 76 Des ces; 77 Aln glu; 78 Sal lan; 79 Lot cor; 87 Ver alp; 88 Pyr nor.

Fig. 4.22 Species group 35, Austerdalsbreen.

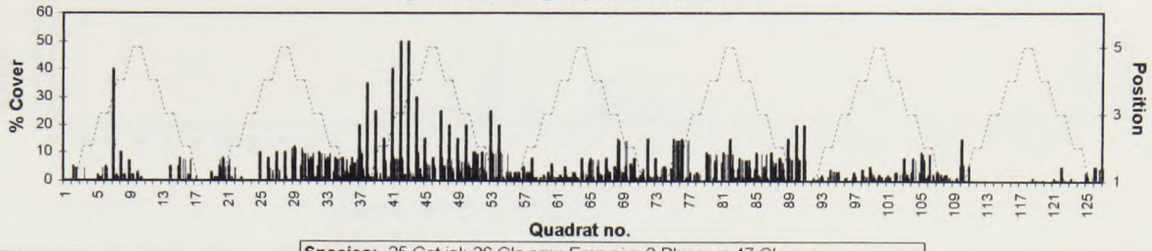


Species: 48 Cla dig; 56 Pin vul; 63 Cla cer.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

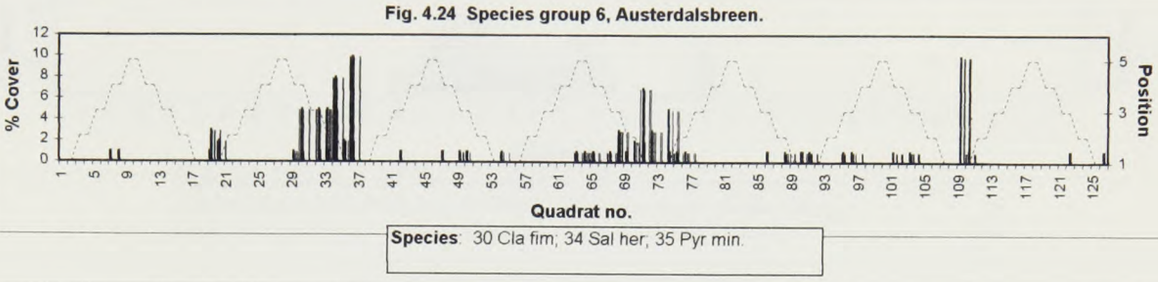
Figs. 4.23 to 4.27 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Austerdalsbreen. *(dashed line represents moraine profiles)*

Fig. 4.23 Species group 5, Austerdalsbreen.



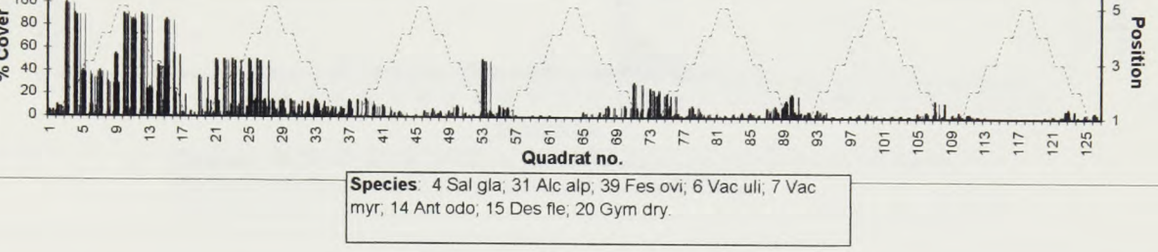
Species: 25 Cet isl; 26 Cla squ; Emp nig; 2 Phy cae; 47 Cla con.

Fig. 4.24 Species group 6, Austerdalsbreen.



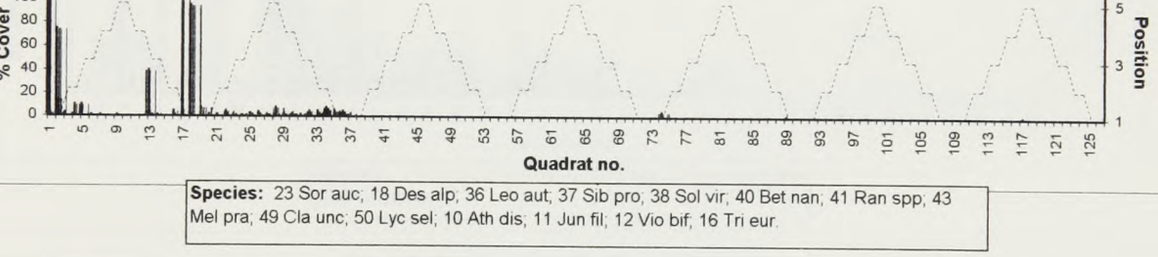
Species: 30 Cla fim; 34 Sal her; 35 Pyr min.

Fig. 4.25 Species group 14, Austerdalsbreen.



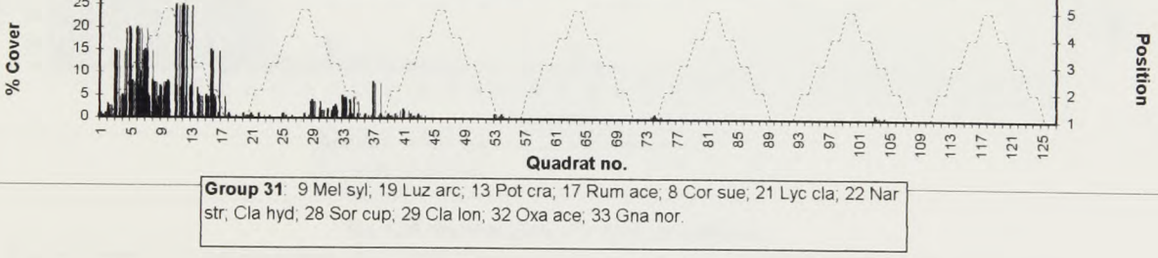
Species: 4 Sal gla; 31 Alc alp; 39 Fes ovi; 6 Vac uli; 7 Vac myr; 14 Ant odo; 15 Des fle; 20 Gym dry.

Fig. 4.26 Species group 30, Austerdalsbreen.



Species: 23 Sor auc; 18 Des alp; 36 Leo aut; 37 Sib pro; 38 Sol vir; 40 Bet nan; 41 Ran spp; 43 Mel pra; 49 Cla unc; 50 Lyc sel; 10 Ath dis; 11 Jun fil; 12 Vio bif; 16 Tri eur.

Fig. 4.27 Species group 31, Austerdalsbreen.

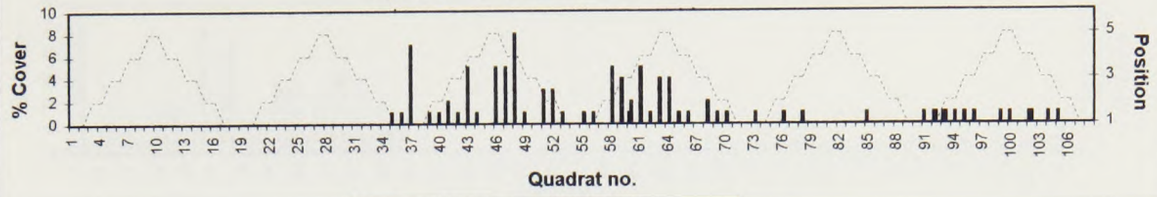


Group 31: 9 Mel syl; 19 Luz arc; 13 Pot cra; 17 Rum ace; 8 Cor sue; 21 Lyc cla; 22 Nar str; Cla hyd; 28 Sor cup; 29 Cla lon; 32 Oxa ace; 33 Gna nor.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

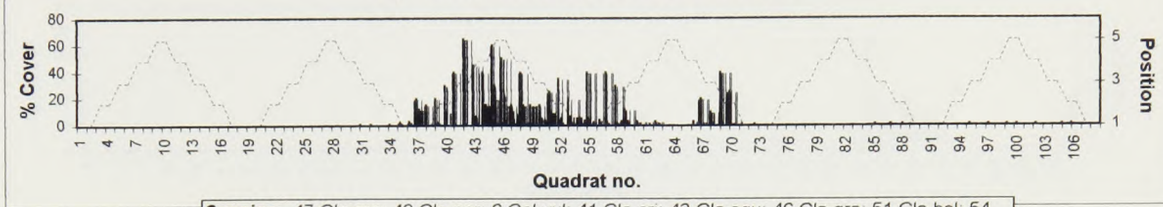
Figs. 4.28 to 4.33 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Fåbergstølsbreen. *(dashed line represents moraine profiles)*

Fig. 4.28 Species group 8, Fåbergstølsbreen.



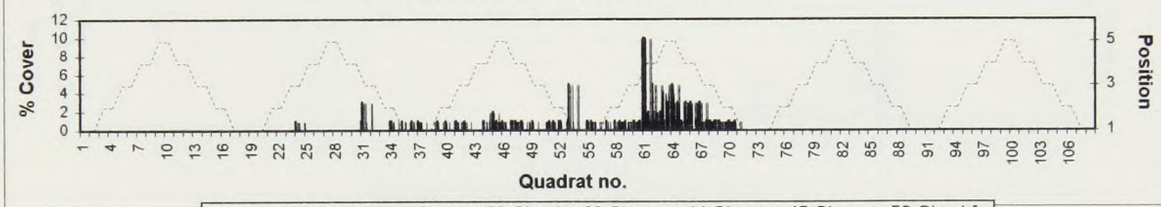
Species: 48 Cla arb; 62 Ste alp.

Fig. 4.29 Species group 36, Fåbergstølsbreen.



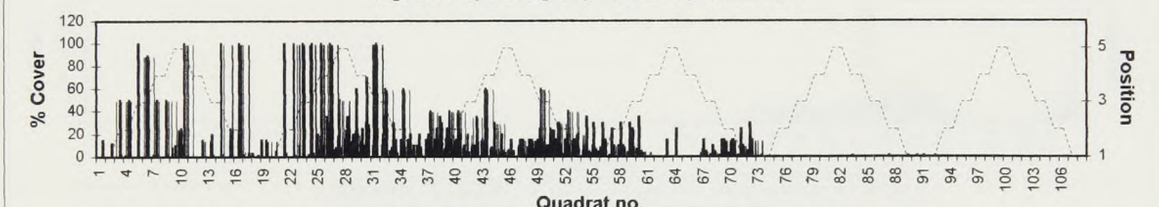
Species: 47 Cla ran; 49 Cla por; 6 Cal vul; 41 Cla cri; 42 Cla squ; 46 Cla gra; 51 Cla bel; 54 Cla crc; 55 Cla ama; 56 Cla dig; 57 Cla fur; 59 Cla ste; 60 Bro cup; 64 Cet cuc.

Fig. 4.30 Species group 37, Fåbergstølsbreen.



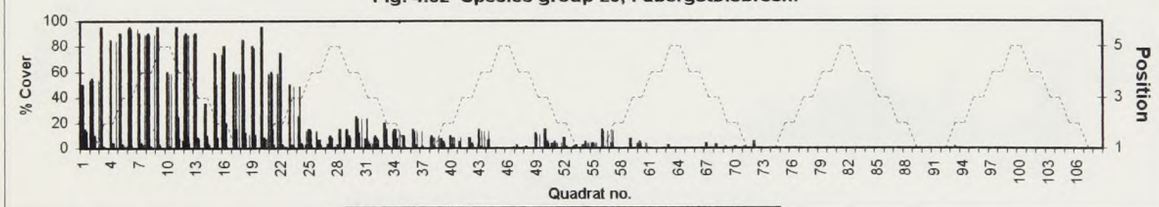
Species: 38 Cla fim; 40 Cla chl; 58 Cla ple; 63 Ste pas; 44 Cla coc; 45 Cla con; 50 Cla sbf; 52 Cla car; 65 Cla pix; 66 Ste bot; 67 Bla cup; 68 Sol cro; 69 Cla ver.

Fig. 4.31 Species group 19, Fåbergstølsbreen.



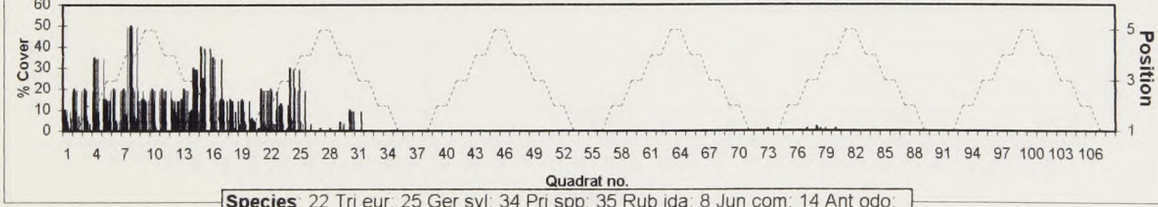
Species: 2 Vac uli; 3 Vac vit; 4 Emp nig; 5 Phy cae; 7 Bet pub; 18 Mel syl.

Fig. 4.32 Species group 20, Fåbergstølsbreen.



Species: 1 Vac myr; 11 Luz arc; 9 sor auc; 37 Cer spp; 43 Str cup.

Fig. 4.33 Species group 21, Fåbergstølsbreen.

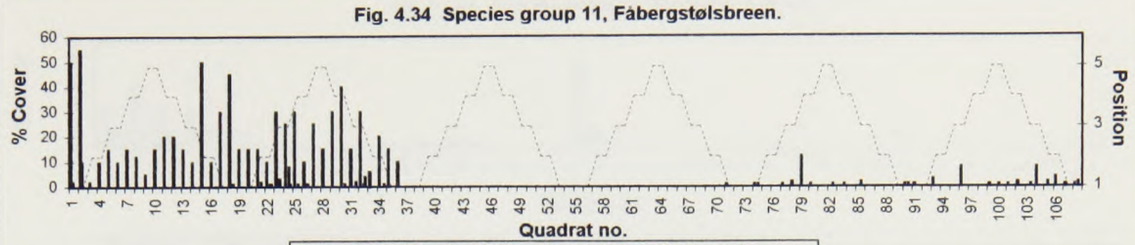


Species: 22 Tri eur; 25 Ger syl; 34 Pri spp; 35 Rub ida; 8 Jun com; 14 Ant odo; 16 Cor sue; 17 Pot cra; 19 Par pal; 23 Pol viv; 32 Vio bif; 20 Gym dry.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

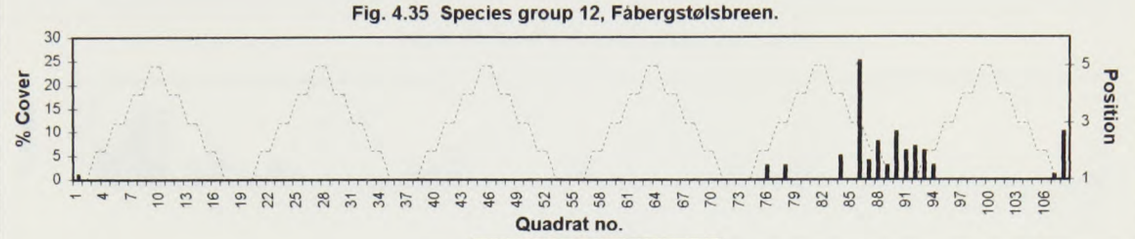
Figs. 4.34 to 4.38 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Fåbergstølsbreen. *(dashed line represents moraine profiles)*

Fig. 4.34 Species group 11, Fåbergstølsbreen.



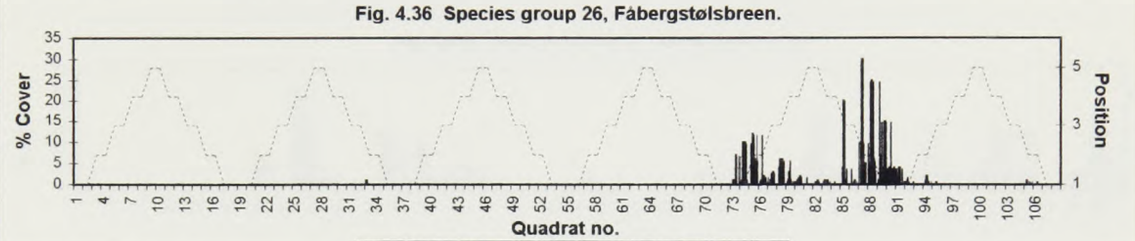
Species: 12 Des fle; 15 Nar str; 24 Sol vir; 39 Pel pol.

Fig. 4.35 Species group 12, Fåbergstølsbreen.



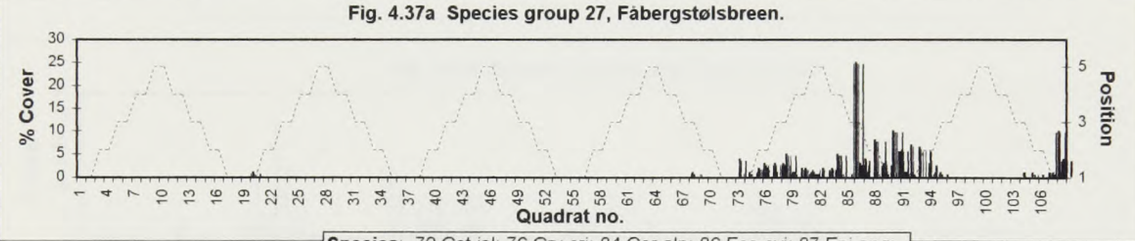
Species: 31 Ort sec.

Fig. 4.36 Species group 26, Fåbergstølsbreen.



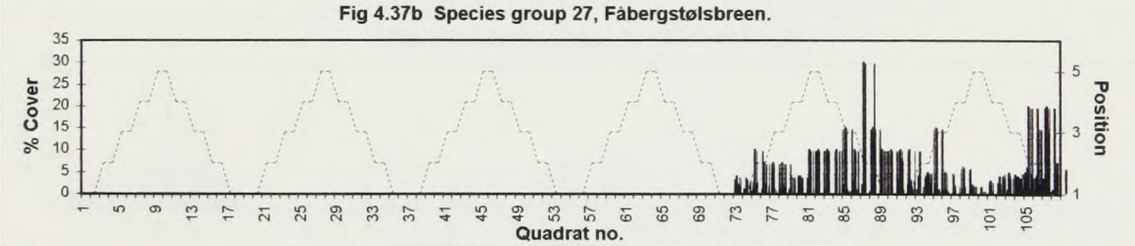
Species: 36 Lis cor; 82 Uln gla; 77 Hie spp; 72 Gna nor; 75 Lot cor; 78 Phl alp; 80 Sag sag.

Fig. 4.37a Species group 27, Fåbergstølsbreen.



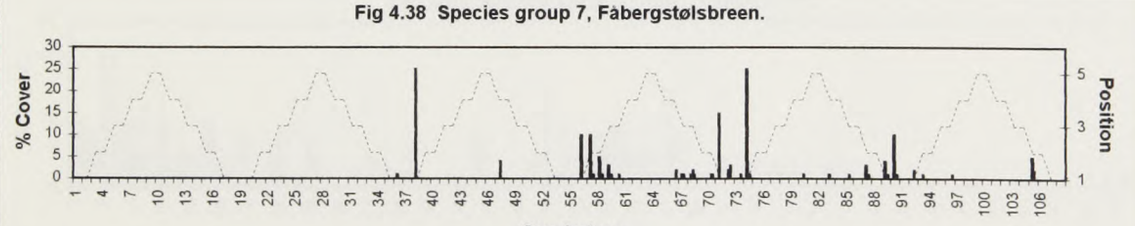
Species: 70 Cet isl; 76 Cry cri; 84 Cer alp; 86 Fes ovi; 87 Epi ang; 13 Des alp; 26 Ath dis; 33 Car spp; 73 Gna sup; 74 Oxy dig.

Fig 4.37b Species group 27, Fåbergstølsbreen.



Species: 71 Cer cer; 79 Agr ten; 81 Luz spi; 83 Epi als; 29 Alc alp; 85 Sax ste; 88 Rus spp; 89 Sib pro.

Fig 4.38 Species group 7, Fåbergstølsbreen.

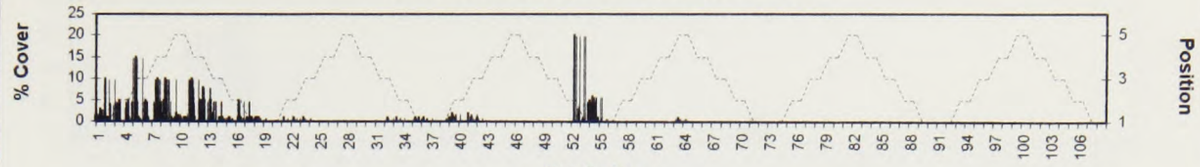


Species: 10 Sal phy; 53 Sal gla; 61 Sal her.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

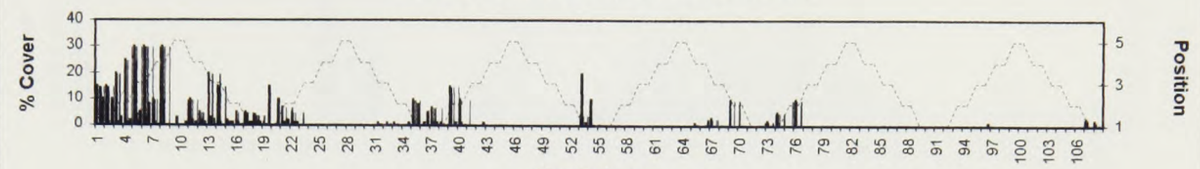
Figs. 4.39 to 4.42 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Storbreen low (1). *(dashed line represents moraine profiles)*

Fig. 4.39a Species group 8, Storbreen Low (1).



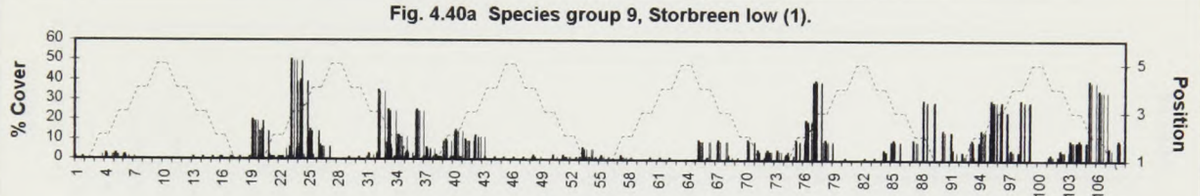
Species: 55 Sph glo; 84 Sil aca; 5 Lou pro; 6 Vac vit; 29 Jun tri; 31 Lyc sel; 35 Ste pas; 47 Cet ste; 9 Jun com; 16 Vio bif; 21 Tri eur; 24 Des fle; 30 Lyc alp; 40 Cla ama; 43 Cla squ; 57 Cla alp; 83 Cla car; 90 Coe vir.

Fig. 4.39b Species group 8, Storbreen low (1).



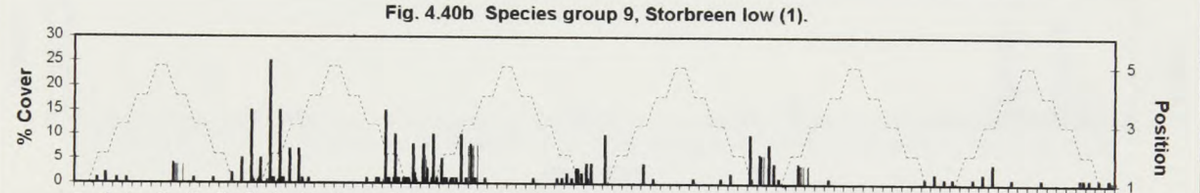
Species: 3 Vac myr; 14 Hie alp; 7 Cal vul; 17 Gna sup; 20 Sib pro; 28 Car spp.

Fig. 4.40a Species group 9, Storbreen low (1).



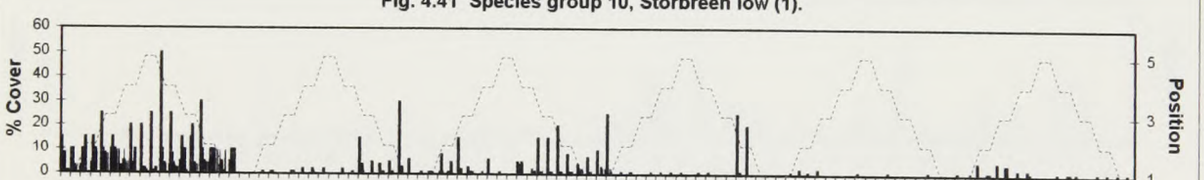
Species: 19 Ant alp; 12 Sed ros; 13 Leo aut; 18 Gna nor; 22 Sol vir; 23 Rum ace; 88 Tof pur; 15 Pol viv; 61 Jun com; 63 Eup fri; 70 Ran acr; 71 Pot cra; 72 Cam rot; 74 Alc alp; 76 Agr ten; 87 Pet fri ; 91 Luz arc; 89 Ped lap.

Fig. 4.40b Species group 9, Storbreen low (1).



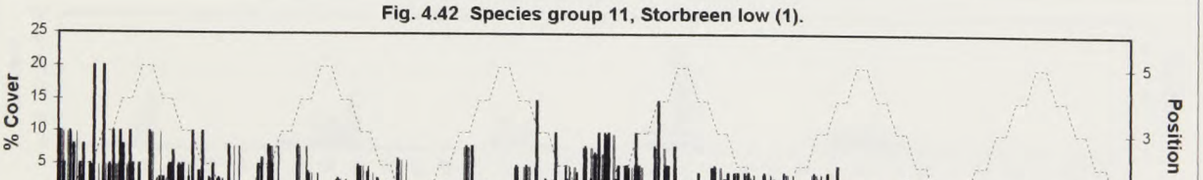
Species: 25 Ant odo; 62 Pyr min; 66 Tar off; 73 Bar alp; 4 Vac uli.

Fig. 4.41 Species group 10, Storbreen low (1).



Species: 27 Fes ovi; 11 Bet nan; 38 Cla ran; 42 Cla gra; 53 Tha ver.

Fig. 4.42 Species group 11, Storbreen low (1).

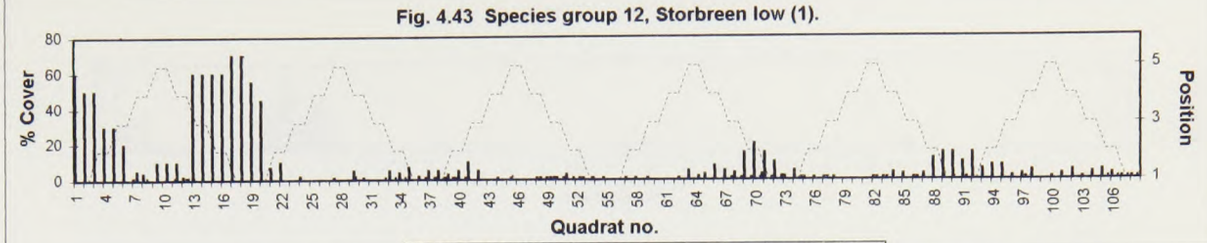


Species: 37 Cla por; 50 Cet isl; 81 Pel pol; 39 Cla arb; 48 Cet arb; 86 Sal phy.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

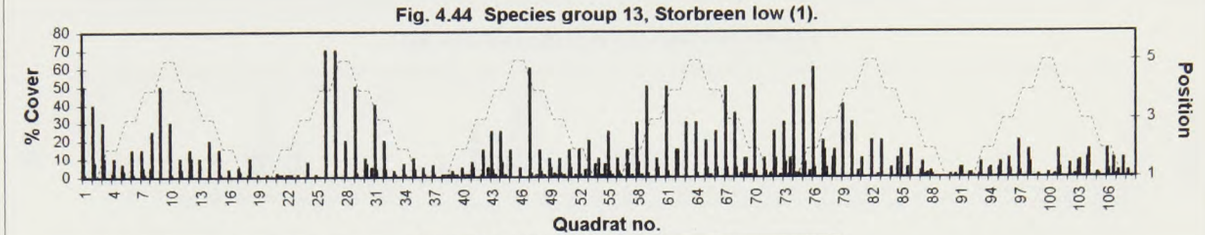
Figs. 4.43 to 4.48 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Storbreen low (1). *(dashed line represents moraine profiles)*

Fig. 4.43 Species group 12, Storbreen low (1).



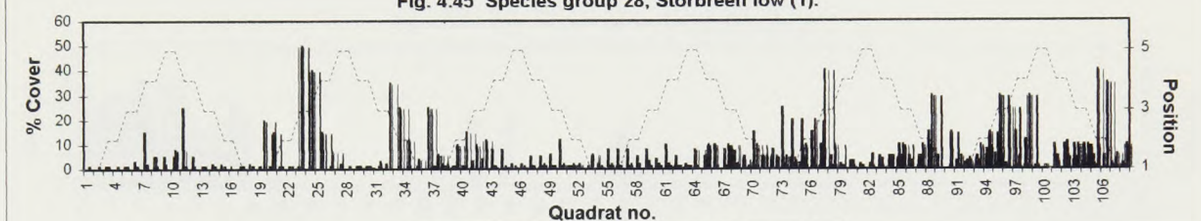
Species: 10 Sal her; 26 Des cae; 45 Cla sul; 49 Cet eri; 56 Nep arc; 64 Ver alp; 65 Pin vul.

Fig. 4.44 Species group 13, Storbreen low (1).



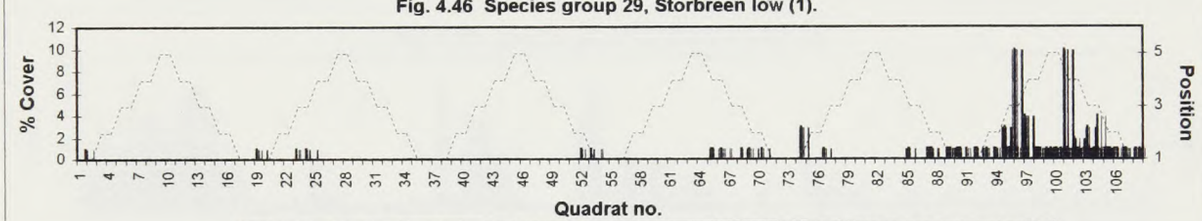
Species: 78 Cla unc; 85 Sal lan; 1 Emp nig; 2 Phy cae; 44 Cla con.

Fig. 4.45 Species group 28, Storbreen low (1).



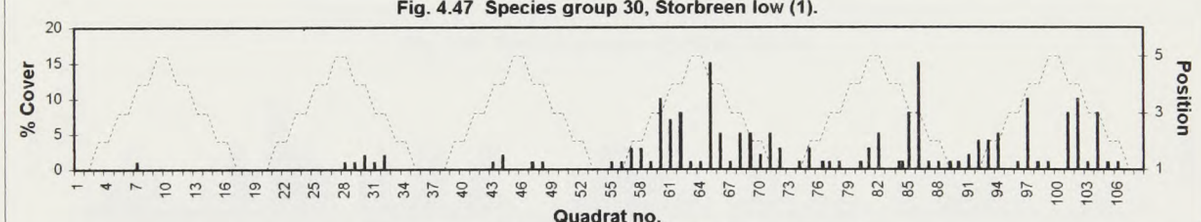
Species: 32 Ste alp; 36 Cla chl; 8 Cas hyp; 33 Ste bot; 60 Sal gla; 82 Pso hyp.

Fig. 4.46 Species group 29, Storbreen low (1).



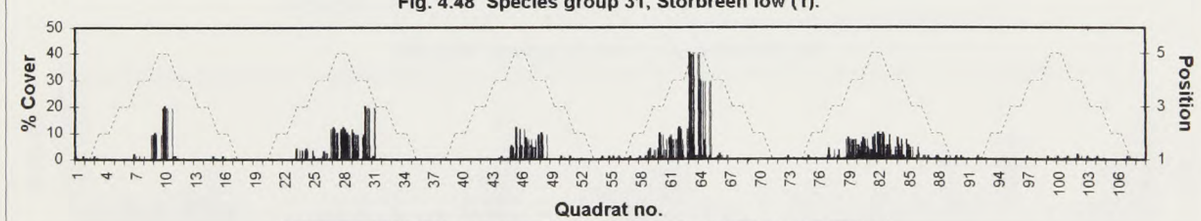
Species: 75 Luz spi; 67 Lis cor; 68 Cla ver; 94 Tri spi; 96 Sph fra; 97 Pan pez; 99 Bet pub; 69 Sph mel; 77 Poa alp; 100 Car pet; 103 Cer cer; 104 Car bel; 106 Cla sym.

Fig. 4.47 Species group 30, Storbreen low (1).



Species: 52 Sol cro; 101 Oxy dig; 105 Cla cen.

Fig. 4.48 Species group 31, Storbreen low (1).

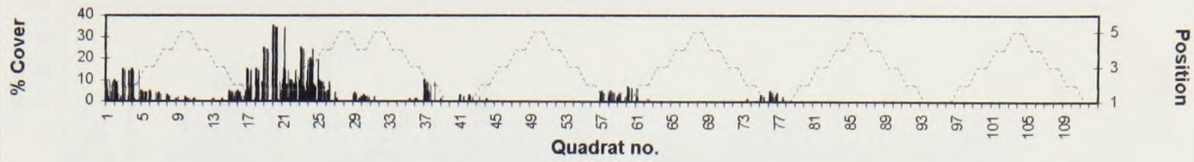


Species: 46 Cet niv; 51 Cet cuc; 58 Arc alp; 59 Arc uva; 80 Ale cha; 92 Cor div; 93 Ale och; 98 Ale nig; 34 Ste con; 41 Cla cri; 54 Cor acu; 79 Cla cer; 102 Cer alp; 95 Cla pix.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

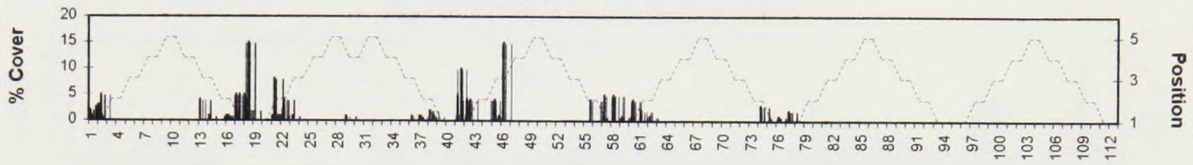
Figs. 4.49 to 4.53 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Storbreen low (2). *(dashed line represents moraine profiles)*

Fig. 4.49 Species group 30, Storbreen low (2).



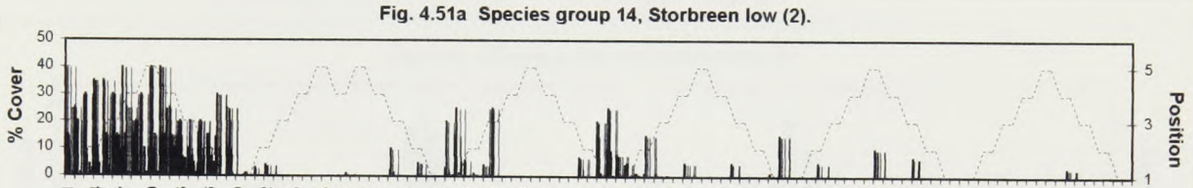
Species: 113 Cer cer; 100 Cla bel; 84 Ran pyg; 76 Sau alp; 75 Gym dry; 74 Mel rub; 73 Sib pro; 70 Gna nor; 39 Luz tri; 26 Ran acr; 23 Sol vir; 20 Tar spp; 29 Sed ros; 27 Vio bif; 22 Pol viv; 19 Tri eur; 15 Car spp.

Fig. 4.50 Species group 31, Storbreen low (2).



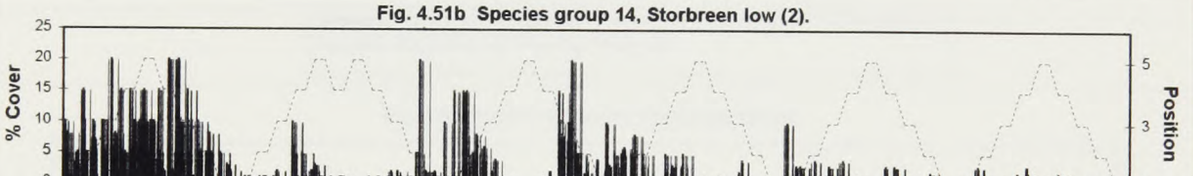
Species: 108 Lis cor; 38 Nar str; 32 Pyr min; 28 Ver alp; 24 Ped lap; 21 Leo aut; 105 Sil aca; 104 Squ cup; 40 Des alp; 33 Eup fri; 25 Ped spp; 18 Jun spp; 30 Bar alp.

Fig. 4.51a Species group 14, Storbreen low (2).



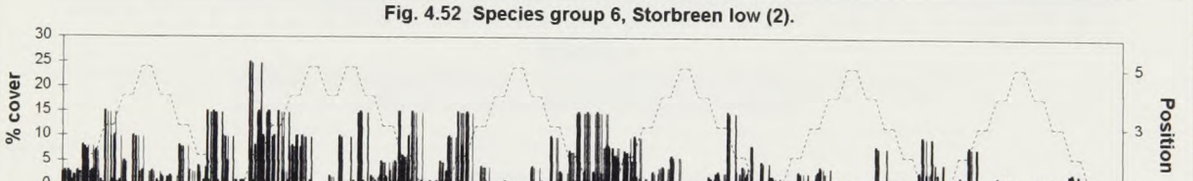
Species: 10 Vac uli; 58 Cla alp; 36 Hie alp; 35 Lyc alp; 17 Des fle; 9 Vac myr; 3 Bet nan; 64 Cla sul; 62 Far red; 59 War gra; 52 Cla con; 50 Cla ama; 47 Cla ste; 31 Vac vit; 14 Jun tri; 8 Cal vul.

Fig. 4.51b Species group 14, Storbreen low (2).



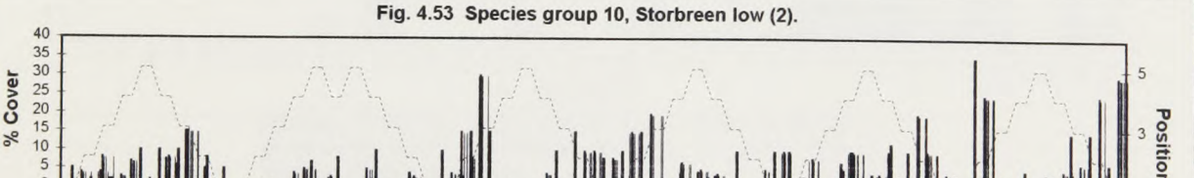
Species: 60 Cla squ; 48 Cla gra; 46 Cla unc; 45 Cla ran; 44 Cla arb; 42 Ste bot; 107 Tof pus; 43 Cla por; 49 Cla cri.

Fig. 4.52 Species group 6, Storbreen low (2).



Species: 65 Cla fur; 55 Cet isl; 4 Jun com; 106 Pin vul; 16 Luz spi; 37 Phl alp; 34 Gna sup; 13 Ant odo; 71 Rum ace; 12 Fes ovi.

Fig. 4.53 Species group 10, Storbreen low (2).

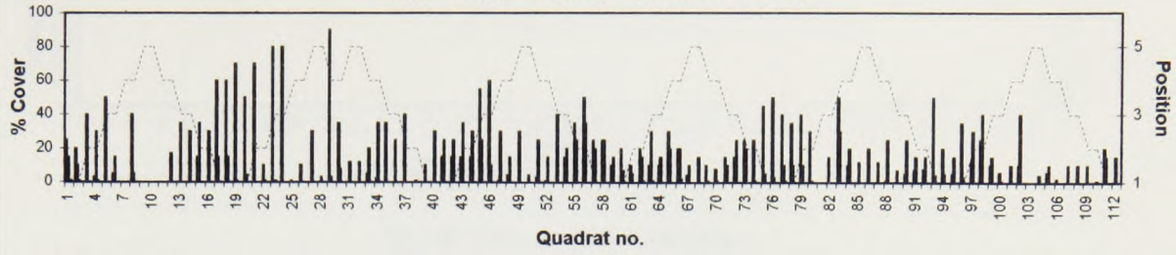


Species: 109 Ste spp; 81 Oxy dig; 6 Phy cae; 77 Cer alp; 66 Tri spi; 56 Cet eri; 51 Cla fim.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

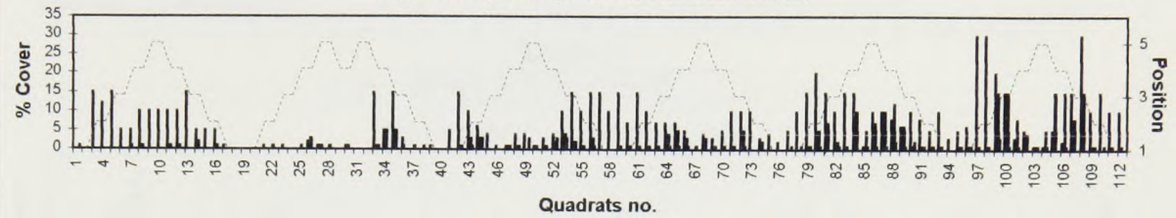
Figs. 4.54 to 4.57 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Storbreen low (2). *(dashed line represents moraine profiles)*

Fig. 4.54 Species group 11, Storbreen low (2).



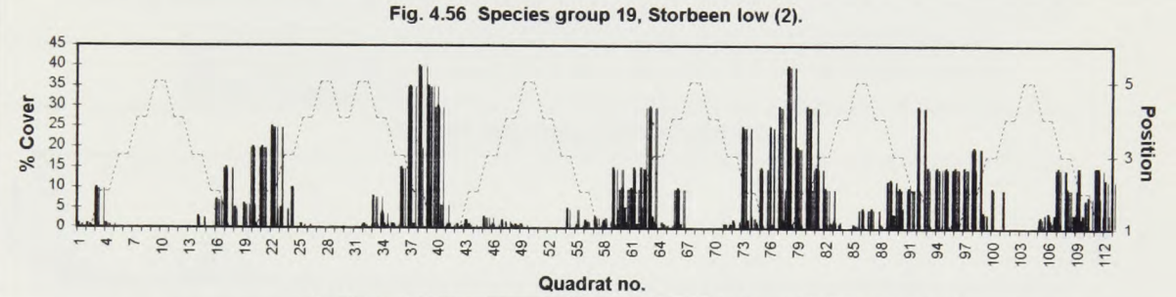
Species: 57 Pel pol; 5 Emp nig; 1 Sal gla.

Fig. 4.55 Species group 18, Storbreen low (2).



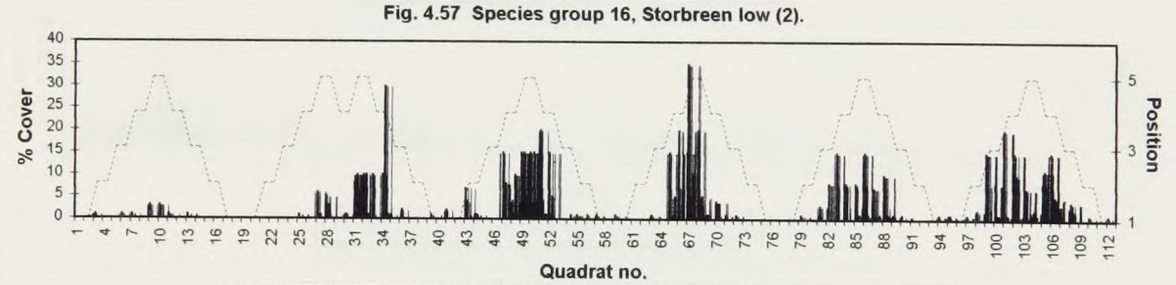
Species: 86 Ste con; 63 Cla chl; 61 Cla dig; 41 Ste alp.

Fig. 4.56 Species group 19, Storbeen low (2).



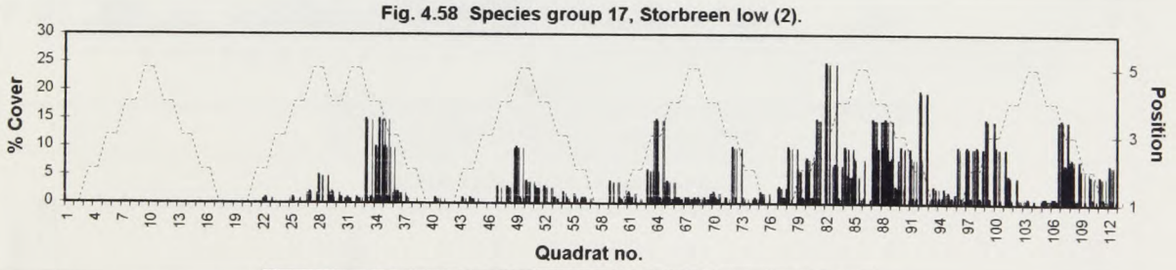
Species: 82 Ant alp; 69 Sal phy; 112 Car bel; 111 Lyc sol; 7 Cas hyp; 95 Pan pez; 89 Sph fra; 67 Poa alp; 2 Sal her.

Fig. 4.57 Species group 16, Storbreen low (2).



Species: 78 Car pet; 79 Sal lan; 54 Cet cuc; 53 Cet niv; 110 Sph glo; 101 Tha ver; 93 Cor acu; 92 Cor div; 91 Ale nig; 90 Ale och; 83 Lou pro; 11 Arc alp.

Fig. 4.58 Species group 17, Storbreen low (2).

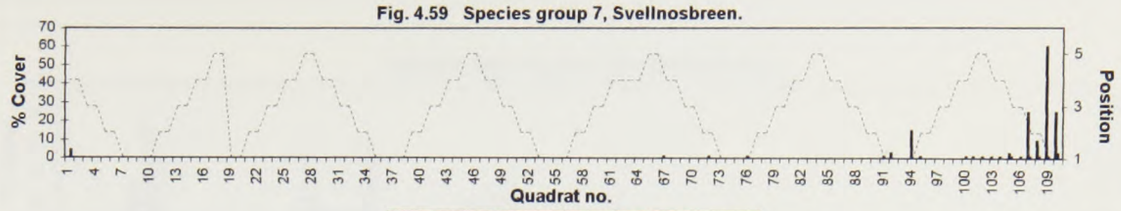


Species: 94 Pso hyp; 116 Dry oct; 103 Cla ple; 102 Cla cer; 96 Cla fri; 88 Cet del; 80 Arc uva; 99 Cla ver; 98 Cla cer; 115 Gre cla; 114 Sag sag; 97 Cla pix; 85 Sol cro.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

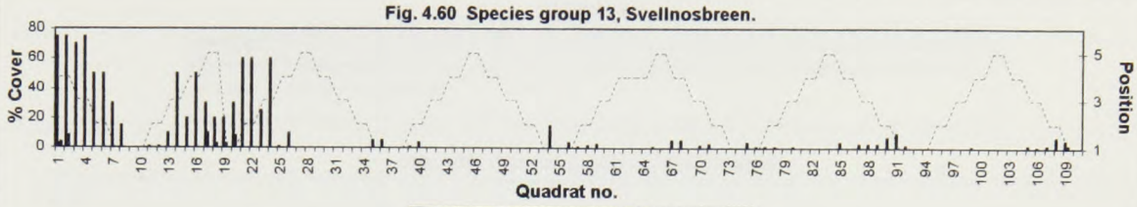
Figs. 4.59 to 4.64 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Svellnosbreen. *(dashed line represents moraine profiles)*

Fig. 4.59 Species group 7, Svellnosbreen.



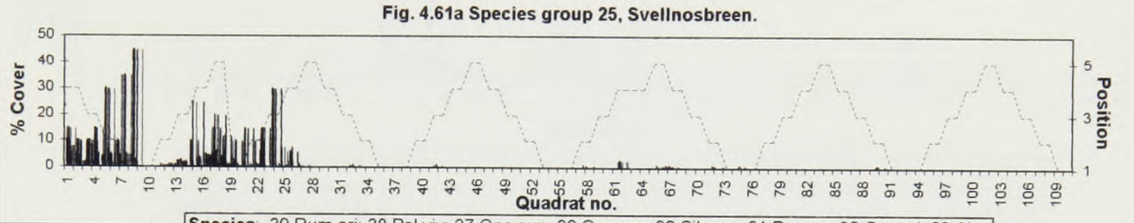
Species: 100 Cer cer; 92 Des alp.

Fig. 4.60 Species group 13, Svellnosbreen.



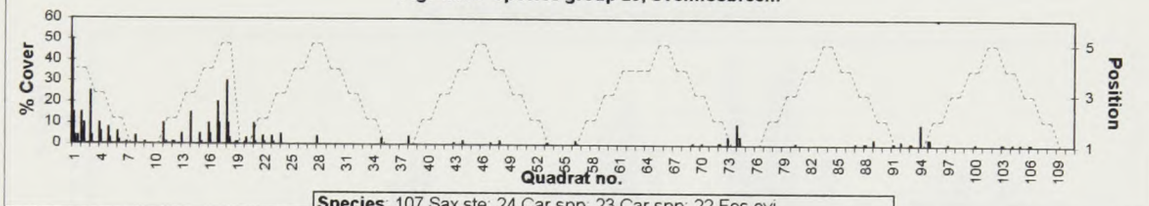
Species: 27 Tar spp; 16 Sal her.

Fig. 4.61a Species group 25, Svellnosbreen.



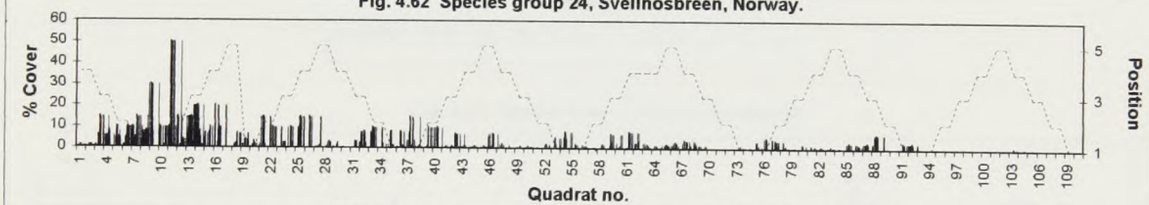
Species: 39 Rum ari; 38 Pol viv; 37 Gna sup; 36 Gna nor; 32 Sib pro; 31 Pyr nor; 30 Ger syl; 29 Alc glo; 28 Leo spp; 26 Ran niv; 15 Sed ros; 14 Ver alp; 61 Cla cen; 41 Cet isl; 34 Vac myr; 33 Sol vir; 18 Hie spp; 17 Lyc alp; 13 Cal vul.

Fig. 4.61b Species group 25, Svellnosbreen.



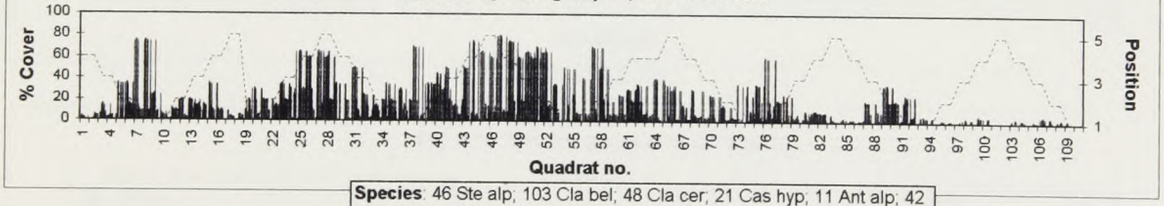
Species: 107 Sax ste; 24 Car spp; 23 Car spp; 22 Fes ovi.

Fig. 4.62 Species group 24, Svellnosbreen, Norway.



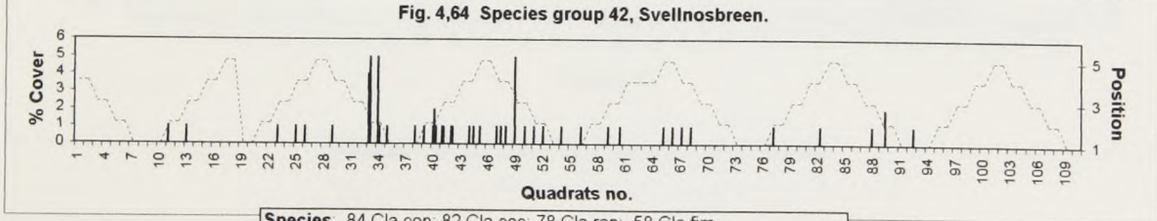
Species: 47 Pel pol; 45 Cla gra; 12 Ane ver; 4 Jun com; 3 Ant dio; 1 Vac vit; 49 Cla ama; 44 Sol cro; 60 Cla dig; 35 Bar alp.

Fig. 4.63 Species group 11, Svellnosbreen.



Species: 46 Ste alp; 103 Cla bel; 48 Cla cer; 21 Cas hyp; 11 Ant alp; 42 Cla por; 40 Cet del; 19 Emp nig; 2 Vac uli; 51 Cla chl.

Fig. 4,64 Species group 42, Svellnosbreen.

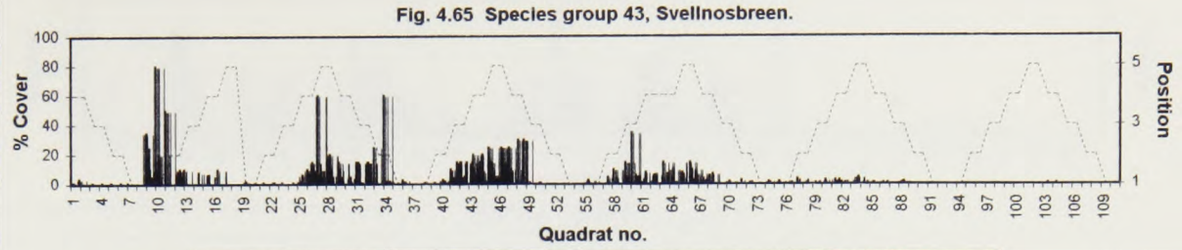


Species: 84 Cla con; 82 Cla coc; 78 Cla ran; 58 Cla fim.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

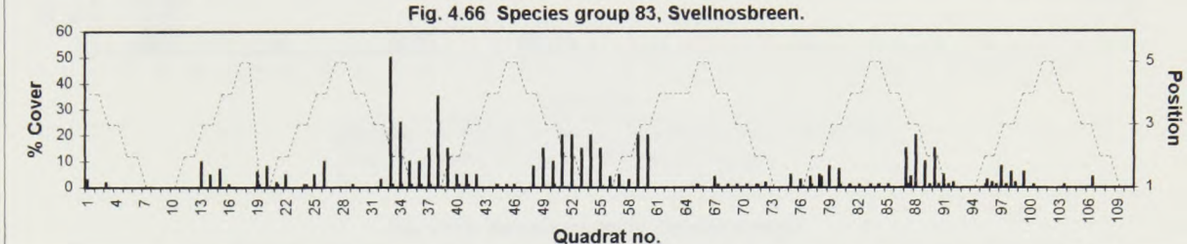
Figs. 4.65 to 4.69 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Svellnosbreen. *(dashed line represents moraine profiles)*

Fig. 4.65 Species group 43, Svellnosbreen.



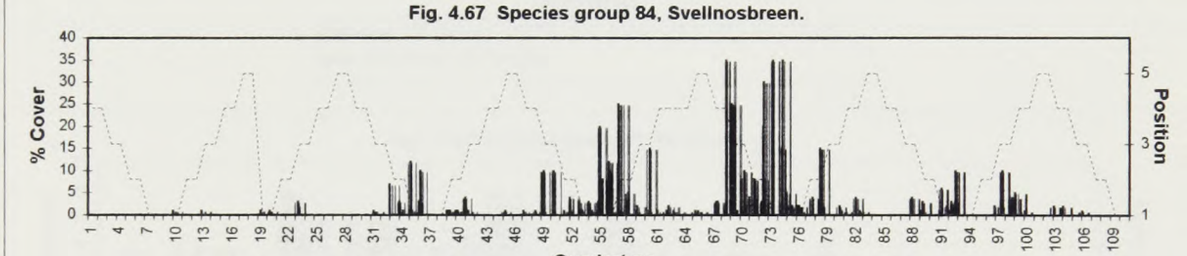
Species: 55 Cet eri; 43 Cla arb; 5 Bet nan; 85 Sph glo; 83 Ste con; 79 Bet pub; 77 Ale nig; 64 Cam rot; 57 Cor aca; 56 Cor div; 54 Tha ver; 53 Cet cuc; 52 Cet niv; 50 Ale och; 9 Nar str; 8 Arc uva; 7 Arc alp; 6 Cam rot.

Fig. 4.66 Species group 83, Svellnosbreen.



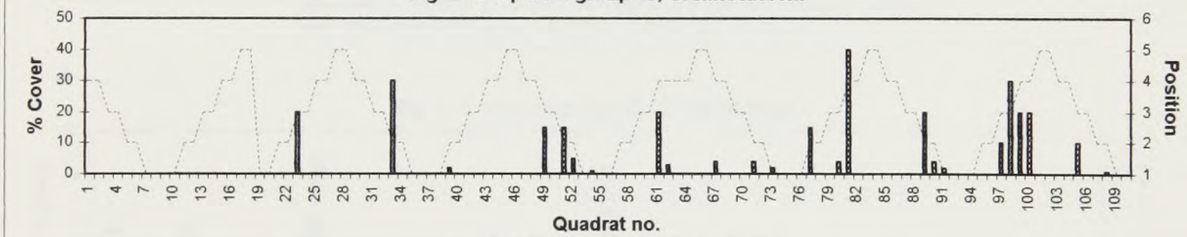
Species: 108 Ara alp; 106 Lou pro; 105 Sal ret; 102 Cla car; 101 Pan pez; 99 Pyr min; 97 Car bel; 96 Dra alp; 94 Cla unc; 93 Luz arc; 91 Lyc sel; 90 Vis alp; 89 Sal lan; 88 Sax cer; 87 Sax opp; 86 Cla ple; 81 Cla def; 80 Eup fri; 76 Pso hyp; 75 Cla ver; 73 Ste bot; 72 Nep arc; 71 Cla fur; 70 Sal myr; 69 Tof pus; 68 Sil aca; 67 Luz spi; 66 Pin vul; 59 Cla cri; 10 Jun tri.

Fig. 4.67 Species group 84, Svellnosbreen.



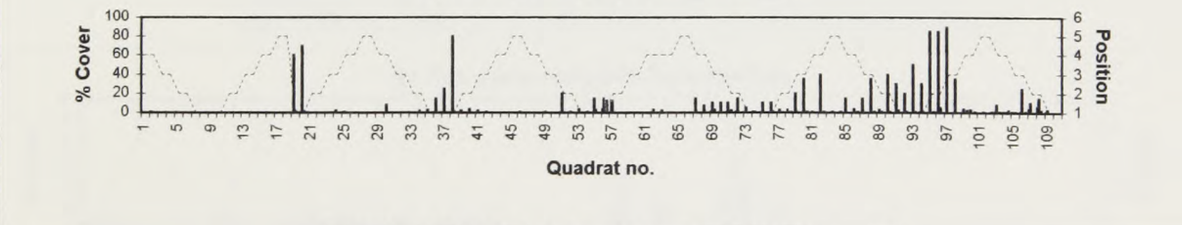
Species: 98 Tri spi; 95 Cer alp; 74 Cla pix; 20 Phy cae.

Fig. 4.68 Species group 40, Svellnosbreen.



Species: 63 Sal phy.

Fig. 4.69 Species group 4, Svellnosbreen.

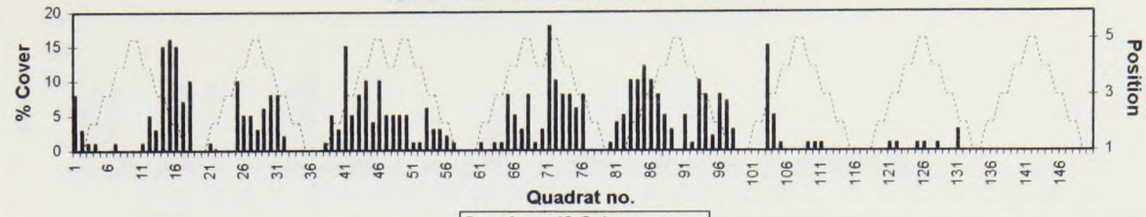


Species: 104 Car pet; 65 Poa alp; 62 Sal gla; 25 Oxy dig.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

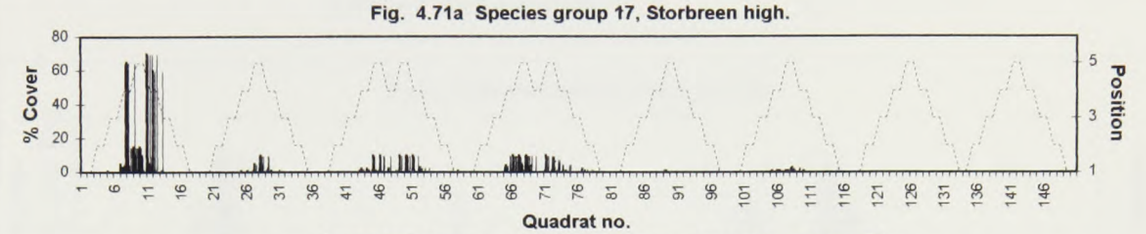
Figs. 4.70 to 4.74 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Storbreen high. *(dashed line represents moraine profiles)*

Fig. 4.70 Species group 16, Storbreen high.



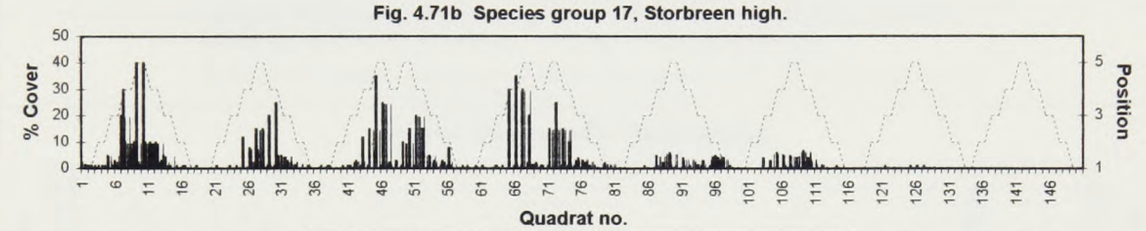
Species: 42 Sol cro.

Fig. 4.71a Species group 17, Storbreen high.



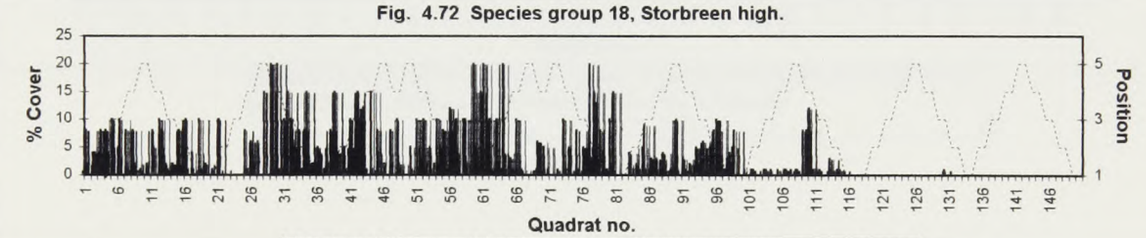
Species: 37 Ale nig; 38 Ale och; 40 Cor div; 41 Tha ver; 65 Phy sch; 68 Cor acu; 76 Sph fra; 4 Bet nan; 29 Cla ran.

Fig. 4.71b Species group 17, Storbreen high.



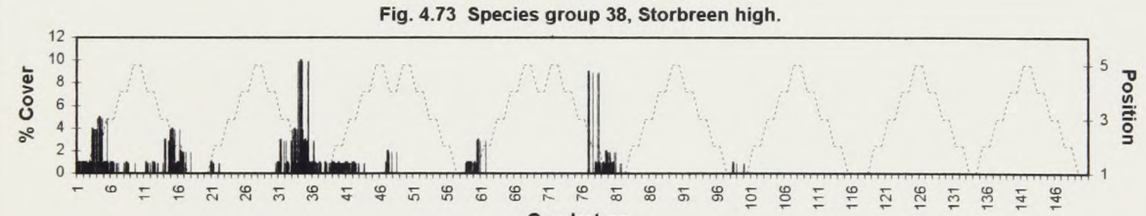
Species: 22 Cet niv; 23 Cet cuc; 6 Vac vit; 20 Ste con; 21 Ste pas; 26 Cet eri; 35 Cla ste.

Fig. 4.72 Species group 18, Storbreen high.



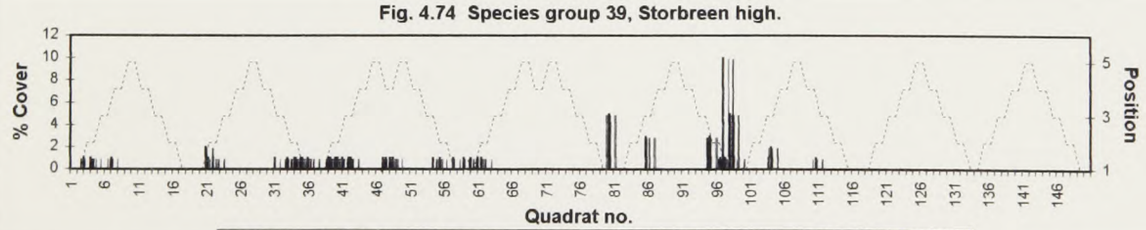
Species: 2 Phy cae; 27 Cla chl; 46 Cashyp; 60 Car bel; 13 Jun tri; 28 Cla por; 30 Cla arb; 33 Cla gra; 36 Cla cri; 58 Cla cer; 24 Cet isl.

Fig. 4.73 Species group 38, Storbreen high.



Species: 7 Gna sup; 14 Luz arc; 8 Hie spp; 9 Lyc spp; 17 Nar str; 31 Pso hyp; 32 Cla squ; 34 Cla unc; 39 Cla con; 43 Nep arc; 56 Sib pro; 71 Ran alp; 73 Lec qua; 75 Och fri.

Fig. 4.74 Species group 39, Storbreen high.

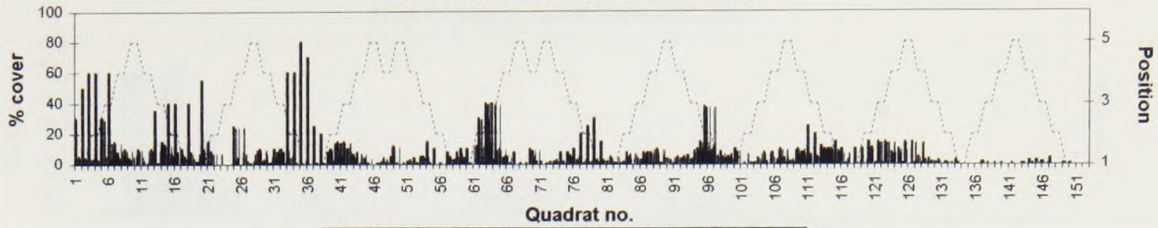


Species: 25 Cet del; 54 Pyr min; 57 Dry exp; 59 Ver alp; 62 Pyr spp; 66Cla ver; 67 Cla ple; 72 Car pet; 77 Sal ret; 79 Sph mel; 80 Cla sph; 84 Ale spp; 86 Ath dis; 18 Ant alp.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

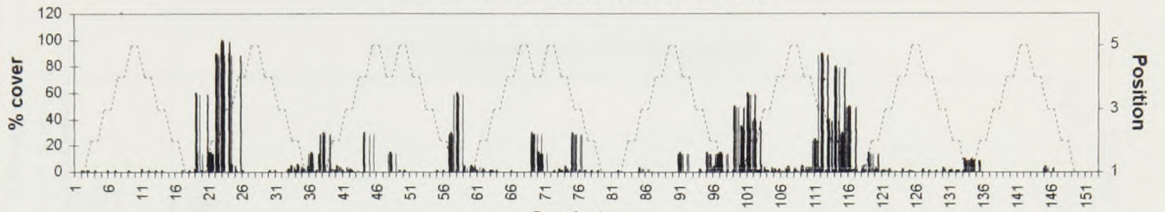
Figs. 4.75 to 4.77 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Storbreen high. *(dashed line represents moraine profiles)*

Fig. 4.75 Species group 5, Storbreen high.



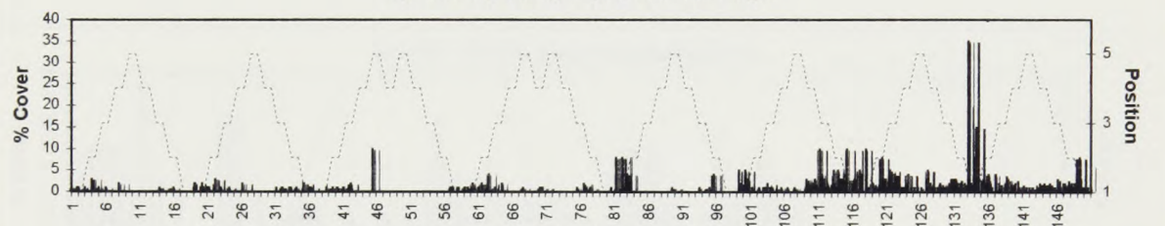
Species: 3 Sal her; 5 Vac myr; 19 Ste alp; 70 Sal phy; 1 Emp nig; 15 Car spp; 69 Vac uli.

Fig. 4.76 Species group 6, Storbreen high.



Species: 45 Sal lan; 55 Cer alp; 85 Pan pez; 44 Sal gla; 50 Pol viv; 74 Pel pol; 82 Des fle; 81 Sax ste; 83 Gym dry; 87 Woo alp; 11 Ant odo; 12 Luz spi; 51 Tar spp.

Fig. 4.77 Species group 7, Storbreen high.

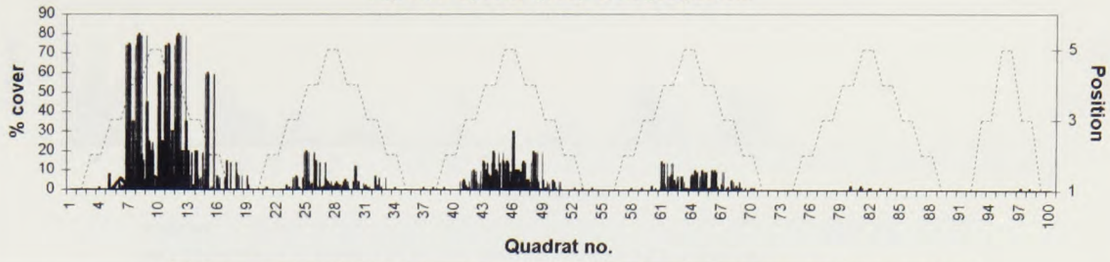


Species: 52 Oxy dig; 53 Cer cer; 61 Arc alp; 16 Phl alp; 47 Des alp; 48 Tri spi; 49 Sag sag; 63 Poa alp; 88 Sax ces; 10 Fes ovi; 78 Ara alp; 64 Ste bot.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

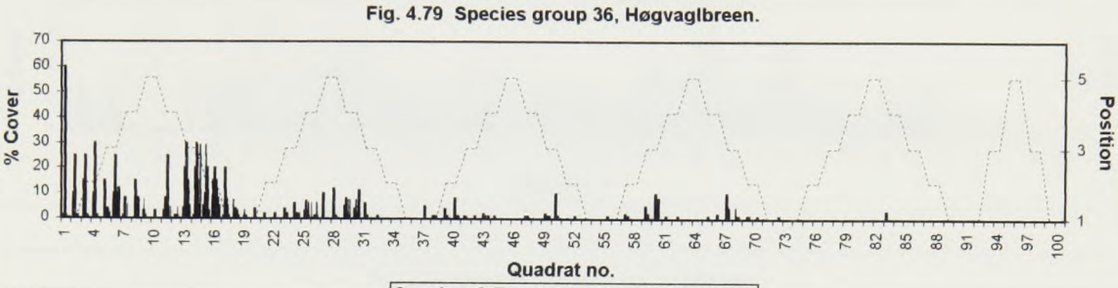
Figs. 4.78 to 4.81 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Høgvaglbreen.. *(dashed line represents moraine profiles)*

Fig. 4.78 Species group 8, Høgvaglbreen.



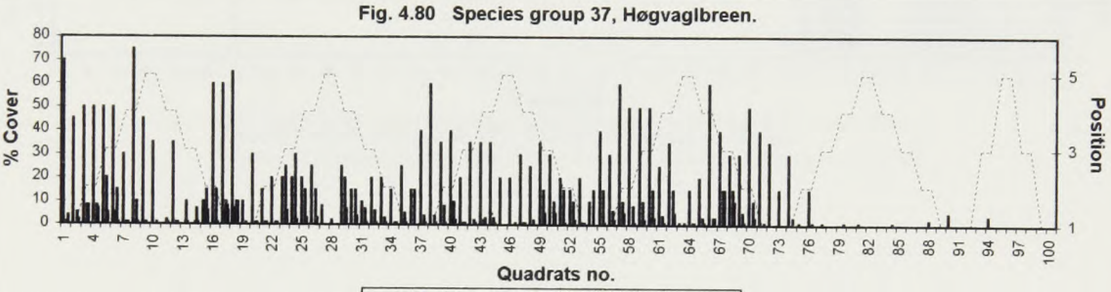
Species: 19 Cet niv; 20 Cet cuc; 8 Vac vit; 9 Vac uli; 34 Ale och; 35 Ale nig; 38 Tha ver; 43 Cla ran; 10 Jun tri; 32 Cor acu; 33 Cor div; 42 Sph glo.

Fig. 4.79 Species group 36, Høgvaglbreen.



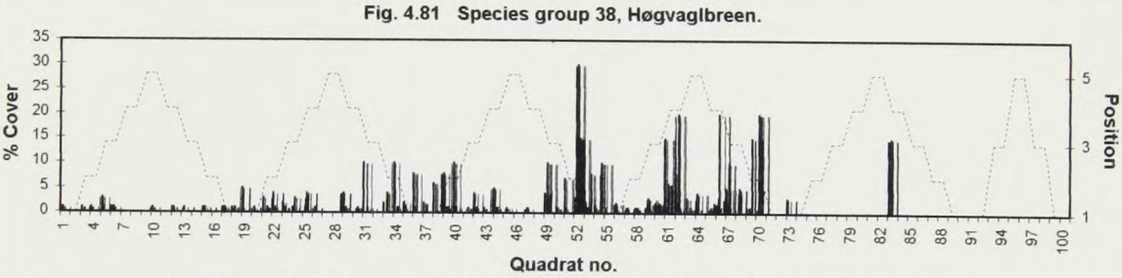
Species: 2 Fes ovi; 21 Cla gra; 29 Cla arb; 30 Cla por; 31 Cla unc;

Fig. 4.80 Species group 37, Høgvaglbreen.



Species: 1 Sal her; 7 Sil aca; 11 Car spp; 17 Cet eri; 25 Cla chl.

Fig. 4.81 Species group 38, Høgvaglbreen.

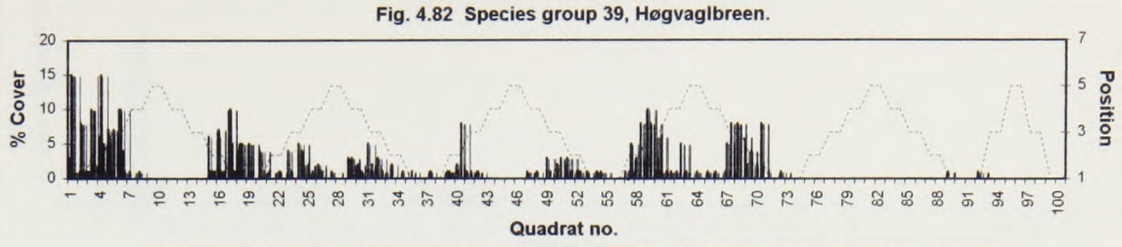


Species: 4 Cas hyp; 5 Luz spi; 27 Cla fim; 45 Phy cae; 49 Ran gla; 28 Cla cer; 41 Cla ver; 46 Pol viv; 47 Phl alp; 51 Emp nig; 52 Luz arc; 53 Ant alp; 54 Nar spp.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

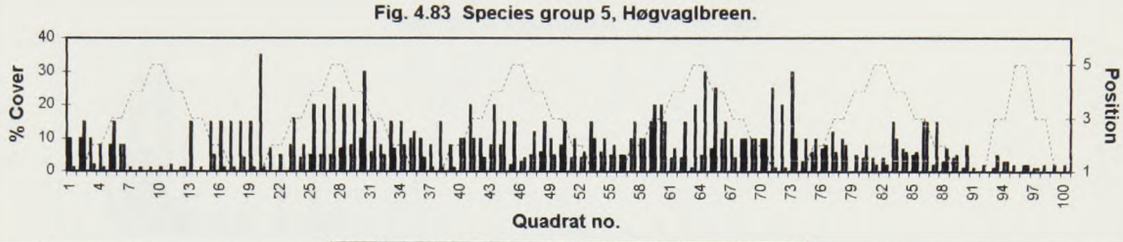
Figs. 4.82 to 4.84 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Høgvaglbreen.. *(dashed line represents moraine profiles)*

Fig. 4.82 Species group 39, Høgvaglbreen.



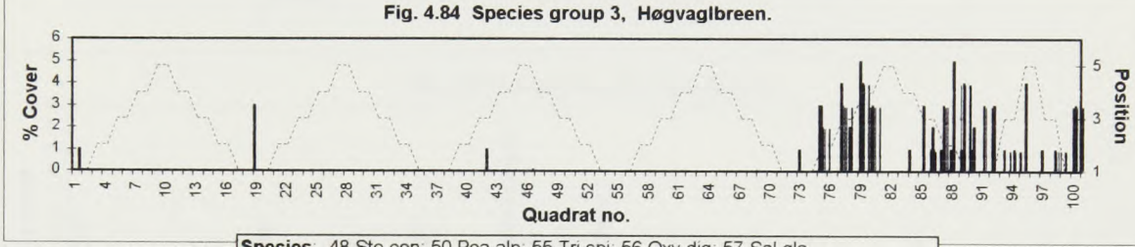
Species: 3 Lyc sel; 6 Gna sup; 12 Hie spp; 14 Ste spp; 22 Cla squ; 23 Cla car; 24 Cla cri; 26 Cla pix; 36 Sph fra; 37 Cla dig; 39 Cla ama; 40 Cla bel; 44 Cla coc; 18 Cet isl.

Fig. 4.83 Species group 5, Høgvaglbreen.



Species: 13 Ste alp; 15 Ste bot; 16 Sol cro.

Fig. 4.84 Species group 3, Høgvaglbreen.

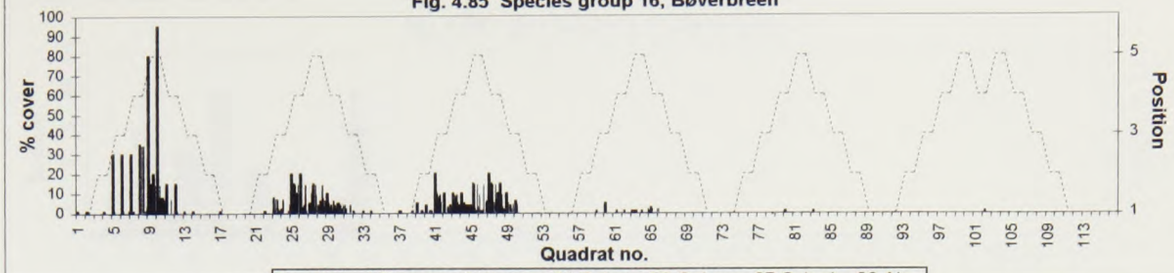


Species: 48 Ste con; 50 Poa alp; 55 Tri spi; 56 Oxy dig; 57 Sal gla.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

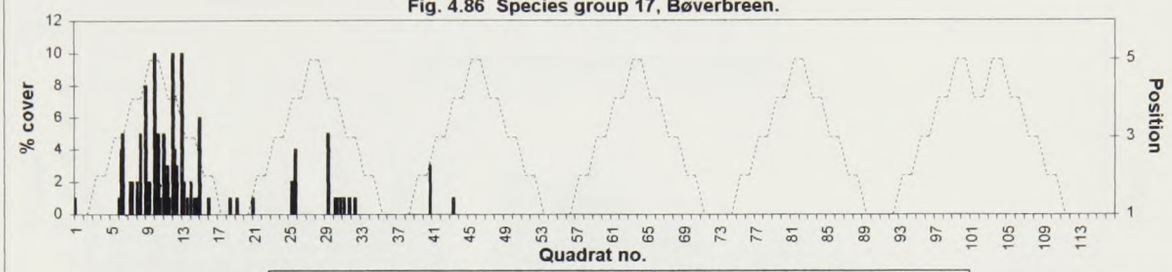
Figs. 4.85 to 4.89a Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Bøverbreen. *(dashed line represents moraine profiles)*

Fig. 4.85 Species group 16, Bøverbreen



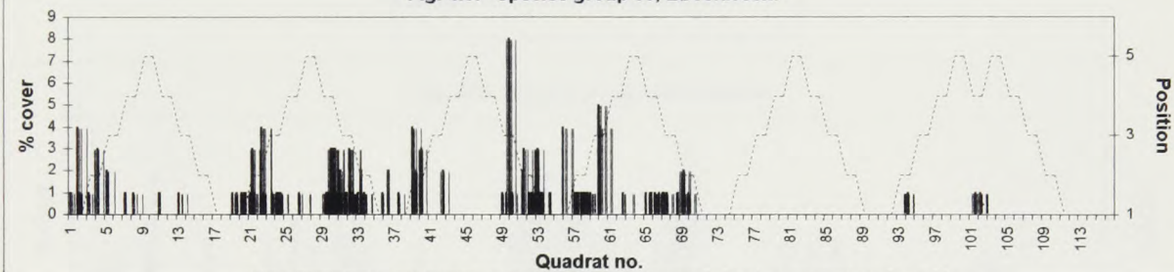
Species: 1 Emp nig; 9 Hie spp; 21 Cet niv; 22 Cet cuc; 37 Sph glo; 38 Ale och; 39 Ale nig; 40 Cor acu; 41 Cor div; 58 Jun tri; 60 Arc alp.

Fig. 4.86 Species group 17, Bøverbreen.



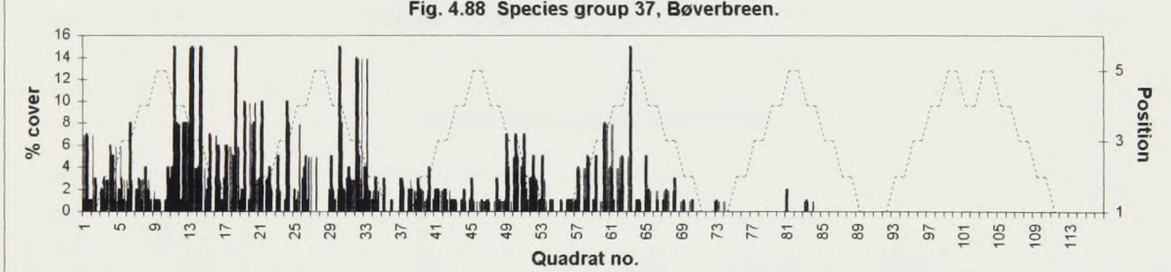
Species: 32 Cla ama; 42 Tha ver; 4 Carr spp; 44 Unn cup; 54 Cla cri.

Fig. 4.87 Species group 36, Bøverbreen.



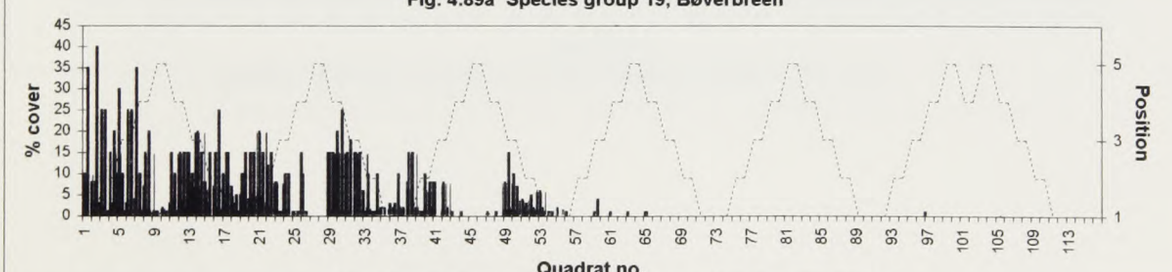
Species: 3 Phy cae; 11 Lyc sel; 18 Ste bot; 36 Cla fur; 48 Cas hyp; 49 Gna sup; 53 Cla cer; 55 Cla dig; 57 Pso hyp.

Fig. 4.88 Species group 37, Bøverbreen.



Species: 6 Luz spi; 16 Ste con; 23 Sph fra; 24 Cla chl; 26 Cla fim; 30 Cla ran.

Fig. 4.89a Species group 19, Bøverbreen

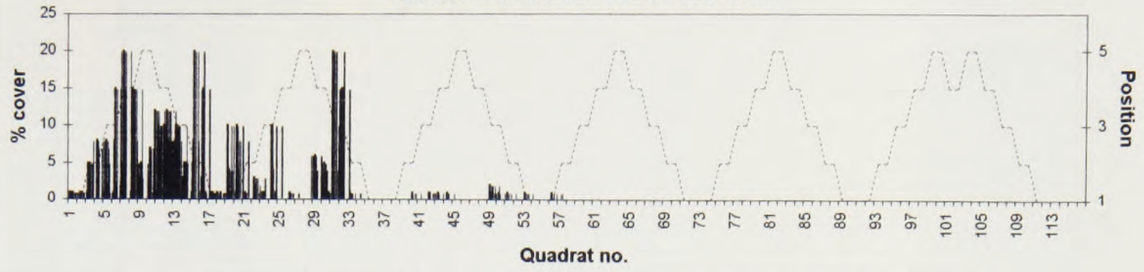


Species: 20 Cet eri; 19 Cet isl; 25 Cla pbc; 27 Cla squ; 33 Cla gra; 35 Cla ver; 62 Cet del.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

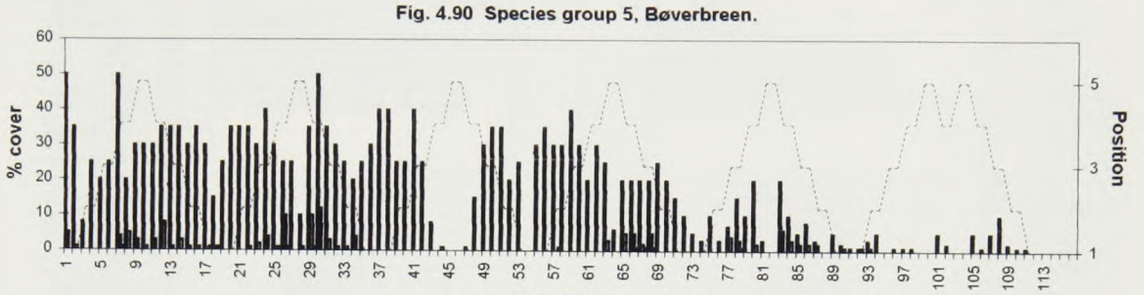
Figs. 4.89b to 4.92 Distribution of TWINSPAN "final species groups" in relation to slope position, in quadrats across moraines of decreasing age, at Bøverbreen. *(dashed line represents moraine profiles)*

Fig. 4.89b Species group 19, Bøverbreen.



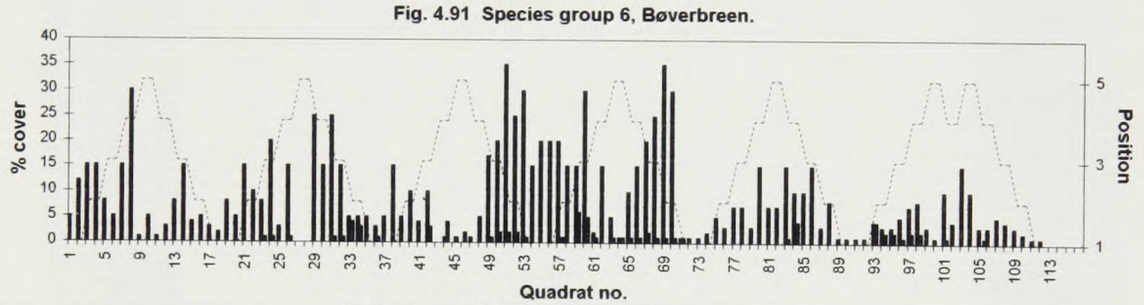
Species: 10 Vac vit; 12 Ran gla; 13 Nep arc; 17 Ste spp; 28 Cla por; Cla unc; 34 Cla car; 45 Cla ste; 46 Cla bel; 47 Pan pez; 51 Sag sga; 56 War red; 29 Cla arb.

Fig. 4.90 Species group 5, Bøverbreen.



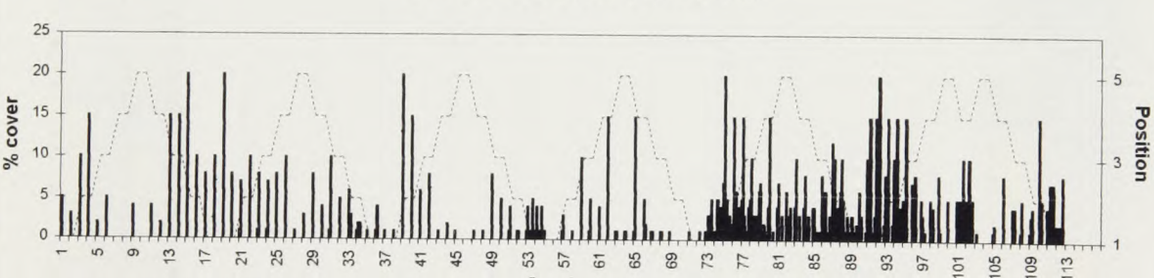
Species: 2 Sal her; 5 Fes ovi; 8 Ant alp.

Fig. 4.91 Species group 6, Bøverbreen.



Species: 15 Ste alp; 50 Tri spi; 63 Sal gla.

Fig. 4.92 Species group 7, Bøverbreen.



Species: 14 Sol cro; 7 Poa alp; 52 Oxy dig; 61 Des alp; 64 Cer cer; 59 Cer alp.

Notes: low quadrat numbers belong to the oldest moraines, and the high numbers belong to the youngest moraines, in each sequence; the different species are not distinguished on each diagram although the individual species, within each TWINSPAN group, are listed. See Appendix 1 for full species names.

Table 5.1 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Austerdalsbreen. *(with superimposed TWINSPAN "final site groups")*

AUSF AXIS (1) RANK1 Eig = 0.93		AUSF AXIS (1) RANK1 Eig = 0.44		AUSF AXIS (2) RANK 2 Eig = 0.29		AUSF AXIS (2) RANK 2 Eig = 0.748	
16	Roo de	17	9a	124	62	26	Alt tud
14	Hum d	18	9b	114	57	21	Bar gra
27	Age m	1	1a	123	62	13	pH* ***
15	Sta de	13	7a	113	57	6	Flu via
12	Soi tex	2	1b	120	60	24	Bry cov
6	Flu via	5	3a	125	63	4	Dow els
23	Veg co	12	6b	117	59	5	Moi tre
25	Asp ea	6	3b	111	56	20	Bar bou
13	pH* ***	11	6a	121	61	7	Slo pe*
8	Sol flu	4	2b	112	56	22	Bar fin
9	Asp ect	3	2a	126	63	25	Asp eas
5	Moi tre	14	7b	122	61	3	Fro hve
7	Slo pe*	16	8b	115	58	11	Ani inf
26	Alt tud	10	5b	109	55	9	Asp ect
2	Pos env	8	4b	110	55	10	Tra mpl
11	Ani inf	9	5a	118	59	1	Sno lie
10	Tra mp	7	4a	1	1a	14	Hum dep
4	Dow els	15	8a	101	51	16	Roo dep
1	Sno lie	22	11b	78	39b	8	Sol flu
22	Bar fin	23	12a	116	58	12	Soi tex
21	Bar gra	33	17a	92	46b	2	Pos env
20	Bar bo	111	56	2	1b	23	Veg cov
3	Fro hve	28	14b	74	37b	15	Sta dep
24	Bry cov	21	11a	26	13b	27	Age mor
		34	17b	13	7a		
		90	45a	90	45b		
		24	12b	73	37a		
		26	13b	107	54a		
		25	13a	76	38b		
		30	15b	108	54b		
		92	46b	25	13a		
		32	16b	75	38a		
		71	36a	57	29a		
		112	56	23	12a		
		27	14a	18	9b		
		10	10a	4	2b		
		31	16a	94	47b		
		74	37b	104	52b		
		73	37a	93	47a		
		35	18a	24	12b		
		36	18b	98	49b		
		90	45b	6	3b		
		20	10b	5	3a		
		89	45a	54	27b		
		91	46a	91	46a		
		121	61	99	50a		
		107	54	105	53a		
		109	55	72	36b		
		53	27a	79	40a		
		75	38a	119	60a		
		105	53	40	20b		
		108	54	103	52a		
		76	38b	106	53b		
		70	35b	53	27a		
		72	36b	89	45a		
		54	27b	12	6b		
		78	39b	88	44b		
		110	55	71	36a		
		55	28a	3	2a		
		93	47a	42	21b		
		88	44b	87	44a		
		103	52	16	8b		
		126	63	21	11a		
		37	19a	28	14b		
		106	53	33	17a		
		125	63	27	14a		
		38	19b	44	22b		
		97	49a	43	22a		
		68	34b	11	6a		
		56	28b	102	51b		
		57	29a	14	7b		
		43	22a	34	17b		
		100	50	41	21a		
		49	25a	95	48a		
		40	20b	60	30b		
		87	44a	50	25b		
		113	57	83	42a		
		98	49b	97	49a		
		123	62	82	41b		
		39	20a	36	18b		
		47	24a	15	8a		
		99	50a	48	24b		
		41	21a	77	39a		
		67	34a	96	48b		
		79	40a	100	50b		
		102	51	55	28a		
		50	25b	56	28b		
		69	35a	70	35b		
		94	47b	22	11b		
		42	21b	30	15b		
		51	26a	39	20a		
		48	24b	49	25a		
		85	43a	59	30a		
		104	52b	20	10b		
		46	23b	10	5b		
		122	61	62	31b		
		65	33a	28	14a		
		84	42b	61	31a		
		83	42a	68	34b		
		101	51	66	33a		
		52	26b	19	10a		
		60	30b	69	35a		
		114	57	84	42b		
		45	23a	9	5a		
		77	39a	35	18a		
		80	40b	47	24a		
		96	48b	67	34a		
		81	41a	33	16a		
		86	43b	52	26b		
		95	48a	37	19a		
		58	29b	45	23a		
		61	31a	38	19b		

+ve end of DCA axis

SITE COLOUR KEY

Represents TWINSPAN "final site groups" - see profiles (Fig 4.3) for location of groups on foreland. AUSTERDALSBREEN *(some colours, used for final groups in Fig. 4.3, have been lightened in order to read the cell captions)*

- Group 7*
- Group 8*
- Group 9*
- Group 10*
- Group 11*
- Group 12*
- Group 13*
- Group 14*
- Group 15*
- Group 16*

Axes continue ...

AXIS (1)	AXIS (2)
axes continue ...	
82	41b 46 23b
59	30a 81 41a
66	33b 82 41b
44	22b 51 26a
120	60 8 4b
64	32b 64 32b
63	32a 63 32a
117	59 85 43a
124	62 86 43b
115	58 7 4a
118	59 58 29b
116	58 66 33b
119	60 17 9a

-ve end of DCA axis

Table 5.2 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Fåbergstølsbreen. *(with superimposed TWINSPAN "final site groups")*

FASF AXIS (1) RANK 1 Eig = 0.96		FASF AXIS (1) RANK 1 Eig = 0.81		FASF AXIS (2) RANK 2 Eig = 0.50		FASF AXIS (2) RANK 2 Eig = 0.79	
6	Flu via	86	42a	48	23a	5	Moi tre
21	Bar gra	96	48b	46	23b	1	Sno lie
20	Bar bo	75	38a	49	24b	20	Bar bo
4	Dow els	91	45b	55	27a	6	Flu via
3	Fro hve	96	48b	51	25a	21	Bar gra
22	Bar fin	88	44b	62	31b	13	pH* ***
13	pH* ***	76	38b	57	28a	2	Pos env
26	Alt tud	94	47b	54	27b	9	Asp ect
10	Tra mp	107	54	44	22b	10	Tra mp
25	Asp ea	92	46b	55	28a	22	Bar fin
9	Asp ect	103	52	52	26b	4	Dow els
8	Sol flu	102	51	43	21a	3	Fro hve
1	Sno lie	91	45b	50	25b	26	Alt tud
11	Ani inf	78	39b	40	20b	8	Sol flu
12	Soi tex	87	44a	47	24a	23	Veg co
5	Moi tre	77	39a	39	20a	15	Sta de
2	Pos env	73	37a	69	35a	12	Soi tex
7	Slo pe*	89	45a	49	25a	24	Bry co
24	Bry co	93	47a	43	22a	7	Slo pe*
23	Veg co	89	45a	42	21b	11	Ani inf
14	Hum d	85	43a	67	34a	25	Asp ea
27	Age m	95	48a	61	31a	27	Age m
16	Roo de	80	40b	97	49a	16	Roo de
15	Sta de	74	37b	70	35b	14	Hum d
		79	40a	65	33a		
		105	53	64	32b		
		106	53	35	18a		
		90	45b	60	30b		
		104	52	63	32a		
		101	51	66	33b		
		93	47a	46	23b		
		97	49a	36	18b		
		102	51	105	53a		
		96	48b	31	16a		
		99	50a	58	29b		
		100	50	57	29a		
		66	33b	28	14b		
		68	34b	85	43a		
		58	29b	38	19b		
		71	36a	33	17a		
		65	33a	87	44a		
		57	29a	102	51b		
		61	31a	88	44b		
		64	32b	57	29a		
		56	28b	81	41a		
		59	30a	27	14a		
		72	36b	59	30a		
		63	32a	68	34b		
		60	30b	98	49b		
		62	31b	29	15a		
		70	35b	34	17b		
		24	12b	89	45a		
		38	19b	74	37b		
		47	24a	76	38b		
		21	11a	33	17a		
		25	13a	74	37b		
		22	11b	93	47a		
		51	26a	106	53b		
		19	10a	90	45b		
		20	10b	92	46b		
		36	18b	75	38a		
		26	13b	26	13b		
		46	23b	73	37a		
		48	24b	32	16b		
		23	12a	83	42a		
		32	16b	72	36b		
		69	35a	84	42b		
		18	9b	107	54a		
		35	18a	99	50a		
		2	1b	104	52b		
		30	15b	56	28b		
		31	16a	103	52a		
		43	22a	101	51b		
		44	22b	78	39b		
		55	28a	80	40b		
		1	1a	82	41b		
		17	9a	30	15b		
		97	49a	71	36a		
		45	23a	77	39a		
		41	21a	79	40a		
		5	3a	100	50b		
		6	3b	10	5b		
		9	5a	101	51a		
		11	6a	96	48b		
		12	6b	23	12a		
		13	7a	25	13a		
		14	7b	7	4a		
		15	8a	3	2a		
		16	8b	6	3b		
		27	14a	4	2b		
		34	17b	14	7b		
		41	21a	8	4b		
		52	26b	16	8b		
		53	27a	5	3a		
		4	2b	13	7a		
		8	4b	15	8a		
		10	5b	9	5a		
		28	14b	19	10a		
		29	15a	12	6b		
		33	17a	24	12b		
		42	21b	1	1a		
		7	4a	17	9a		
		39	20a	2	1b		
		40	20b	21	11a		
		49	25a	22	11b		
		3	2a	11	6a		
		50	25b	18	9b		
		54	27b	20	10b		

+ve end of DCA axis

SITE COLOUR KEY

Represents TWINSPAN "final site groups" - see profiles (Fig. 4.4) for location of groups on foreland. FÅBERGSTØLSBREEN *(some colours, used for final groups in Fig. 4.4, have been lightened in order to read the cell captions)*

- Group 7*
- Group 9*
- Group 11*
- Group 12*
- Group 16*
- Group 17*
- Group 20*
- Group 21*
- Group 26*
- Group 27*

-ve end of DCA axis

Note: see Appendix 3 for environmental parameter abbreviations

Table 5.3 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Storbreen low (1). *(with superimposed TWINSPAN "final site groups")*

STLF1	STL1	STL1	STLF1
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig = 0.94	Eig = 0.35	Eig = 0.22	Eig = 0.852
5 Moi tre	46 23b	23 12a	16 Roo dep
2 Pos env	28 14b	24 12b	20 Bar bou
21 Bar gra	82 41b	19 10a	21 Bar gra
10 Tra mpl	81 41a	20 10b	9 Asp ect
1 Sno lie	45 23a	90 45b	7 Slo pe*
13 pH* ***	80 40b	33 17a	22 Bar fin
4 Dow els	63 32a	21 11a	26 Alt tud
20 Bar bo	64 32b	108 54	6 Flu via
3 Fro hve	99 50a	22 11b	10 Tra mpl
24 Bry cov	79 40a	34 17b	13 pH* ***
7 Slo pe*	27 14a	89 45a	4 Dow els
9 Asp ect	83 42a	95 48a	25 Asp eas
22 Bar fin	30 15b	37 19a	24 Bry cov
26 Alt tud	84 42b	100 50	5 Moi tre
25 Asp ea	29 15a	105 53	14 Hum dep
6 Flu via	86 43b	36 18b	15 Sta dep
16 Roo de	85 43a	99 50a	1 Sno lie
12 Soi tex	100 50	106 53	2 Pos env
23 Veg co	62 31b	38 19b	23 Veg cov
8 Sol flu	60 30b	101 51	27 Age mor
27 Age mo	59 30a	104 52	3 Fro hve
14 Hum de	104 52	94 47b	12 Soi tex
15 Sta dep	61 31a	107 54	8 Sol flu
	102 51	98 49b	
	97 49a	103 52a	
	101 51	96 48b	
	66 33b	87 44a	
	48 24b	32 16b	
	103 52	102 51b	
	75 38a	71 36a	
	77 39a	88 44b	
	26 13b	91 46a	
	78 39b	92 46b	
	87 44a	46 23b	
	68 34b	86 43a	
	88 44b	93 47a	
	57 29a	40 20b	
	10 5b	39 20a	
	43 22a	84 42b	
	66 33a	17 9a	
	44 22b	97 49a	
	92 46b	72 36b	
	58 29b	82 41b	
	108 53	66 33a	
	93 47a	78 39b	
	94 47b	80 40b	
	47 24a	25 13a	
	91 46a	53 27a	
	25 13a	73 37a	
	98 49b	75 38a	
	105 53	45 23a	
	67 34a	42 21b	
	73 37a	81 41a	
	90 45b	35 18a	
	107 54	79 40a	
	9 5a	18 9b	
	55 28a	66 33b	
	74 37b	67 34a	
	76 38b	76 38b	
	89 45a	83 42a	
	72 36b	70 35b	
	70 35b	77 39a	
	71 36a	68 34b	
	95 48a	30 15b	
	50 25b	41 21a	
	49 25a	28 14b	
	96 48b	74 37b	
	108 54	64 32b	
	56 28b	43 22a	
	69 35a	86 43b	
	31 16a	60 30b	
	51 26a	5 3a	
	7 4a	26 13b	
	32 16b	54 27b	
	42 21b	6 3b	
	38 19b	15 8a	
	52 26b	51 26a	
	41 21a	69 35a	
	54 27b	57 29a	
	40 20b	4 2b	
	53 27a	61 31a	
	24 12b	44 22b	
	11 6a	13 7a	
	8 4b	16 8b	
	23 12a	31 16a	
	34 17b	62 31b	
	15 8a	48 24b	
	37 19a	14 7b	
	12 6b	2 1b	
	20 10b	1 1a	
	3 2a	3 2a	
	39 20a	27 14a	
	36 18b	59 30a	
	33 17a	63 32a	
	19 10a	29 15a	
	1 1a	58 29b	
	35 18a	55 28a	
	2 1b	50 25b	
	18 9b	47 24a	
	14 7b	56 28b	
	17 9a	52 26b	
	6 3b	49 25a	
	16 8b	12 6b	
	21 11a	8 4b	
	22 11b	11 6a	
	13 7a	7 4a	
	4 2b	10 5b	
	5 3a	9 5a	

+ve end of DCA axis

SITE COLOUR KEY
Represents TWINSPAN "final sitegroups" - see profiles (Fig 4.5) for location of groups on foreland.
STORBREEN LOW (1) *(some colours, used for final groups in Fig. 4.5, have been lightened in order to read the cell captions)*

Group 4*
Group 10*
Group 11*
Group 12*
Group 13*
Group 14*
Group 15*

-ve end of DCA axis

Note: see Appendix 3 for environmental parameter abbreviations

Table 5.4 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Storbreen low (2). *(with superimposed TWINSPAN "final site groups")*

STLF2	STL2	STL2	STLF2
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig= 954	Eig = 0.42	Eig = 0.27	Eig= 791
21 Bar gra	31 16a	24 12b	20 Bar bo
3 Fro hve	103 52	23 12a	6 Flu via
26 Alt tud	50 25b	21 11a	26 Alt tud
5 Moi tre	32 16b	22 11b	21 Bar gra
1 Sno lie	49 25a	37 19a	24 Bry cov
22 Bar fin	67 34a	26 13b	7 Slo pe*
2 Pos env	28 14b	19 10a	14 Hum de
7 Slo pe*	47 24a	20 10b	10 Tra mpl
20 Bar bo	85 43a	75 38a	22 Bar fin
4 Dow els	48 24b	76 38b	3 Fro hve
10 Tra mpl	104 52	17 9a	16 Roo de
9 Asp ect	68 34b	29 15a	11 Ani inf
11 Ani inf	51 26a	74 37b	9 Asp ect
8 Sol flu	106 53	25 13a	13 pH* ***
6 Flu via	52 26b	36 18b	27 Age mo
13 pH* ***	87 44a	93 47a	4 Dow els
24 Bry cov	100 50	60 30b	5 Moi tre
25 Asp ea	86 43b	30 15b	12 Soi tex
27 Age mo	99 50a	41 21a	25 Asp ea
15 Sta dep	107 54	48 24b	1 Sno lie
12 Soi tex	88 44b	18 9b	15 Sta dep
14 Hum de	105 53	57 29a	2 Pos env
23 Veg cov	34 17b	104 52	8 Sol flu
16 Roo dep	108 54	38 19b	23 Veg cov
	102 51	47 24a	
	84 42b	58 29b	
	101 51	67 34a	
	33 17a	32 16b	
	81 41a	42 21b	
	69 35a	73 37a	
	65 33a	82 41b	
	112 56	94 47b	
	89 45a	49 25a	
	70 35b	106 53b	
	82 41b	28 14b	
	109 55	2 1b	
	83 42a	85 43a	
	96 48b	61 31a	
	66 33b	46 23b	
	27 14a	77 39a	
	79 40a	79 40a	
	92 46b	35 18a	
	97 49a	100 50b	
	111 56	62 31b	
	98 49b	51 26a	
	95 48a	76 39b	
	72 36b	98 49b	
	90 45b	107 54a	
	91 46a	45 23a	
	110 55	111 56a	
	63 32a	80 40b	
	64 32b	99 50a	
	40 20b	87 44a	
	80 40b	34 17b	
	78 39b	69 35a	
	94 47b	33 17a	
	77 39a	86 43b	
	71 36a	39 20a	
	73 37a	59 30a	
	93 47a	92 46b	
	56 28b	108 54b	
	43 22a	68 34b	
	39 20a	50 25b	
	54 27b	109 55a	
	36 18b	71 36a	
	44 22b	81 41a	
	74 37b	88 45a	
	29 15a	90 45b	
	35 18a	40 20b	
	59 30a	112 56b	
	75 38a	105 53a	
	30 15b	95 48a	
	53 27a	97 49a	
	61 31a	91 48a	
	62 31b	70 35b	
	55 28a	63 32a	
	45 23a	52 26b	
	60 30b	56 28b	
	38 19b	98 49b	
	76 38b	66 33b	
	25 13a	88 44b	
	26 13b	3 2a	
	37 19a	84 42b	
	41 21a	65 33a	
	42 21b	110 55b	
	46 23b	72 36b	
	19 10a	83 42a	
	20 10b	102 51b	
	57 29a	101 51a	
	58 29b	103 52a	
	14 7b	16 8b	
	8 4b	55 28a	
	13 7a	64 32b	
	3 2a	1 1a	
	9 5a	4 2b	
	12 6b	44 22b	
	22 11b	54 27b	
	10 5b	27 14a	
	11 6a	43 22a	
	5 3a	8 4b	
	16 8b	14 7b	
	4 2b	13 7a	
	6 3b	53 27a	
	17 9a	15 8a	
	7 4a	5 3a	
	15 8a	31 16a	
	21 11a	6 3b	
	23 12a	10 5b	
	18 9b	9 5a	
	2 1b	12 6b	
	24 12b	11 6a	
	1 1a	7 4a	

+ve end of DCA axis

SITE COLOUR KEY
Represents TWINSPAN "final site groups" - see profiles (Fig 4.6) for location of groups on foreland.
STORBREEN LOW (2) *(some colours, used for final groups in Fig. 4.6, have been lightened in order to read the cell captions)*

Group 4*
Group 7*
Group 10*
Group 11*
Group 12*
Group 13*

-ve end of DCA axis

Table 5.5 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Svellnosbreen. *(with superimposed TWINSPAN "final site groups")*

SVLF AXIS (1) RANK 1		SVLF AXIS (1) RANK 1		SVLF AXIS (2) RANK 2		SVLF AXIS (2) RANK 2	
Eig = 0.88		Eig = .442		Eig = .357		Eig = 0.916	
6 Flu via		110	55	17	9a	14 Hum dep	
14 Hum de		101	51	2	1b	27 Age mor	
15 Sta dep		102	51	1	1a	15 Sta dep	
24 Bry co		109	55	18	9b	16 Roo dep	
10 Tra mp		107	54	4	2b	23 Veg cov	
20 Bar bo		94	47b	3	2a	8 Sol flu	
16 Roo de		108	54	109	55	12 Soi tex	
21 Bar gra		104	52	16	8b	7 Slo pe*	
25 Asp ea		105	53	5	3a	5 Moi tre	
26 Alt tud		100	50	6	3b	11 Ani inf	
13 pH* ***		95	48a	7	4a	6 Flu via	
7 Slo pe*		106	53	22	11b	25 Asp eas	
11 Ani inf		96	48b	8	4b	2 Pos env	
23 Veg co		99	50a	12	6b	24 Bry cov	
8 Sol flu		103	52	11	6a	1 Sno lie	
22 Bar fin		93	47a	14	7b	4 Dow els	
9 Asp ect		92	46b	15	8a	22 Bar fin	
4 Dow els		97	49a	21	11a	10 Tra mpl	
12 Soi tex		17	9a	101	51	26 Alt tud	
27 Age mo		2	1b	102	51	3 Fro hve	
5 Moi tre		92	46a	13	7a	9 Asp ect	
3 Fro hve		91	46a	24	12b	20 Bar bou	
2 Pos env		98	49b	20	10b	21 Bar gra	
1 Sno lie		18	9b	19	10a	13 pH* ***	
		1	1a	9	5a		
		73	38a	10	5b		
		74	39a	20	10a		
		20	10b	28	14b		
		50	26a	26	13b		
		49	25b	25	13a		
		4	2b	47	24a		
		65	34b	48	23b		
		3	2a	44	22b		
		19	10a	31	16a		
		37	19a	66	33b		
		38	19b	65	33a		
		66	34a	107	54a		
		86	43b	43	22a		
		69	36a	32	16b		
		70	36b	27	14a		
		58	29b	58	29b		
		82	41b	64	32b		
		67	34b	54	27b		
		81	41a	42	21b		
		22	11b	48	24a		
		23	12a	48	24b		
		76	39b	59	30a		
		21	11a	28	14a		
		24	12b	94	47b		
		85	43a	29	15a		
		5	3a	63	32a		
		79	40a	68	34b		
		54	27a	41	21a		
		61	31a	60	30b		
		83	42a	84	42b		
		78	39a	40	20b		
		6	3b	110	55b		
		16	8b	61	31a		
		62	31b	62	31b		
		33	17a	33	17a		
		75	38a	34	17b		
		35	18a	35	18a		
		8	4b	30	15b		
		31	16a	39	19a		
		15	8a	39	20a		
		7	4a	37	19b		
		36	18b	37	18b		
		80	40b	85	43a		
		60	30a	70	35b		
		77	39a	98	49b		
		14	7b	108	54b		
		39	20a	70	35a		
		13	7a	67	34a		
		63	32a	71	36a		
		40	20b	30	15b		
		68	34b	105	53a		
		91	46a	23	12a		
		57	29a	42	21b		
		61	31a	97	49a		
		83	42a	70	35b		
		25	13a	83	42a		
		41	21a	95	48a		
		55	28a	92	46b		
		34	17b	95	48a		
		64	32b	64	32b		
		58	29b	64	32a		
		62	31b	38	19b		
		59	30a	59	30a		
		12	6b	104	52b		
		26	13b	91	46a		
		41	21a	103	52a		
		95	48b	46	23b		
		60	30b	32	16b		
		65	33a	17	9a		
		48	24b	79	40a		
		42	21b	39	20a		
		47	24a	106	53b		
		93	47a	93	47a		
		43	22a	31	16a		
		46	23b	94	48b		
		64	32b	51	26a		
		31	16a	86	43b		
		32	16b	69	35b		
		44	22a	82	41b		
		45	23a	67	34b		
		28	14b	88	44b		
		44	22b	100	50b		
		27	14a	97	49a		
		9	5a	96	48b		
		26	13a	99	50a		
		10	5b	98	49b		

+ve end of DCA axis

SITE COLOUR KEY

Represents TWINSPAN "final site groups" - see profiles (Fig 4.7) for location of groups on foreland. SVELLNOSBREEN *(some colours, used for final groups in Fig. 4.7, have been lightened in order to read the cell captions)*

Group 3*
Group 8*
Group 9*
Group 20*
Group 21*
Group 22*
Group 23*

-ve end of DCA axis

Note: see Appendix 3 for environmental parameter abbreviations

Table 5.6 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Storbreen high. *(with superimposed TWINSPAN "final site groups")*

STHF AXIS (1) RANK 1		STHF AXIS (1) RANK 1		STHF AXIS (2) RANK 2		STHF AXIS (2) RANK 2	
Eig = 0.89		Eig = .483		Eig = .223		Eig = 0.80	
6 Flu via		135	68	102	51	20 Bar bo	
13 pH* ***		136	68	24	12b	21 Bar gra	
10 Tra mp		134	67	22	11b	7 Slo pe*	
22 Bar fin		142	71	101	51	3 Fro hve	
25 Asp ea		149	75	23	12a	5 Moi tre	
9 Asp ect		148	74	44	22b	24 Bry co	
23 Veg co		150	75	91	46a	22 Bar fin	
14 Hum de		133	67	90	45b	2 Pos env	
16 Roo de		117	59	86	43a	1 Sno lie	
8 Sol flu		138	69	115	58	25 Asp ea	
20 Bar bo		143	72	92	46b	6 Flu via	
21 Bar gra		118	59	73	37a	8 Sol flu	
26 Alt tud		140	70	99	50a	9 Asp ect	
24 Bry co		146	73	69	35a	10 Tra mp	
4 Dow els		132	66	74	37b	4 Dow els	
7 Slo pe*		137	69	88	44b	13 pH* ***	
15 Sta dep		147	74	108	54	26 Alt tud	
3 Fro hve		131	66	75	38a	12 Soi tex	
5 Moi tre		139	70	56	28b	27 Age mo	
12 Soi tex		141	71	53	27a	16 Roo de	
1 Sno lie		130	66	150	75	14 Hum de	
2 Pos env		127	64	94	47b	23 Veg co	
27 Age mo		144	72	52	26b	15 Sta dep	
		129	65	81	41a		
		99	50a	30	15b		
		119	60	105	53a		
		145	73	87	44a		
		124	62	66	33b		
		123	62	109	55a		
		128	64	55	28a		
		102	51	93	47a		
		116	58	86	43b		
		122	61	149	75a		
		22	11b	57	29a		
		19	10a	82	41b		
		120	60	113	57a		
		100	50	89	45a		
		115	58	26	13b		
		82	41b	65	33a		
		112	56	111	56a		
		23	12a	29	15a		
		113	57	48	24b		
		121	61	100	50b		
		114	57	43	22a		
		24	12b	50	25b		
		81	41a	51	26a		
		101	51	76	38b		
		20	10b	27	14a		
		111	56	134	67b		
		125	63	25	13a		
		62	31b	97	49a		
		57	29a	42	21b		
		70	35b	84	42b		
		35	18a	112	56b		
		60	30b	38	19b		
		83	42a	72	36b		
		103	52	107	54a		
		59	30a	126	63b		
		104	52	104	52b		
		21	11a	28	14b		
		58	29b	95	48a		
		61	31a	148	74b		
		109	55	103	52a		
		36	18b	83	42a		
		40	20b	49	25a		
		110	55	116	58b		
		33	17a	61	31a		
		39	20a	96	48b		
		77	39a	45	23a		
		95	48a	70	35b		
		126	63	98	49b		
		69	35a	118	59b		
		34	17b	133	67a		
		4	2b	41	21a		
		38	19b	110	55b		
		3	2a	114	57b		
		41	21a	67	34a		
		63	32a	47	24a		
		106	53	117	59a		
		42	21b	145	73a		
		75	38a	119	60a		
		37	19a	58	29b		
		80	40b	54	27b		
		79	40a	63	32a		
		97	49a	40	20b		
		2	1b	62	31b		
		14	7b	71	36a		
		17	9a	46	23b		
		91	46a	80	40b		
		16	8b	106	53b		
		64	32b	60	30b		
		78	39b	64	32b		
		6	3b	78	39b		
		18	9b	39	20a		
		32	16b	37	19a		
		76	38b	31	16a		
		1	1a	19	10a		
		84	42b	14	7b		
		5	3a	77	39a		
		107	54	136	68b		
		15	8a	21	11a		
		98	49b	68	34b		
		31	16a	13	7a		
		85	43a	131	66a		
		86	43b	138	69b		
		44	22b	32	16b		
		93	47a	125	63a		
		74	37b	59	30a		
		94	47b	120	60b		
		26	13b	79	40a		
		48	24b	146	73b		
		55	28a	132	66b		

+ve end of DCA axis

SITE COLOUR KEY

Represents TWINSPAN "final site groups" - see profiles (Fig 4.8) for location of groups on foreland. STORBREEN HIGH *(some colours, used for final groups in Fig. 4.8, have been lightened in order to read the cell captions)*

Group 6*
Group 8*
Group 9*
Group 10*
Group 11*
Group 12*
Group 13*

AXIS (1)		AXIS (2)	
axes continue ...			
88	44b	122	61b
87	44a	143	72a
53	27a	15	8a
92	46b	142	71b
96	48b	18	9b
54	27b	1	1a
25	13a	121	61a
13	7a	137	69a
47	24a	144	72b
90	45b	17	9a
89	45a	140	70b
8	4b	16	8b
12	6b	35	18a
30	15b	123	62a
43	22a	135	68a
56	28b	141	71a
106	53	128	64b
29	15a	127	64a
73	37a	124	62b
7	4a	147	74a
108	54	33	17a
52	26b	2	1b
65	33a	129	65a
51	26a	7	4a
66	33b	130	65b
11	6a	5	3a
27	14a	6	3b
49	25a	36	18b
9	5a	139	70a
46	23a	10	5b
67	34a	34	17b
10	5b	9	5a
28	14b	3	2a
72	36b	4	2b
50	25b	12	6b
71	36a	8	4b
46	23b	20	10b
68	34b	11	6a

-ve end of DCA axis

Axes continue ...

Table 5.7 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Høgvaglbreen. *(with superimposed TWINSPAN "final site groups")*

HOHF AXIS (1) RANK 1	Eig = 0.90	HOHF AXIS (1) RANK 1	Eig = 0.37	HOHF AXIS (2) RANK 2	Eig = 0.22	HOHF AXIS (2) RANK 2	Eig = 0.911
26 Alt tud	91	46a	14	7b	15	Sta dep	
6 Flu via	100	50	13	7a	14	Hum dep	
13 pH* ***	79	40a	15	8a	16	Roo dep	
21 Bar gra	92	46b	16	8b	23	Veg cov	
20 Bar bou	89	45a	17	9a	27	Age mor	
11 Ani inf	87	44a	6	3b	12	Soi tex	
24 Bry cov	86	44b	11	6a	7	Slo pe*	
22 Bar fin	83	43a	1	1a	25	Asp eas	
14 Hum dep	75	38a	3	2a	8	Sol flu	
25 Alt eas	77	39a	18	9b	6	Flu via	
5 Moi tre	93	47a	2	1b	10	Tra mpl	
9 Asp ect	98	49b	4	2b	11	Ani inf	
3 Fro hve	80	40b	5	3a	9	Asp ect	
8 Sol flu	86	43b	60	30b	20	Bar bou	
4 Dow els	90	45b	92	46b	24	Bry cov	
16 Roo dep	79	39b	8	4b	22	Bar fin	
7 Slo pe*	94	47b	37	19a	3	Fro hve	
15 Sta dep	95	48a	20	10b	5	Moi tre	
10 Tra mpl	96	48b	38	19b	4	Dow els	
12 Soi tex	99	50a	77	39a	1	Sno lie	
2 Pos env	97	49a	69	30a	2	Pos env	
23 Veg cov	78	39a	89	45a	21	Bar gra	
1 Sno lie	84	42b	98	49b	26	Alt tud	
27 Age mor	76	38b	23	12a	13	pH* ***	
	82	41b	24	12b			
	85	17a	35	18a			
	74	37b	31	16a			
	84	17b	39	20a			
	63	27a	40	20b			
	64	27b	76	38a			
	71	36a	86	43a			
	83	42a	95	48a			
	20	10b	19	10a			
	35	15a	20	11b			
	36	18b	57	29a			
	72	36b	67	34a			
	81	41a	88	44b			
	18	10a	21	11a			
	61	26a	25	13a			
	55	28a	86	43b			
	68	23b	90	45b			
	58	29b	91	46a			
	23	11b	99	50a			
	35	18b	30	15b			
	40	20b	60	30b			
	52	26b	68	35a			
	57	29a	72	36b			
	59	30a	80	40b			
	69	35a	99	47a			
	2	1b	94	47b			
	21	11a	55	28a			
	37	19a	58	29b			
	39	20a	71	36a			
	70	35b	87	44a			
	1	1a	100	50b			
	23	12a	7	4a			
	31	16a	9	5a			
	42	21b	54	27b			
	60	30b	64	27a			
	3	2a	88	28b			
	4	2b	12	6b			
	18	9b	33	17a			
	24	12b	49	25a			
	29	15a	52	26b			
	41	21a	70	35b			
	49	25a	78	39b			
	50	25b	26	13b			
	5	3a	26	13a			
	6	3b	36	18b			
	17	9a	74	37b			
	32	16b	79	40a			
	67	34a	83	42a			
	38	34b	10	5b			
	16	8b	53	27a			
	26	13b	56	28a			
	30	15b	73	37a			
	25	13a	75	38b			
	61	31a	96	48b			
	62	31b	32	16b			
	15	8a	34	17b			
	43	22a	64	32b			
	44	22b	82	41b			
	63	32a	28	14b			
	64	32b	82	41b			
	65	33a	41	21a			
	66	33b	42	21b			
	28	14b	81	41a			
	27	14a	44	22a			
	47	24a	47	24a			
	48	24b	27	14a			
	13	7a	61	31a			
	14	7b	66	33b			
	45	23a	97	49a			
	8	4b	44	22b			
	46	23b	45	23a			
	12	6b	65	33a			
	7	4a	48	24b			
	9	5a	63	32a			
	10	5b	64	32b			
	11	6a	48	25a			

+ve end of DCA axis

SITE COLOUR KEY
Represents TWINSPAN "final site groups" - see profiles (Fig 4.9) for location of groups on foreland. HØGVAGLBREEN *(some colours, used for final groups in Fig. 4.9, have been lightened in order to read the cell captions)*

Group 4*
Group 6*
Group 7*
Group 11*
Group 20*
Group 21*

-ve end of DCA axis

Note: see Appendix 3 for environmental parameter abbreviations

Table 5.8 Rank of sites and environmental parameters on DCA ordination axes (1) and (2), Bøverbreen. *(with superimposed TWINSPAN "final site groups")*

BOHF AXIS (1) RANK 1	Eig = 0.93	BOHF AXIS (1) RANK 1	Eig = 0.50	BOHF AXIS (2) RANK 2	Eig = 0.26	BOHF AXIS (2) RANK 2	Eig = 0.82
21 Bar gra	112	56a	27	14a	1	Sno lie	
6 Flu via	91	46a	46	23a	21	Bar gra	
22 Bar fin	111	56b	26	13b	5	Moi tre	
4 Dow els	92	46b	49	25b	20	Bar bou	
8 Sol flu	74	37b	47	24a	22	Bar fin	
2 Pos env	95	48a	48	24b	4	Dow els	
3 Fro hve	100	50	44	22b	7	Slo pe*	
26 Alt tud	88	44b	25	13a	2	Pos env	
24 Bry cov	89	45a	45	23a	11	Ani inf	
25 Asp eas	94	47b	41	21a	8	Sol flu	
7 Slo pe*	76	38b	63	32a	3	Fro hve	
5 Moi tre	73	37a	26	13b	25	Asp eas	
9 Asp ect	87	44a	5	3a	26	Alt tud	
20 Bar bou	102	51	61	31a	13	pH* ***	
13 pH* ***	96	48b	42	21b	6	Flu via	
11 Ani inf	93	47a	23	12a	12	Soi tex	
12 Soi tex	99	50a	95	48a	9	Asp ect	
23 Veg cov	75	38a	64	32b	27	Age mor	
1 Sno lie	101	51	60	30b	16	Roo dep	
14 Hum dep	98	49b	65	33a	14	Hum dep	
15 Sta dep	86	43b	39	20a	23	Veg cov	
16 Roo dep	79	40a	71	36a	24	Bry cov	
27 Age mor	77	39a	62	31b	15	Sta dep	
	52	41b	100	50b			
	109	55a	10	5b			
	90	45b	59	30a			
	78	39b	92	46b			
	110	55b	30	15b			
	85	43a	40	20b			
	97	49a	74	37b			
	107	54a	58	29b			
	54	42b	70	35b			
	54	27b	93	47a			
	81	41a	29	15a			
	72	36b	50	25b			
	106	53a	57	29a			
	80	40b	94	47b			
	108	54b	88	44b			
	83	42a	96	48b			
	104	52a	89	45a			
	103	52b	56	28b			
	66	33b	67	34a			
	106	53b	68	34b			
	69	35a	102	51b			
	68	34b	37	19a			
	71	36a	69	35a			
	36	18b	49	25a			
	55	28a	76	38b			
	64	32b	73	37a			
	67	34a	98	49b			
	70	35b	52	26b			
	53	27a	33	17a			
	57	29a	83	42a			
	60	30b	87	44a			
	34	17b	35	18a			
	62	31b	66	33b			
	59	30a	55	28a			
	58	29b	99	50a			
	65	33a	38	19b			
	56	28b	51	26a			
	63	32a	34	17b			
	61	31a	101	51a			
	33	17a	75	38a			
	52	26b	80	40b			
	35	18a	91	46a			
	51	26a	111	56a			
	39	20a	105	53b			
	50	25b	108	54b			
	21	11a	72	36b			
	23	12a	84	42b			
	42	21b	86	43b			
	50	25b	105	53a			
	24	12b	79	40a			
	38	19b	90	45b			
	40	20b	109	55a			
	37	19a	97	49a			
	2	1b	78	39b			
	31	16a	77	39a			
	22	11b	21	11a			
	49	25a	53	27a			
	26	13b	103	52a			
	18	9b	104	52b			
	1	1a	36	18b			
	4	2b	81	41a			
	3	2a	82	41b			
	17	9a	107	54a			
	19	10a	110	55b			
	14	7b	2	1b			
	20	10b	85	43a			
	29	15a	22	11b			
	32	16b	18	9b			
	48	24b	24	12b			
	41	21a	31	16a			
	44	22b	17	9a			
	13	7a	7	4a			
	15	8a	1	1a			
	28	14b	84	27b			
	16	8b	4	2b			
	25	13a	5	3a			
	30	15b	32	16b			
	5	3a	3	2a			
	7	4a	14	7b			
	8	4b	19	10a			
	45	23a	8	4b			
	6	3b	6	3b			
	27	14a	112	56b			
	12	6b	13	7a			
	11	6a	20	10b			
	9	5a	15	8a			
	43	22a	16	8b			
	10	5b	12	6b			
	47	24a	11	6a			

+ve end of DCA axis

SITECOLOUR KEY
Represents TWINSPAN "final site groups" - see profiles (Fig 4.10) for location of groups on foreland. BØVERBREEN *(some colours, used for final groups in Fig. 4.10, have been lightened in order to read the cell captions)*

Group 4*
Group 6*
Group 7*
Group 10*
Group 11*

-ve end of DCA axis

Table 5.9 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Austerdalsbreen. *(with superimposed TWINSPAN "species final groups")*

AUSF	AUSF	AUSF	AUSF
Environme	Species	Species	Environment
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK1	RANK1	RANK 2	RANK 2
Eig = 0.93	Eig = 0.44	Eig = 0.29	Eig = 0.748
16 Roo de	10 [illegible]	84 Sax ste	26 Alt tud
14 Hum d	11 Jun tri	83 Phl alp	21 Bar gra
27 Age m	12 Vio bif	81 Ste bot	13 pH* ***
15 Sta de	13 Pot cra	82 Oxy dig	6 Flu via
12 Soi tex	22 Nar str	87 Ver alp	24 Bry cov
6 Flu via	8 Cor sue	88 Pyr noi	4 Dow els
23 Veg co	17 Rum a	58 Car sp	5 Moi tre
25 Asp ea	21 Lyc cla	85 Sax aiz	20 Bar bou
13 pH* ***	33 Gna no	80 [illegible]	7 Slo pe*
8 Sol flu	24 Cla hy	86 Ste ves	22 Bar fin
9 Asp ect	28 Sor cu	44 Ste alp	25 Asp eas
5 Moi tre	16 Tri eur	20 Gym d	3 Fro hve
7 Slo pe*	19 Luz arc	42 Sal phl	11 Ani inf
26 Alt tud	29 Cla lon	56 Pin vul	9 Asp ect
2 Pos env	32 Oxa ac	35 Pyr mi	10 Tra mpl
11 Ani inf	15 Des fle	11 Jun tri	1 Sno lie
10 Tra mp	20 Gym d	4 Sal gla	14 Hum dep
4 Dow els	9 Mel syl	14 Ant od	16 Roo dep
1 Sno lie	14 Ant od	12 Vio bif	8 Sol flu
22 Bar fin	36 [illegible]	52 Lis cor	12 Soi tex
21 Bar gra	37 Sib pro	63 Cla cer	2 Pos env
20 Bar bo	43 Mel pra	76 Des ce	23 Veg cov
3 Fro hve	31 Alc alp	15 Des fle	15 Sta dep
24 Bry co	18 Des alp	79 Lot cor	27 Age mor
	6 Vac uli	53 Lyc ann	
	59 Sol vir	77 Aln glu	
	23 Gna sup	16 Tri eur	
	50 Lyc sel	78 Sal lan	
	40 Bet nan	10 [illegible]	
	7 Vac myr	51 Eup hel	
	87 Ver alp	54 Jun tri	
	88 Pyr no	13 Pot cra	
	41 Ran sp	19 Luz arc	
	52 Lis cor	75 Pel pol	
	4 Sal gla	48 Cla dig	
	39 Fes ovi	31 Alc alp	
	79 Lot cor	34 Sal her	
	49 Cla unc	38 [illegible]	
	35 Pyr mi	39 Fes ovi	
	76 Des ce	7 Vac myr	
	30 Cla fim	2 Phy cae	
	80 [illegible]	6 Vac uli	
	34 Sal her	5 Bet pub	
	77 Aln glu	18 Des alp	
	42 Sal phl	33 Gna nor	
	78 Sal lan	1 Emp nig	
	51 Eup he	43 Mel pra	
	54 Jun tri	3 Cal vul	
	56 Pin vul	36 [illegible]	
	1 Emp nig	37 Sib pro	
	2 Phy cae	46 Cla [illegible]	
	5 Bet pub	67 Cla arb	
	47 Cla co	59 Cet eri	
	75 Pel po	9 Mel syl	
	53 Lyc an	23 Gna sup	
	25 Cet isl	57 Arc alp	
	26 Cla sq	8 Cor sue	
	85 Sax aiz	21 Lyc cla	
	82 Oxy dig	47 Cla con	
	61 Lou pr	64 Cla ver	
	83 Phl alp	22 Nar str	
	58 Car sp	40 Bet nan	
	45 Cla pix	26 Cla squ	
	84 Sax ste	50 Lyc sel	
	46 Cla [illegible]	72 Cla sul	
	57 Arc alp	17 Rum ace	
	70 Cla am	32 Oxa ace	
	3 Cal vul	61 Lou pro	
	72 Cla sul	74 Cla cri	
	67 Cla ark	45 Cla pix	
	27 Cla gra	70 Cla ama	
	71 Cla bel	66 Cla ran	
	66 Cla rar	68 Cla def	
	48 Cla dig	25 Cet isl	
	68 Cla de	73 Cla ple	
	69 Cla pix	71 Cla bel	
	62 Cla ca	27 Cla gra	
	74 Cla cri	55 Vac vit	
	64 Cla ver	65 Sol cro	
	63 Cla cer	62 Cla car	
	55 Vac vi	24 Cla hyd	
	73 Cla ple	69 Cla pix	
	60 Ste co	41 Ran scp	
	81 Ste bo	28 Sor cup	
	65 Sol cro	30 Cla fim	
	44 Ste alp	49 Cla unc	
	59 Cet eri	60 Ste con	
	86 Ste ves	29 Cla lon	

+ve end of DCA axis (top); -ve end of DCA axis (bottom)

Note: See Appendix 1 for species abbreviations; and Appendix 3 for environmental parameter abbreviations.

TABLE 5.9 COLOUR KEY
Represents TWINSPAN "final species groups", as well as location. See Table 4.18 for group description; and **colour-coded key** for general location on foreland.
AUSTERDALSBREEN

- Group 31
- Group 30
- Group 14
- Group 6
- Group 5
- Group 9
- Group 35
- Group 69
- Group 68
- Group 16

Table 5.10 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Fåbergstølsbreen. *(with superimposed TWINSPAN "final species groups")*

FASF	FASF	FASF	FASF
Environme	Species	Species	Environme
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig = 0.96	Eig = 0.81	Eig = 0.50	Eig = 0.79
6 Flu via	87 Epi ang	56 Cla dig	5 Moi tre
21 Bar gra	74 Oxy dig	60 Bro cu	1 Sno lie
20 Bar bo	84 Cer alp	55 Cla arr	20 Bar bo
4 Dow els	13 Des alp	41 Cla cri	6 Flu via
3 Fro hve	75 Lot cor	54 Cla cro	21 Bar gra
22 Bar fin	80 Sag sa	58 Cla ple	13 pH* ***
13 pH* ***	86 Fes ovi	64 Cet cu	2 Pos env
26 Alt tud	78 Phl alp	46 Cla gra	9 Asp ect
10 Tra mp	73 Gna su	47 Cla ran	10 Tra mp
25 Asp ea	72 Gna no	51 Cla bel	22 Bar fin
9 Asp ect	26 Ath dis	59 Cla ste	4 Dow els
8 Sol flu	83 Epi als	42 Cla sq	3 Fro hve
1 Sno lie	71 Cer ce	6 Cal vul	26 Alt tud
11 Ani inf	85 Sax ste	69 Cla ver	8 Sol flu
12 Soi tex	79 Agr ter	49 Cla bor	23 Veg co
5 Moi tre	81 Luz sp	38 Cla fim	15 Sta de
2 Pos env	77 Hie sp	57 Cla for	12 Soi tex
7 Slo pe*	76 Cry cri	63 Ste pa	24 Bry cov
24 Bry co	82 Uln gla	48 Cla [illegible]	7 Slo pe*
23 Veg co	29 Alc alp	40 Cla chl	11 Ani inf
14 Hum d	33 Car sp	45 cla cor	25 Asp ea
27 Age m	89 Sib pro	44 Cla co	27 Age m
16 Roo de	70 Cet isl	68 Sol cro	16 Roo de
15 Sta de	88 Rus sp	3 Vac vit	14 Hum d
	36 Lis cor	65 Cla pix	
	61 Sal her	66 Ste bot	
	53 Sal gla	50 Cla sbf	
	31 Ort sec	4 Emp nig	
	10 Sal phy	5 Phy cae	
	62 [illegible]	67 Bla cup	
	24 Sol vir	52 Cla car	
	15 Nar str	32 [illegible]	
	40 Cla [illegible]	53 Sal gla	
	12 Des fle	2 Vac uli	
	39 Pel pol	70 Cet isl	
	66 Ste bo	[illegible]	
	69 Cla ver	88 Rus spp	
	49 Cla bor	61 Sal her	
	65 Cla pix	86 Fes ovi	
	68 Sol cro	29 Alc alp	
	20 Gym d	80 Sag sag	
	45 cla cor	18 Mel syl	
	63 Ste pa	10 Sal phy	
	67 Bla cu	36 Lis cor	
	44 Cla co	87 Epi ang	
	40 Cla ch	[illegible]	
	46 Cla gra	75 Lot cor	
	6 Cal vul	13 Des alp	
	35 Rub id	72 Gna nor	
	38 Cla fim	82 Uln gla	
	47 Cla ran	83 Epi als	
	59 Cla ste	71 Cer cer	
	7 Bet pub	85 Sax ste	
	34 Pri spp	79 Agr ten	
	57 Cla for	7 Bet pub	
	58 Cla ple	77 Hie spp	
	2 Vac uli	81 Luz spi	
	4 Emp nig	78 Phl alp	
	25 Ger syl	26 Ath dis	
	32 Vio bif	89 Sib pro	
	52 Cla ca	73 Gna sup	
	5 Phy cae	76 Cry cri	
	60 Bro cu	74 Oxy dig	
	[illegible]	84 Cer alp	
	14 Ant od	33 Car spp	
	55 Cla arr	[illegible]	
	[illegible]	[illegible]	
	17 Pot cra	39 Pel pol	
	23 Pol viv	12 Des fle	
	42 Cla sq	24 Sol vir	
	50 Cla sbf	[illegible]	
	3 Vac vit	31 Ort sec	
	[illegible]	8 Jun com	
	18 Mel syl	15 Nar str	
	22 Tri eur	22 Tri eur	
	41 Cla cri	16 Cor sue	
	64 Cet cu	20 Gym dry	
	8 Jun com	19 Par pal	
	19 Par pa	25 Ger syl	
	54 Cla cro	32 Vio bif	
	56 Cla dig	35 Rub ida	
	16 Cor su	14 Ant odo	
	43 [illegible]	17 Pot cra	
	51 Cla bel	34 Pri spp	
	37 [illegible]	23 Pol viv	

+ve end of DCA axis (top); -ve end of DCA axis (bottom)

TABLE 5.10 COLOUR KEY
Represents TWINSPAN "final species groups", as well as location. See Table 4.18 for group description; and **colour-coded key** for general location on foreland.
FÅBERGSTØLSBREEN

- Group 20
- Group 21
- Group 11
- Group 12
- Group 19
- Group 37
- Group 36
- Group 8
- Group 7
- Group 26
- Group 27

Colour coded key (Tables 5.9-16):
Differentiates the TWINSPAN "final species groups" and also shows the general location of each assemblage across the selected forelands, as shown by the TWINSPAN analysis.
Mature = >250 yrs - moraine (1) (+2)
Intermediate = 100 - 250 yrs - moraines (2) - (4) (5 - StH)
Pioneer = 0 -100 yrs - moraines (5) to (8)
Low-slope positions = Toe-, low- and mid-slope.
High-slope positions = Mid- and shoulder-slope and crest.

- **Mature and intermediate Low-slope positions**
- **Mostly intermediate low-slope assemblages**
- **Widespread low-slope and snowbed assemblages**
- **Mature assemblages at general positions**
- **Intermediate assemblages at general positions**
- **Intermediate to pioneer assemblages at general positions**
- **Pioneer assemblages at general positions**
- **Intermediate to pioneer assemblages at high-slope or exposed positions**
- **Widespread assemblages at high-slope positions**
- **Widespread assemblages at general positions**
- **Widespread assemblages at general positions**

Table 5.11 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Storbreen low (1). *(with superimposed TWINSPAN "final species groups")*

Table 5.12 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Storbreen low (2). *(with superimposed TWINSPAN "final species groups")*

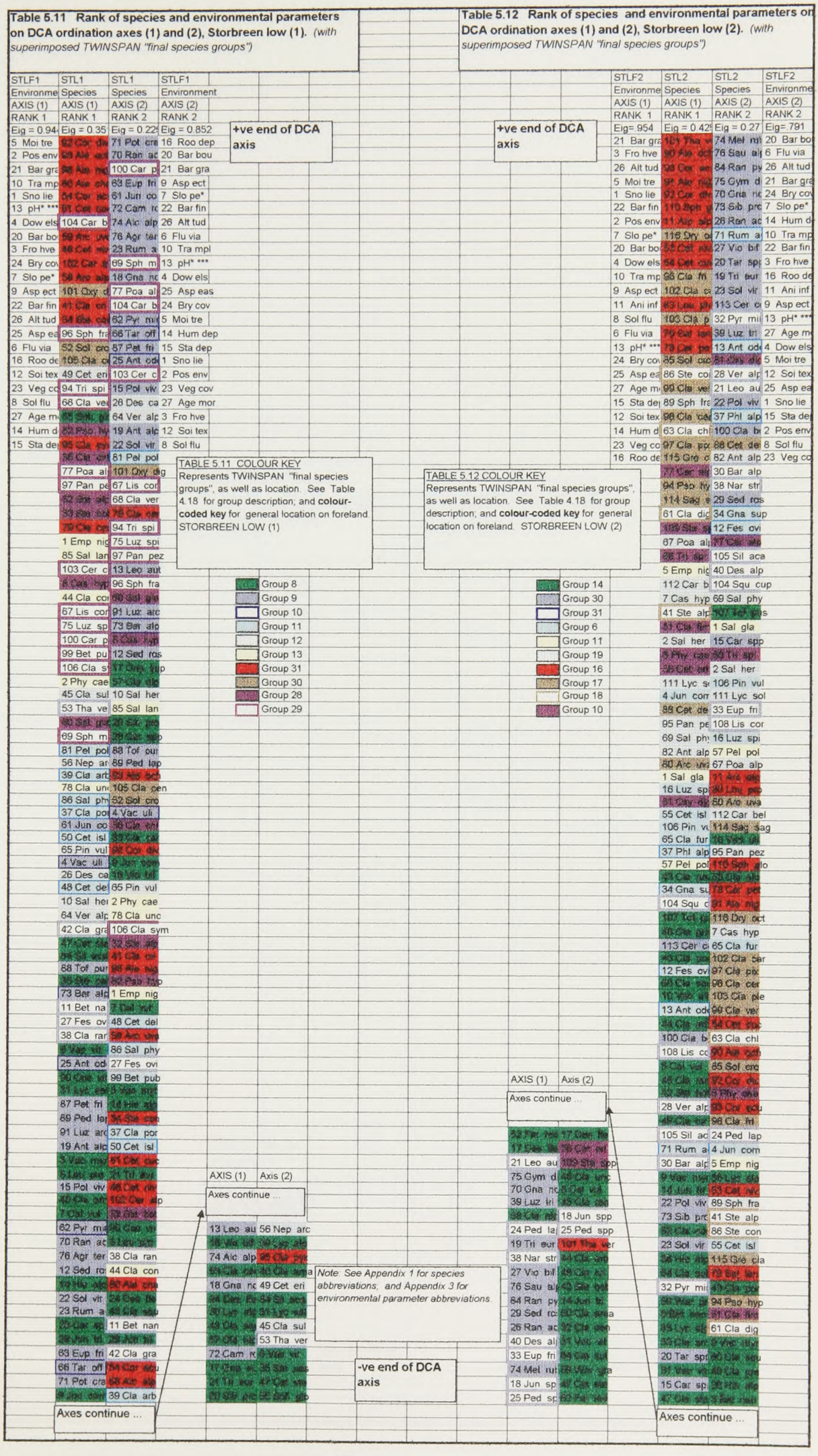


Table 5.13 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Svellnosbreen. *(with superimposed TWINSPAN "final species groups")*

SVLF Environme	SVLF Species	SVLF Species	SVLF Environment
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig = 0.889	Eig = .442	Eig = .357	Eig = 0.916
6 Flu via	92 Des alp	26 Ran ni	14 Hum dep
14 Hum d	100 Cer c	39 Rum a	27 Age mor
15 Sta de	107 Sax s	29 Alc glo	15 Sta dep
24 Bry co	108 Ara a	15 Sed ro	16 Roo dep
10 Tra mp	104 Cam	30 Ger sy	23 Veg cov
20 Bar bo	79 Oxy di	32 Sib pr	8 Sol flu
16 Roo de	83 Gym d	36 Gna ni	12 Soi tex
21 Bar gra	27 Tar spi	28 Leo sp	7 Slo pe*
25 Asp ea	98 Tri spi	38 Pol viv	5 Moi tre
26 Alt tud	67 Luz spi	31 Pyr no	11 Ani inf
13 pH* ***	26 Ran ni	27 Tar spi	6 Flu via
7 Slo pe*	103 Cla b	37 Gna su	25 Asp eas
11 Ani inf	29 Alc glo	53 Sol vir	2 Pos env
23 Veg co	39 Rum a	24 Car spi	24 Bry cov
8 Sol flu	106 Lou p	13 Cal vul	1 Sno lie
22 Bar fin	15 Sed ro	17 Lyc alp	4 Dow els
9 Asp ect	38 Pol viv	34 Vac m	22 Bar fin
4 Dow els	28 Leo sp	61 Cla ce	10 Tra mpl
12 Soi tex	30 Ger syl	14 Ver alp	26 Alt tud
27 Age m	32 Sib prc	5 Ant dio	3 Fro hve
5 Moi tre	23 Ant od	18 Hie spi	9 Asp ect
3 Fro hve	99 Pyr mi	4 Vas cor	20 Bar bou
2 Pos env	95 Cer alp	12 Ant ge	21 Bar gra
1 Sno lie	36 Gna ni	23 Ant od	13 pH* ***
	96 Dra alp	22 Fes ovi	
	14 Ver alp	41 Cet isl	
	24 Car spi	1 Vac myr	
	84 Sal pha	16 Sal her	
	37 Gna su	47 Des alp	
	31 Pyr no	21 Cla gra	
	97 Car be	35 Bar lag	
	93 Luz arc	21 Cas hyp	
	69 Sal phy	5 Cam rot	
	88 Sax ce	40 Cet del	
	68 Sil aca	8 Nar ery	
	87 Sax op	42 Cla por	
	33 Sol vir	44 Sal cyc	
	16 Sal her	11 Ant alp	
	73 Ste bot	3 Bet nan	
	13 Cal vul	45 Cla gyma	
	21 Cas hyp	6 Arc eva	
	102 Cla ca	65 Son gla	
	22 Fes ovi	2 Vac uli	
	17 Lyc alp	54 Tha ver	
	86 Cla ple	43 Cla sub	
	35 Bar lag	92 Des alp	
	41 Cet isl	50 Ale con	
	34 Vac my	56 Cet ad	
	91 Lyc sel	66 Cor div	
	18 Hie spp	77 Ale squ	
	90 Vis alp	7 Arc alp	
	72 Nep arc	48 Cla cer	
	48 Cla cer	57 Cor aca	
	70 Sal myr	53 Cer cer	
	66 Pin vul	19 Emp nig	
	61 Cla cer	107 Sax ste	
	82 Cla cor	63 Cet niv	
	20 Phy cae	79 Sph mag	
	46 Ste alp	46 Ste alp	
	11 Ant alp	76 Pso hyp	
	76 Pso hyp	60 Car bel	
	40 Cet del	80 Eup fri	
	89 Sal lan	58 Cla fim	
	20 Cla arb	83 Sib con	
	75 Cla ver	51 Cla chl	
	4 Cam rot	69 Tof pus	
	59 Cla cri	78 Cla lan	
	5 Ran sto	74 Cla pix	
	71 Cla fur	81 Cla def	
	42 Cla por	100 Cer cer	
	44 Sal cyc	20 Phy cae	
	69 Tof pus	75 Cla ver	
	94 Cla unc	10 Jun tri	
	84 Cla cor	89 Sal lan	
	101 Pan p	94 Cla unc	
	105 Sal re	84 Cla con	
	74 Cla pix	59 Cla cri	
	81 Cla def	66 Pin vul	
	42 Cla por	72 Nep arc	
	80 Eup fri	70 Sal myr	
	51 Cla chl	101 Pan pez	
	19 Emp nig	105 Sal ret	
	47 Des alp	71 Cla fur	
	58 Cla fim	73 Ste bot	
	43 Cla sub	90 Vis alp	
	10 Jun tri	104 Cam rot	
	78 Cla lan	94 Cla unc	
	81 Cla def	91 Lyc sel	
	2 Vac uli	64 Sal pha	
	1 Vac myr	62 Cla coc	
	56 Cet ad	88 Sax cer	
	63 Cet niv	68 Sil aca	
	5 Ran sto	87 Sax opp	

+ve end of DCA axis

TABLE 5.13 COLOUR KEY
Represents TWINSPAN "final species groups", as well as location. See Table 4.18 for group description; and **colour-coded key** for general location on foreland.
SVELLNOSBREEN

Group 24
Group 25
Group 43
Group 13
Group 11
Group 42
Group 84
Group 83
Group 40
Group 4
Group 7

AXIS (1)	Axis (2)
64 Cam	104 Cam
79 Bet	93 Luz arc
83 Sib	106 Lou pro
92 Des	100 Cer cer
77 Ale	103 Cla bel
6 Arc	69 Sal phy
53 Cer	67 Luz spi
7 Arc	96 Dra alp
66 Cor	102 Cla car
56 Cet	95 Cer alp
54 Tha	98 Tri spi
50 Ale	97 Car bel
57 Cor	99 Pyr min
5 Cam	86 Cla ple
9 Nar	108 Ara alp

Axes continue ...

-ve end of DCA axis

Axes continue ...

Table 5.14 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Storbreen high. *(with superimposed TWINSPAN "final species groups")*

STHF Environme	STHF Species	STHF Species	STHF Environme
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig = 0.89	Eig = .483	Eig = .223	Eig = 0.80
6 Flu via	88 Sax ce	83 Gym d	20 Bar bo
13 pH* ***	53 Cer cer	87 Woo a	21 Bar gra
10 Tra mp	47 Des alp	81 Sax ste	7 Slo pe*
22 Bar fin	16 Phl alp	55 Cer alp	3 Fro hve
25 Asp ea	52 Oxy dig	79 Sph m	5 Moi tre
9 Asp ect	63 Poa alp	82 Des fle	24 Bry cov
23 Veg co	49 Sag sag	44 Sal gla	22 Bar fin
14 Hum d	78 Ara alp	67 Cla ple	2 Pos env
16 Roo de	83 Gym d	62 Pyr spi	1 Sno lie
8 Sol flu	87 Woo a	74 Pel pol	25 Asp ea
20 Bar bo	51 Tar spi	52 Oxy dig	6 Flu via
21 Bar gra	74 Pel pol	45 Sal lan	8 Sol flu
26 Alt tud	82 Des fle	85 Pan pe	9 Asp ect
24 Bry cov	81 Sax ste	60 Car be	10 Tra mp
4 Dow els	10 Fes ovi	86 Ath dis	4 Dow els
7 Slo pe*	48 Tri spi	70 Sal phy	13 pH* ***
15 Sta dep	50 Pol viv	72 Car pe	26 Alt tud
3 Fro hve	64 Ste bot	80 Cla sul	12 Soi tex
5 Moi tre	61 Arc alp	2 Phy cae	27 Age m
12 Soi tex	44 Sal gla	77 Sal ret	16 Roo de
1 Sno lie	11 Ant odo	42 Sol cro	14 Hum d
2 Pos env	62 Pyr spi	27 Cla chl	23 Veg co
27 Age m	12 Luz spi	18 Sph fus	15 Sta dep
	85 Pan pe	33 Cet niv	
	56 Sib pro	25 Cet del	
	5 Vac myr	84 Ale spp	
	86 Ath dis	66 Cla ver	
	70 Sal phy	69 Vac uli	
	57 Dry exp	65 Phy sch	
	45 Sal lan	20 Cla arb	
	72 Car pe	68 Cor squ	
	3 Sal her	46 Cas hyp	
	54 Pyr min	58 Ale con	
	69 Vac uli	19 Ste alp	
	18 Ant alp	43 Cla sub	
	84 Ale spp	11 Ant odo	
	55 Cer alp	59 Ver alp	
	59 Ver alp	64 Ste bot	
	71 Ran alp	23 Cet cuc	
	19 Ste alp	1 Emp nig	
	73 Lec qua	36 Cla cri	
	9 Lyc spp	37 Ale squ	
	7 Gna sup	48 Tri spi	
	8 Hie spp	3 Sal her	
	1 Emp nig	47 Des alp	
	39 Cla cor	61 Arc alp	
	58 Cla cer	53 Cer cer	
	46 Cas hyp	63 Poa alp	
	24 Cet isl	16 Phl alp	
	31 Pso hyp	26 Cet ad	
	36 Cla cri	14 Luz arc	
	34 Cla unc	71 Ran alp	
	60 Car bel	18 Ant alp	
	28 Cla por	50 Pol viv	
	75 Och fri	73 Lec qua	
	14 Luz arc	57 Dry exp	
	32 Cla squ	88 Sax ces	
	15 Car spp	54 Pyr min	
	17 Nar str	10 Fes ovi	
	27 Cla chl	30 Cla arb	
	25 Cet del	7 Gna sup	
	13 Jun tri	12 Luz spi	
	30 Cla arb	41 Tha ver	
	33 Cla gra	51 Tar spp	
	43 Nep arc	33 Cla gra	
	2 Phy cae	49 Sag sag	
	66 Cla ver	13 Jun tri	
	42 Sol cro	75 Och fri	
	77 Sal ret	28 Cla por	
	79 Sph mag	5 Vac myr	
	26 Cet isl	24 Cet isl	
	30 Cla arb	58 Cla cer	
	67 Cla ple	9 Lyc spp	
	80 Cla sul	78 Ara alp	
	31 Pso hyp	31 Pso hyp	
	29 Cla ren	56 Sib pro	
	22 Cet niv	35 Bar lag	
	23 Cet cuc	34 Cla unc	
	8 Vac vit	15 Car spp	
	21 Ste pal	8 Hie spp	
	76 Bet nan	39 Cla con	
	41 Tha ver	17 Nar str	
	4 Bet nan	43 Nep arc	
	37 Ale squ	32 Cla squ	
	40 Cor div	21 Ste pal	
	65 Phy sch	35 Cla ste	
	68 Cor squ	4 Bet nan	

+ve end of DCA axis

TABLE 5.14 COLOUR KEY
Represents TWINSPAN "final species groups", as well as location. See Table 4.18 for group description; and **colour-coded key** for general location on foreland.
STORBREEN HIGH

Group 18
Group 38
Group 39
Group 16
Group 17
Group 5
Group 6
Group 7

-ve end of DCA axis

Note: See Appendix 1 for species abbreviations; and Appendix 3 for environmental parameter abbreviations.

Table 5.15 Rank of species and environmental parameters on DCA ordination axes (1) and (2), Høgvaglbreen. *(with superimposed TWINSPAN "final species groups")*

HOHF	HOHF	HOHF	HOHF
Environme	Species	Species	Environment
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig = 0.90	Eig = 0.37	Eig = 0.22	Eig = 0.911
26 Alt tud	56 Oxy dig	11 Car spp	15 Sta dep
6 Flu via	50 Poa alp	12 Hie spp	14 Hum dep
13 pH* ***	55 Tri spi	44 Cla cor	16 Roo dep
21 Bar gra	57 Sal gla	40 Cla bel	23 Veg cov
20 Bar bou	15 Ste bot	8 Vac vit	27 Age mor
11 Ani inf	48 Ste cor	16 Jun tri	12 Soi tex
24 Bry cov	52 Luz arc	39 Cla arm	7 Slo pe*
22 Bar fin	13 Ste alp	22 Cla squ	25 Alt eas
14 Hum de	16 Sol cro	24 Cla cri	8 Sol flu
25 Alt eas	18 Cet isl	31 Cla unc	6 Flu via
5 Moi tre	49 Ran gla	6 Gna sup	10 Tra mpl
9 Asp ect	51 Emp nig	9 Vac uli	11 Ani inf
3 Fro hve	4 Cas hyp	25 Cla chl	9 Asp ect
8 Sol flu	23 Cla car	50 Cla pse	20 Bar bou
4 Dow els	27 Cla fim	2 Fes ovi	24 Bry cov
16 Roo de	45 Phy cae	21 Cla gra	22 Bar fin
7 Slo pe*	3 Lyc sel	23 Cla car	3 Fro hve
15 Sta dep	7 Sil aca	42 Sph gir	5 Moi tre
10 Tra mpl	36 Sph fra	26 Cla pbx	4 Dow els
12 Soi tex	46 Pol viv	37 Cla dig	1 Sno lie
2 Pos env	1 Sal her	7 Sil aca	2 Pos env
23 Veg cov	6 Gna sup	43 Cla ram	21 Bar gra
1 Sno lie	14 Ste spp	3 Lyc sel	26 Alt tud
27 Age mor	17 Cet eri	15 Ste bot	13 pH* ***
	22 Cla squ	18 Cet isl	
	24 Cla cri	17 Cet eri	
	25 Cla chl	55 Tri spi	
	26 Cla pbx	57 Sal gla	
	37 Cla dig	14 Ste spp	
	5 Luz spi	25 Cla chl	
	28 Cla cer	28 Cla cer	
	39 Cla arm	36 Sph fra	
	40 Cla bel	56 Oxy dig	
	41 Cla ver	27 Cla fim	
	47 Phl alp	1 Sal her	
	21 Cla gra	13 Ste alp	
	2 Fes ovi	4 Cas hyp	
	11 Car spp	5 Luz spi	
	12 Hie spp	46 Pol viv	
	29 Cla sch	48 Ste cor	
	30 Cla aus	16 Sol cro	
	31 Cla unc	19 Cet niv	
	44 Cla cor	41 Cla ver	
	53 Ant alp	49 Ran gla	
	54 Nar spp	50 Poa alp	
	10 Jun tri	51 Emp nig	
	19 Cet niv	58 Tha ver	
	43 Cla ram	52 Luz arc	
	32 Cor acu	45 Phy cae	
	33 Cor div	20 Cet cuc	
	42 Sph gir	34 Ale con	
	58 Tha ver	47 Phl alp	
	20 Cet cuc	33 Cor div	
	8 Vac vit	35 Ale mig	
	34 Ale con	32 Cor acu	
	35 Ale mig	54 Nar spp	
	9 Vac uli	53 Ant alp	

+ve end of DCA axis

-ve end of DCA axis

TABLE 5.15 COLOUR KEY
Represents TWINSPAN "final species groups", as well as location. See Table 4.18 for group description; and **colour-coded key** for general location on foreland.
HØGVAGLBREEN

Group 36
Group 39
Group 38
Group 37
Group 8
Group 5
Group 3

Note: See Appendix 1 for species abbreviations, and Appendix 3 for environmental parameter abbreviations.

Table 5.16 Rank of species and environmental parameters on DCA ordination axes 1 and 2, Bøverbreen. *(with superimposed TWINSPAN "final species groups")*

BOHF	BOHF	BOHF	BOHF
Environme	Species	Species	Environme
AXIS (1)	AXIS (1)	AXIS (2)	AXIS (2)
RANK 1	RANK 1	RANK 2	RANK 2
Eig = 0.93	Eig = 0.50	Eig = 0.26	Eig = 0.82
21 Bar gra	64 Cer cer	60 Ant alp	1 Sno lie
6 Flu via	61 Des alp	37 Sph gir	21 Bar gra
22 Bar fin	52 Oxy dig	39 Ale ocl	5 Moi tre
4 Dow els	7 Poa alp	55 Ale mig	20 Bar bou
8 Sol flu	59 Cer alp	40 Cer sco	22 Bar fin
2 Pos env	63 Sal gla	41 Cer div	4 Dow els
3 Fro hve	50 Tri spi	58 Jun tri	7 Slo pe*
26 Alt tud	15 Ste alp	54 Cla cri	2 Pos env
24 Bry cov	14 Sol cro	22 Cet cuc	11 Ani inf
25 Asö ea	49 Gna sup	21 Cet niv	8 Sol flu
7 Slo pe*	2 Sal her	1 Emp nig	3 Fro hve
5 Moi tre	5 Fes ovi	50 Tri spi	25 Asö ea
9 Asp ect	8 Ant alp	62 Cer del	26 Alt tud
20 Bar bou	11 Lyc sel	56 Ver alp	13 pH* ***
13 pH* ***	3 Phy cae	55 Cla dig	6 Flu via
11 Ani inf	18 Ste bot	3 Phy cae	12 Soi tex
12 Soi tex	53 Cla cer	8 Ant alp	9 Asp ect
23 Veg cov	55 Cla dig	9 Hie spp	27 Age mor
1 Sno lie	57 Pso hyp	2 Sal her	16 Roo dep
14 Hum de	48 Cas hyp	7 Poa alp	14 Hum dep
15 Sta dep	26 Cla fim	16 Sxi cop	23 Veg cov
16 Roo de	36 Cla fur	23 Sph fra	24 Bry cov
27 Age mor	24 Cla chl	53 Cla cer	15 Sta dep
	23 Sph fra	63 Sal gla	
	18 Ste cor	64 Cer cer	
	62 Cer del	48 Cas hyp	
	6 Luz spi	14 Sol cro	
	22 Cet cuc	52 Oxy dig	
	51 Sag sag	5 Fes ovi	
	27 Cla fim	6 Luz spi	
	10 Cet isl	15 Ste alp	
	20 Cet cuc	28 Cla fim	
	33 Cla gra	24 Cla chl	
	12 Hie spp	61 Des alp	
	28 Cla cer	18 Ste bot	
	45 Cla pse	57 Pso hyp	
	54 Cla cri	42 Tha ver	
	9 Hie spp	11 Lyc sel	
	13 Nap sch	59 Cer alp	
	29 Cla sch	29 Cla sch	
	24 Cla cri	49 Gna sup	
	21 Cet niv	19 Cet isl	
	60 Ant alp	36 Cla fur	
	48 Cla pse	26 Cla fim	
	49 Cla che	13 Ran cha	
	28 Cla cer	31 Cla unc	
	31 Cla unc	30 Cla aus	
	43 Ran cha	51 Sag sag	
	40 Vac uli	23 Cla pbx	
	46 Cor acu	39 Cla arm	
	41 Cor div	37 Cla squ	
	17 Phl alp	34 Cla pse	
	45 Cla gra	32 Cla arma	
	32 Ale ocl	4 Car spp	
	4 Car spp	44 Unn cup	
	39 Ale mig	54 Cla cri	
	30 Cla aus	31 Cla unc	
	32 Cla arm	13 Nap sch	
	42 Tha ver	42 Sta spp	
	44 Unn cup	43 Pet pol	
	43 Pet pol	35 Cla squ	
	10 Vac uli	28 Cla cer	
	37 Sph gir	17 Phl alp	
	1 Emp nig	33 Vac vit	

+ve end of DCA axis

-ve end of DCA axis

TABLE 5.16 COLOUR KEY
Represents TWINSPAN "final species groups", as well as location. See Table 4.18 for group description; and **colour-coded key** for general location on foreland.
BØVERBREEN

Group 19
Group 17
Group 36
Group 37
Group 16
Group 6
Group 5
Group 7

Table 5.17 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Austerdalsbreen data set (coefficients significant at p <0.001 are in bold).**

Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sa	AUSF																																					
SPEC	1																																					
SPEC	0	1																																				
SPEC	0	0	1																																			
SPEC	0	0	0	1																																		
ENVI A	**0.9651**	-0.01	-0.034	0.0053	1																																	
ENVI A	-0.012	**0.7908**	0.1699	0.0831	-0.013	1																																
ENVI A	-0.05	0.2038	**0.6594**	-0.058	-0.052	0.2577	1																															
ENVI A	0.0074	0.0949	-0.055	**0.6927**	0.0077	0.12	-0.084	1																														
Sno lie	-0.273	-0.127	-0.045	**-0.318**	-0.283	-0.161	-0.068	**-0.46**	1																													
Pos en	-0.114	-0.207	0.0413	**-0.396**	-0.119	-0.262	0.0626	**-0.572**	**0.4254**	1																												
Fro hve	**-0.472**	-0.011	0.0953	-0.479	**-0.489**	-0.014	0.1446	**-0.692**	**0.438**	**0.5197**	1																											
Dow el	-0.19	0.0798	0.1069	-0.24	-0.197	0.1009	0.1622	**-0.347**	-0.054	0.1365	**0.3935**	1																										
Moi tre	-0.196	-0.051	-0.053	-0.072	-0.203	-0.064	-0.081	-0.104	0.0779	0.1184	0.2771	0.24	1																								
Flu via	**0.428**	0.1204	-0.246	-0.007	**0.4435**	0.1523	**-0.373**	-0.01	-0.052	-0.2	-0.097	-0.026	-0.037	1																							
Slo pe*	-0.084	-0.003	0.011	0.0963	-0.087	-0.004	0.0167	0.1391	-0.093	0.1537	-0.02	0.008	0.0947	-3E-04	1																						
Sol flu	-0.023	-0.177	0.151	-0.1	-0.024	-0.224	0.229	-0.144	-0.074	0.2055	0.2317	0.2072	0.2031	-0.179	**0.5037**	1																					
Asp ec	-0.036	-0.073	0.0063	-0.073	-0.037	-0.092	0.0096	-0.106	0.2431	0.2152	0.1685	-0.05	0.0235	0.0056	-0.245	-0.158	1																				
Tra mp	-0.176	-0.116	-0.004	-0.265	-0.182	-0.147	-0.006	**-0.383**	0.1086	**0.3093**	**0.3904**	0.0673	0.0592	-0.027	-0.1	-0.188	0.1008	1																			
Ani inf	-0.126	-0.022	0.1051	-0.022	-0.13	-0.028	0.1594	-0.031	-0.082	-0.118	0.1367	-0.087	-0.068	-0.041	0.0497	0.0916	-0.027	-0.043	1																	
Soi tex	**0.5247**	-0.188	-0.05	0.1434	**0.5437**	-0.238	-0.075	0.207	0.1643	0.1252	**-0.343**	-0.29	-0.161	0.1722	0.0506	-0.065	-0.01	-0.141	-0.213	1															
pH* ***	-0.039	**0.3704**	-0.03	0.0503	-0.041	**0.4683**	-0.046	0.0726	0.0303	-0.033	0.0603	0.1024	-0.027	0.1122	0.069	0.0275	-0.246	-0.002	-0.034	0.1403	1													
Hum d	**0.7461**	-0.144	-0.055	0.0972	**0.7731**	-0.183	-0.084	0.1403	-0.216	0.061	**-0.419**	-0.277	-0.165	0.2636	-0.041	-0.004	0.1403	-0.139	-0.179	**0.4681**	-0.189	1											
Sta dep	**0.6024**	-0.28	0.0411	0.1994	**0.6241**	**-0.354**	0.0624	0.2878	-0.184	-0.12	**-0.529**	-0.275	-0.212	0.1521	0.1233	-0.108	0.0199	-0.256	-0.035	**0.5963**	-0.253	**0.5939**	1									
Roo de	**0.8822**	-0.154	-0.028	-0.02	**0.9141**	-0.195	-0.042	-0.029	-0.218	0.0223	**-0.428**	-0.217	-0.145	0.2663	-0.069	-0.035	0.0608	-0.15	-0.099	**0.5688**	-0.087	**0.8705**	**0.7043**	1								
Bar bo	**-0.37**	0.024	0.1069	0.0081	**-0.383**	0.0304	0.1622	0.0117	0.0826	0.0544	**0.3419**	0.2452	0.0774	-0.083	0.2089	0.1049	-0.033	0.1624	0.0927	-0.178	0.005	**-0.344**	-0.16	**-0.39**	1							
Bar gra	**-0.32**	**0.3256**	0.1322	-0.26	**-0.331**	**0.4118**	0.2005	**-0.375**	0.1717	0.1974	**0.5923**	0.2475	0.1704	0.1299	-0.034	0.0836	0.0213	0.251	0.0012	**-0.325**	0.208	**-0.389**	**-0.551**	**-0.45**	0.2156	1						
Bar fin	**-0.303**	0.0106	0.0234	-0.173	**-0.314**	0.0134	0.0354	-0.25	**0.2907**	0.2551	**0.5694**	0.2197	0.2861	-0.047	0.1419	0.1266	0.1088	0.1258	0.1218	-0.076	0.0107	**-0.307**	-0.187	-0.275	**0.3249**	**0.3505**	1					
Veg co	**0.5167**	-0.236	-0.154	0.1904	**0.5354**	-0.298	-0.233	0.2749	-0.18	-0.213	**-0.664**	**-0.345**	-0.199	0.108	-0.096	-0.15	-0.021	-0.287	-0.062	**0.3585**	-0.138	**0.5022**	**0.504**	**0.5781**	**-0.737**	**-0.744**	**-0.54**	1				
Bry cov	**-0.584**	0.1344	0.0932	0.0696	**-0.605**	0.17	0.1414	0.1005	0.1453	-0.192	0.1461	0.11	0.0778	-5E-04	-0.045	-0.076	-0.055	0.0943	0.0651	**-0.336**	0.0173	**-0.488**	**-0.345**	**-0.642**	0.1687	0.1919	0.0147	-0.255	1			
Asp ea	-0.037	0.018	**0.3493**	-0.141	-0.038	0.0228	**0.5298**	-0.203	0.0831	0.0859	0.254	0.0818	-0.097	-0.019	-0.15	-0.04	**0.3913**	0.1725	0.0864	-0.047	-0.17	-0.086	0.0318	-0.095	0.1232	0.2586	0.1985	-0.262	0.0529	1		
Alt tud	-0.257	**0.5752**	**0.3629**	-0.11	-0.266	**0.7274**	**0.5504**	-0.158	-0.095	-0.107	**0.4101**	**0.3916**	0.0718	0.0245	-0.031	0.075	-0.097	0.0476	0.2726	**-0.501**	0.2368	**-0.393**	**-0.44**	**-0.401**	**0.3285**	**0.491**	0.2665	**-0.556**	**0.3941**	0.1876	1	
Age mo	**0.7638**	**-0.335**	-0.244	0.0291	**0.7914**	**-0.424**	**-0.37**	0.0419	-0.092	0.1327	**-0.467**	**-0.339**	-0.154	0.1797	-0.029	-0.005	0.0664	-0.107	-0.243	**0.6842**	-0.092	**0.7484**	**0.606**	**0.8311**	**-0.446**	**-0.47**	**-0.291**	**0.6266**	**-0.686**	-0.164	**-.7530**	1
	SPEC	SPEC	SPEC	SPEC	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hve	Dow el	Moi tre	Flu via	Slo pe*	Sol flu	Asp ec	Tra mp	Ani inf	Soi tex	pH* ***	Hum d	Sta dep	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry cov	Asp ea	Alt tud	Age mor						

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.18 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Fåbergstølsbreen data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sample total) **** FÅBERGSTØLSBREEN																																			
SPEC .	1																																		
SPEC .	0	1																																	
SPEC .	0	0	1																																
SPEC .	0	0	0	1																															
ENVI A	0.9675	-0.003	0.0004	-0.014	1																														
ENVI A	-0.004	**0.7906**	-0.033	-0.063	-0.004	1																													
ENVI A	0.0005	-0.031	**0.863**	0.0418	0.0005	-0.039	1																												
ENVI A	-0.02	-0.073	0.0526	**0.6856**	-0.021	-0.092	0.0609	1																											
Sno lie	-0.071	0.247	**0.7014**	0.0048	-0.074	**0.3124**	**0.8127**	0.007	1																										
Pos en	-0.136	0.0796	0.2608	-0.11	-0.141	0.1007	0.3022	-0.16	**0.3179**	1																									
Fro hve	**0.4135**	-0.037	0.3012	-0.111	**0.4274**	-0.047	**0.3489**	-0.162	**0.3683**	0.1873	1																								
Dow el	**0.4609**	-0.014	0.1818	**-0.343**	**0.4764**	-0.018	0.2106	**-0.501**	0.1525	0.1653	**0.4101**	1																							
Moi tre	-0.108	**0.3234**	0.2441	-0.044	-0.112	**0.409**	0.2828	-0.065	**0.422**	**0.3178**	**0.3083**	0.0882	1																						
Flu via	**0.7206**	0.0906	-0.022	0.0272	**0.7448**	0.1145	-0.025	0.0396	-0.127	**-0.346**	0.1511	0.0058	-0.181	1																					
Slo pe*	-0.153	-0.265	0.075	-0.067	-0.158	**-0.335**	0.0869	-0.097	0.0379	0.295	0.166	0.0771	0.0573	-0.284	1																				
Sol flu	0.1024	-0.082	0.127	-0.064	0.1058	-0.103	0.1472	-0.093	0.0514	**0.3123**	0.0179	0.097	0.1076	-0.029	**0.3646**	1																			
Asp ec	0.1301	0.0751	-0.044	-0.146	0.1345	0.095	-0.051	-0.213	0.2602	-0.188	0.2294	0.1155	0.0993	0.0906	0.0547	-0.026	1																		
Tra mp	0.2592	0.0119	-0.032	-0.013	0.2679	0.0151	-0.037	-0.019	-0.035	0.0306	0.0975	0.0875	0.0066	0.1785	0.0409	0.0901	-0.009	1																	
Ani inf	-0.08	-0.284	0.0455	0.0236	-0.083	**-0.36**	0.0527	0.0344	-0.062	-0.24	-0.083	-0.032	-0.068	-0.073	-0.167	-0.157	-0.063	-0.021	1																
Soi tex	-0.089	-0.174	0.0267	0	-0.092	-0.221	0.031	0.0001	-0.052	0.1247	-0.073	-0.045	-0.061	-0.072	0.117	0.0913	-0.123	-0.02	-0.012	1															
pH* ***	**0.3518**	0.0823	0.0465	0.0079	**0.3636**	0.1041	0.0538	0.0115	0.1656	0.0384	0.2767	0.1691	0.0609	0.2745	-0.23	0.077	**0.5374**	0.0704	-0.086	-0.095	1														
Hum d	**-0.616**	**-0.358**	0.0095	-0.002	**-0.637**	**-0.453**	0.011	-0.003	**-0.316**	0.1678	**-0.461**	**-0.318**	-0.097	**-0.442**	0.046	0.0056	**-0.417**	-0.14	0.1981	0.1689	**-0.377**	1													
Sta dep	**-0.879**	-0.11	-0.189	-0.002	**-0.908**	-0.139	-0.219	-0.002	-0.216	0.0908	**-0.527**	**-0.465**	0.0527	**-0.6**	0.146	-0.048	-0.2	-0.214	0.1613	0.0867	**-0.364**	**0.7264**	1												
Roo de	**-0.657**	**-0.352**	-0.111	-0.027	**-0.679**	**-0.445**	-0.128	-0.039	-0.283	0.2024	**-0.463**	**-0.353**	-0.095	**-0.492**	0.1883	0.0245	-0.266	-0.141	0.1515	0.07	-0.29	**0.8587**	**0.8261**	1											
Bar bo	**0.5609**	0.1003	**0.3253**	0.0781	**0.5797**	0.1268	**0.377**	0.1139	**0.4163**	0.0149	**0.468**	**0.4281**	0.2604	**0.3101**	-0.025	0.0038	**0.3368**	0.2259	-0.098	-0.098	**0.3562**	**-0.655**	**-0.652**	**-0.646**	1										
Bar gra	**0.6816**	0.0885	0.2594	0.098	**0.7045**	0.1119	0.3006	0.1429	**0.3613**	0.0334	**0.5698**	0.2886	0.1434	**0.5061**	-0.169	0.0153	0.254	0.1052	-0.09	-0.096	**0.3742**	**-0.658**	**-0.757**	**-0.699**	**0.6012**	1									
Bar fin	**0.3862**	-0.011	0.0881	**0.3452**	**0.3991**	-0.014	0.102	**0.5035**	0.0619	-0.033	0.1145	0.048	-0.155	**0.354**	-0.093	-0.007	0.0198	0.0577	-0.025	-0.033	0.1267	-0.232	**-0.346**	-0.269	0.097	**0.4697**	1							
Veg co	**-0.456**	-0.089	-0.211	-0.1	**-0.471**	-0.113	-0.245	-0.146	-0.267	-0.11	**-0.348**	-0.243	-0.111	-0.299	-0.072	-0.233	-0.026	-0.112	0.121	-0.245	0.1931	**0.4936**	**0.5125**	**0.5604**	**-0.527**	**-0.593**	**-0.302**	1						
Bry co	**-0.376**	-0.258	-0.107	-0.005	**-0.388**	**-0.326**	-0.124	-0.007	-0.273	**-0.492**	-0.209	-0.21	-0.093	-0.224	-0.05	-0.176	0.1113	-0.105	0.1983	-0.066	0.0138	**0.4326**	**0.4289**	**0.3853**	**-0.373**	**-0.386**	-0.141	**0.5187**	1					
Asp ea	0.1859	**-0.316**	-0.02	0.0978	0.1922	**-0.4**	-0.023	0.1426	0.108	-0.114	0.2833	0.0492	0.0336	0.0257	0.1632	0.2581	**0.4753**	0.1731	0.1518	-0.102	**0.3954**	-0.192	-0.14	-0.091	0.1846	0.1989	0.1363	0.015	0.0972	1				
Alt tud	0.3016	-0.046	0.0397	0.0204	**0.3117**	-0.059	0.046	0.0297	0.0965	-0.016	0.297	0.1719	0.1322	0.1689	-0.19	0.1056	**0.4666**	0.0781	-0.018	-0.029	**0.7944**	-0.223	-0.299	-0.212	**0.3351**	**0.307**	0.157	0.1551	0.073	**0.4698**	1			
Age m	**-0.648**	**-0.346**	-0.027	-0.055	**-0.669**	**-0.437**	-0.031	-0.08	-0.206	0.0858	**-0.366**	-0.277	-0.12	**-0.502**	0.1189	0.0518	-0.156	-0.124	0.1966	0.1586	-0.018	**0.7811**	**0.7253**	**0.7892**	**-0.614**	**-0.671**	-0.255	**0.6609**	**0.5646**	0.0519	0.0483	1		
	SPEC .	SPEC .	SPEC .	SPEC .	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hve	Dow el	Moi tre	Flu via	Slo pe*	Sol flu	Asp ec	Tra mp	Ani inf	Soi tex	pH* ***	Hum d	Sta dep	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry co	Asp ea	Alt tud	Age mor			

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.19 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Storbreen low (1) data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sample total) **** STORBREEN LOW (1) FORELAND																																			
SPEC	0	0	1																																
SPEC	0	0	0	1																															
ENVI A	**0.9436**	0.0336	0.028	0.0395	1																														
ENVI A	0.0372	**0.8519**	0.0808	-0.063	0.0394	1																													
ENVI A	0.0413	0.1076	**0.6398**	0.082	0.0437	0.1263	1																												
ENVI A	0.0543	-0.079	0.0764	**0.6869**	0.0575	-0.092	0.1194	1																											
Sno lie	**0.3881**	**-0.313**	-0.11	-0.218	**0.4113**	**-0.367**	-0.172	**-0.318**	1																										
Pos en	**0.5234**	**-0.335**	-0.081	-0.286	**0.5547**	**-0.393**	-0.127	**-0.417**	**0.7697**	1																									
Fro hv	0.2291	**-0.438**	-0.079	-0.019	0.2428	**-0.514**	-0.124	-0.028	**0.6183**	**0.6971**	1																								
Dow el	0.2979	0.0522	0.1129	-0.008	**0.3157**	0.0613	0.1765	-0.012	**0.3233**	**0.3175**	0.1905	1																							
Moi tre	**0.6964**	-0.1	-0.114	-0.216	**0.7381**	-0.118	-0.179	**-0.315**	**0.6149**	**0.8029**	**0.5091**	**0.3423**	1																						
Flu via	-0.107	0.1584	0.1947	0.2455	-0.113	0.186	0.3043	**0.3574**	-0.277	**-0.477**	-0.293	-0.097	**-0.414**	1																					
Slo pe*	0.1492	0.2648	-0.089	-0.23	0.1582	**0.3108**	-0.139	**-0.334**	-0.075	0.1881	-0.129	0.0142	**0.3549**	-0.264	1																				
Sol flu	**-0.48**	**-0.513**	-0.249	-0.044	**-0.508**	**-0.602**	**-0.389**	-0.064	0.2193	0.1871	**0.4668**	-0.033	-0.051	-0.242	-0.186	1																			
Asp ec	0.1267	0.277	-0.079	0.0636	0.1343	**0.3252**	-0.123	0.0925	-0.048	0.0027	-0.219	-0.041	0.1907	-0.179	0.2397	-0.165	1																		
Tra mp	**0.4034**	0.1395	-0.059	0.0015	**0.4275**	0.1637	-0.092	0.0022	0.2503	0.2708	0.0252	0.1759	**0.4409**	-0.262	0.1568	**-0.415**	**0.3295**	1																	
Soi tex	**-0.344**	**-0.456**	0.0598	0.1161	**-0.365**	**-0.535**	0.0934	0.1691	-0.075	-0.128	0.0921	-0.146	**-0.307**	-0.06	-0.228	0.2973	-0.118	-0.181	1															
pH* ***	**0.3732**	0.1258	0.192	-0.037	**0.3955**	0.1477	0.3002	-0.054	0.0615	0.2396	0.0652	0.1216	0.2518	0.0228	0.2292	**-0.417**	0.0374	0.1936	-0.254	1														
Hum d	**-0.755**	-0.105	-0.083	-0.126	**-0.801**	-0.123	-0.13	-0.184	-0.084	-0.272	-0.036	-0.138	**-0.519**	-0.034	-0.278	**0.578**	-0.238	**-0.342**	0.2033	**-0.403**	1												
Sta de	**-0.808**	-0.156	0.0637	-0.112	**-0.857**	-0.183	0.0996	-0.163	-0.133	-0.251	-0.071	-0.236	**-0.605**	-0.046	-0.306	**0.474**	-0.055	-0.232	**0.4265**	**-0.343**	**0.7501**	1											
Roo de	**-0.305**	**0.4495**	0.1946	-0.076	**-0.323**	**0.5277**	0.3042	-0.111	**-0.336**	**-0.398**	**-0.455**	-0.137	**-0.38**	0.2774	-0.121	-0.268	0.2404	-0.048	-0.148	-0.238	**0.309**	0.2899	1										
Bar bo	0.2558	**0.4458**	0.0365	-0.267	0.2711	**0.5233**	0.0571	**-0.389**	0.0518	0.0269	-0.139	0.2113	0.169	0.0253	0.251	**-0.39**	0.0746	0.0994	-0.278	0.1718	**-0.353**	-0.281	-0.039	1								
Bar gra	**0.4355**	**0.3208**	-0.119	-0.102	**0.4615**	**0.3766**	-0.187	-0.148	0.2479	0.2144	0.1666	0.165	**0.4468**	-0.123	0.2692	**-0.314**	0.0744	0.2138	**-0.339**	0.2026	**-0.43**	**-0.5**	-0.205	**0.4989**	1							
Bar fin	0.1241	0.2642	0.0229	0.0153	0.1315	**0.3102**	0.0358	0.0223	0.1066	0.1813	0.0838	0.0396	0.1677	-0.075	0.0495	-0.091	0.1661	0.1289	-0.114	0.0767	-0.031	-0.032	0.0986	-0.018	0.0958	1						
Veg co	**-0.399**	**-0.348**	-0.059	0.1236	**-0.423**	**-0.408**	-0.092	0.1799	-0.151	-0.163	0.0643	-0.195	**-0.343**	0.0132	-0.203	**0.4324**	-0.242	**-0.351**	**0.3427**	-0.213	**0.407**	**0.3542**	0.0563	**-0.664**	**-0.543**	**-0.328**	1					
Bry co	0.1621	-0.024	0.2988	**0.3121**	0.1718	-0.028	**0.4671**	**0.4543**	-0.171	-0.169	0.0136	0.0595	-0.098	0.1983	-0.107	-0.111	-0.283	-0.178	0.1413	0.0456	-0.136	-0.253	-0.12	-0.113	0.0523	-0.097	0.1873	1				
Asp ea	-0.064	-0.01	0.0674	-0.091	-0.068	-0.012	0.1053	-0.132	-0.024	0.0086	0.132	0.1065	-0.103	0.0308	-0.325	0.2143	-0.214	**-0.322**	-0.085	-0.132	0.1606	0.0954	0.1291	0.0072	0.095	0.0454	-0.019	0.1131	1		
Alt tud	0.0994	0.2298	-0.25	-0.004	0.1054	0.2697	**-0.392**	-0.006	-0.095	-0.035	-0.107	0.0632	0.1197	0.0723	0.2845	-0.116	0.0881	0.1426	-0.183	0.0193	-0.195	-0.251	-0.159	0.1508	0.1776	0.0328	-0.176	-0.003	-0.065	1	
Age m	**-0.667**	**-0.38**	-0.046	-0.169	**-0.706**	**-0.446**	-0.071	-0.247	0.1059	0.0076	0.1341	-0.172	**-0.318**	-0.099	**-0.343**	**0.6431**	-0.218	-0.163	**0.3342**	**-0.36**	**0.7622**	**0.7913**	0.1608	**-0.479**	**-0.612**	0.0095	**0.3909**	-0.299	0.0835	-0.218	1	
	SPEC	SPEC	SPEC	SPEC	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hv	Dow el	Moi tre	Flu via	Slo pe*	Sol flu	Asp ec	Tra mp	Soi tex	pH* ***	Hum d	Sta de	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry co	Asp ea	Alt tud	Age mo				

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.20 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Storbreen low (2) data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sample total) **** STORBREEN LOW (2) FORELAND																																			
SPEC .	1																																		
SPEC .	0	1																																	
SPEC .	0	0	1																																
SPEC .	0	0	0	1																															
ENVI A	**0.9539**	0.0387	0.0568	-0.017	1																														
ENVI A	0.0467	**0.7912**	0.0297	-0.047	0.049	1																													
ENVI A	0.0849	0.0367	**0.6387**	-0.122	0.089	0.0464	1																												
ENVI A	-0.028	-0.063	-0.132	**0.5909**	-0.029	-0.08	-0.207	1																											
Sno lie	**0.5241**	-0.204	**0.3571**	-0.169	**0.5494**	-0.258	**0.5591**	-0.286	1																										
Pos en	**0.4684**	-0.23	**0.3653**	-0.064	**0.491**	-0.291	**0.572**	-0.109	**0.8078**	1																									
Fro hve	**0.7665**	0.0073	0.1482	0.012	**0.8036**	0.0092	0.2321	0.0203	**0.654**	**0.5771**	1																								
Dow el	0.2913	-0.12	0.0397	0.0172	0.3054	-0.152	0.0622	0.0291	**0.5254**	**0.4536**	**0.3216**	1																							
Moi tre	**0.5943**	-0.132	0.0697	0.0848	**0.623**	-0.167	0.1091	0.1435	**0.4711**	**0.552**	**0.4853**	**0.3713**	1																						
Flu via	-0.061	0.2675	-0.113	-0.041	-0.064	**0.3381**	-0.177	-0.069	-0.276	**-0.391**	-0.241	-0.147	-0.202	1																					
Slo pe*	**0.3385**	0.0839	0.143	0.002	**0.3548**	0.1061	0.2239	0.0034	0.1857	**0.3873**	**0.3911**	0.2401	**0.4254**	**-0.301**	1																				
Sol flu	0.1123	-0.237	-8E-04	0.0319	0.1177	-0.3	-0.001	0.0539	0.1869	0.2955	**0.3374**	0.2704	**0.3303**	**-0.405**	**0.6032**	1																			
Asp ec	0.2805	-0.087	0.0596	0.064	0.2941	-0.109	0.0934	0.1084	0.1254	-0.011	0.1835	-0.071	0.1694	0.1743	0.0747	-0.074	1																		
Tra mp	0.2903	0.0495	-2E-04	-0.237	0.3043	0.0625	-3E-04	**-0.4**	0.1114	0.1602	0.1589	0.1437	0.1002	-0.08	0.1349	-0.004	-0.145	1																	
Ani inf	0.2403	-0.058	-0.023	-0.124	0.2519	-0.074	-0.036	-0.209	0.2342	0.1158	0.1356	0.0519	0.2025	0.075	-0.116	-0.064	-0.013	0.2228	1																
Soi tex	**-0.716**	-0.17	-0.021	0.0462	**-0.75**	-0.215	-0.032	0.0781	-0.114	-0.155	**-0.411**	-0.09	**-0.479**	-0.06	**-0.342**	0.0699	-0.194	**-0.33**	-0.082	1														
pH* ***	-0.091	-0.089	0.0059	**0.3481**	-0.095	-0.112	0.0092	**0.5891**	0.0341	-0.029	0.0027	0.1111	0.109	-0.205	0.0332	0.2048	0.0609	**-0.369**	-0.091	0.2873	1													
Hum d	**-0.746**	0.0552	0.0875	0.0241	**-0.782**	0.0698	0.137	0.0408	-0.264	-0.28	**-0.495**	-0.079	**-0.536**	-0.074	**-0.359**	-0.042	**-0.313**	-0.275	-0.248	**0.7485**	0.1816	1												
Sta de	**-0.715**	-0.227	-0.124	0.104	**-0.75**	-0.286	-0.194	0.176	**-0.322**	**-0.356**	**-0.559**	-0.181	**-0.531**	-0.006	**-0.445**	-0.082	-0.058	-0.298	-0.113	**0.7789**	**0.3259**	**0.6704**	1											
Roo de	**-0.788**	-0.051	0.0931	0.0122	**-0.826**	-0.064	0.1458	0.0207	-0.193	-0.25	**-0.496**	-0.124	**-0.514**	-0.141	**-0.367**	0.0433	-0.262	-0.257	-0.166	**0.7854**	0.2089	**0.9116**	**0.7073**	1										
Bar bo	**0.3069**	**0.3408**	0.276	-0.143	**0.3217**	**0.4308**	**0.4321**	-0.242	0.2295	0.2683	0.1772	0.0685	0.2299	0.091	0.2449	-0.12	-0.1	0.1832	0.0934	**-0.402**	-0.272	-0.263	**-0.518**	**-0.326**	1									
Bar gra	**0.7935**	0.1318	0.0038	0.0818	**0.8318**	0.1666	0.0059	0.1385	**0.3515**	**0.3435**	**0.6442**	0.2241	**0.5029**	0.0824	0.2337	0.0651	0.206	0.1686	0.1848	**-0.652**	-0.135	**-0.626**	**-0.67**	**-0.689**	0.2021	1								
Bar fin	**0.5008**	0.0416	0.1677	-0.165	**0.525**	0.0525	0.2626	-0.278	**0.54**	**0.4224**	**0.5747**	**0.3635**	**0.321**	-0.142	0.2558	0.1826	0.0023	**0.4074**	0.0693	-0.289	-0.02	**-0.321**	**-0.417**	**-0.317**	0.0938	**0.3995**	1							
Veg co	**-0.746**	-0.286	-0.159	-0.008	**-0.782**	**-0.361**	-0.249	-0.013	**-0.371**	**-0.367**	**-0.557**	-0.208	**-0.492**	-0.074	-0.291	0.0376	-0.097	-0.229	-0.144	**0.703**	0.2107	**0.5975**	**0.7894**	**0.6822**	**-0.674**	**-0.791**	**-0.386**	1						
Bry cov	-0.094	0.1086	-0.258	0.189	-0.098	0.1372	**-0.404**	**0.3199**	**-0.486**	**-0.546**	-0.164	-0.263	-0.262	0.2475	-0.267	-0.226	0.0258	-0.043	0.0038	-0.011	0.0244	0.0533	0.1455	-0.006	**-0.327**	-0.143	-0.142	0.2265	1					
Asp ea	-0.124	-0.2	-0.145	0.1109	-0.13	-0.252	-0.227	0.1877	-0.175	-0.195	-0.072	-0.227	-0.015	-0.043	-0.058	0.136	-0.06	-0.049	0.0892	-0.043	0.1694	-0.144	0.1366	0.0247	-0.158	-0.02	0.0091	0.1449	0.0352	1				
Alt tud	**0.7382**	0.2039	-0.133	0.0589	**0.7738**	0.2577	-0.209	0.0997	0.0603	0.0566	**0.4887**	-0.032	**0.4349**	0.1447	**0.3263**	0.0143	**0.3638**	0.001	-0.051	**-0.76**	-0.092	**-0.685**	**-0.643**	**-0.777**	0.2307	**0.6534**	0.2174	**-0.625**	0.1548	-0.099	1			
Age mo	**-0.713**	-0.1	0.1581	-0.08	**-0.748**	-0.127	0.2476	-0.135	-0.063	-0.034	**-0.483**	0.0403	**-0.427**	-0.135	-0.283	-0.056	**-0.394**	0.0683	0.0479	**0.7055**	0.0714	**0.6624**	**0.5699**	**0.7325**	-0.142	**-0.633**	-0.201	**0.5551**	-0.172	0.0581	**0.9623**	1		
	SPEC A	SPEC A	SPEC A	SPEC A	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos env	Fro hve	Dow els	Moi tre	Flu via	Slo pe*	Sol flu	Asp ect	Tra mpl	Ani inf	Soi tex	pH* ***	Hum de	Sta dep	Roo dep	Bar bou	Bar gra	Bar fin	Veg cov	Bry cov	Asp eas	Alt tud	Age mor			

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.21 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Svellnosbreen data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sa	SVELLNOSBREEN GLACIER FORELAND																																	
SPEC .	1																																	
SPEC .	0	1																																
SPEC .	0	0	1																															
SPEC .	0	0	0	1																														
ENVI A	**0.8889**	-0.059	0.0127	-0.042	1																													
ENVI A	-0.057	**0.9161**	-0.029	0.0125	-0.065	1																												
ENVI A	0.0155	-0.036	**0.727**	-0.134	0.0174	-0.04	1																											
ENVI A	-0.058	0.0178	-0.151	**0.6449**	-0.066	0.0194	-0.208	1																										
Sno lie	**-0.654**	-0.108	0.2148	0.0852	**-0.736**	-0.118	0.2955	0.1321	1																									
Pos en	**-0.599**	-0.083	0.1968	0.0224	**-0.673**	-0.091	0.2707	0.0347	**0.7647**	1																								
Fro hve	**-0.578**	-0.245	0.2315	0.156	**-0.65**	-0.268	**0.3184**	0.2419	**0.591**	**0.6637**	1																							
Dow el	-0.258	-0.11	-0.012	-3E-04	-0.29	-0.12	-0.017	-5E-04	**0.4326**	**0.3203**	0.288	1																						
Moi tre	**-0.439**	0.1714	-0.017	**0.3212**	**-0.494**	0.1871	-0.023	**0.498**	**0.3966**	**0.5452**	**0.5089**	0.171	1																					
Flu via	0.2864	0.0885	-0.128	-0.063	**0.3222**	0.0966	-0.176	-0.097	-0.231	**-0.348**	**-0.335**	-0.12	-0.246	1																				
Slo pe*	0.0219	0.2349	0.0586	0.0995	0.0246	0.2564	0.0806	0.1542	-0.22	0.0791	-0.015	-0.05	0.2218	-0.262	1																			
Sol flu	-0.166	**0.4341**	0.0399	0.0964	-0.187	**0.4739**	0.0549	0.1495	-0.113	0.06	0.2439	0.0613	**0.3523**	-0.241	**0.5774**	1																		
Asp ec	-0.21	-0.263	-0.19	0.0044	-0.237	-0.287	-0.261	0.0068	0.1763	-0.071	-0.038	0.1437	-0.069	-0.01	-0.178	-0.246	1																	
Tra mp	0.1593	-0.192	-0.197	0.0116	0.1792	-0.209	-0.27	0.018	-0.185	-0.125	-0.13	-0.093	-0.177	0.0047	-0.121	-0.184	-0.2	1																
Ani inf	0.0198	0.1453	0.2541	-0.17	0.0222	0.1586	**0.3494**	-0.264	-0.015	-0.204	-0.004	-0.138	-0.136	-0.015	-0.163	0.043	0.0234	-0.044	1															
Soi tex	-0.279	**0.3829**	0.1058	**-0.347**	**-0.314**	**0.418**	0.1455	**-0.537**	0.0278	0.1806	0.0892	-0.191	0.1645	0.0977	-0.015	**0.3051**	-0.191	**-0.312**	0.2062	1														
pH* ***	0.0553	**-0.584**	0.1523	-0.102	0.0622	**-0.637**	0.2095	-0.158	0.099	-0.109	0.1568	0.0869	**-0.407**	-0.04	-0.274	**-0.395**	0.2478	0.0943	0.2085	-0.282	1												
Hum d	0.2702	**0.6694**	-0.116	0.0061	**0.304**	**0.7307**	-0.159	0.0095	**-0.437**	**-0.439**	**-0.49**	-0.113	-0.133	0.137	0.1555	0.2107	-0.044	-0.011	0.1846	0.0517	-0.22	1											
Sta dep	0.1941	**0.6483**	-0.213	-0.065	0.2184	**0.7077**	-0.293	-0.101	**-0.386**	-0.204	**-0.466**	-0.166	-0.041	0.0937	0.1235	0.1279	-0.203	-0.072	0.0306	**0.3289**	**-0.377**	**0.6658**	1										
Roo de	0.1482	**0.6351**	-0.252	-0.018	0.1667	**0.6933**	**-0.347**	-0.028	**-0.409**	-0.299	**-0.415**	-0.125	-0.101	0.0737	0.0844	0.2329	-0.223	-0.034	0.1455	0.2933	-0.282	**0.7352**	**0.858**	1									
Bar bo	0.1528	**-0.335**	0.0385	0.1633	0.1719	**-0.366**	0.053	0.2532	0.0398	-0.185	-0.058	0.105	-0.093	**0.3787**	-0.14	**-0.387**	0.238	-0.12	-0.065	**-0.331**	**0.3042**	-0.175	**-0.38**	**-0.356**	1								
Bar gra	0.1467	**-0.436**	**0.3411**	0.14	0.165	**-0.476**	**0.4692**	0.217	0.0481	0.1958	**0.3325**	0.0702	0.1088	-0.135	0.0184	-0.124	-0.089	0.2439	-0.115	**-0.396**	0.2248	**-0.342**	**-0.457**	**-0.477**	0.0723	1							
Bar fin	-0.177	-0.117	0.1806	-0.003	-0.199	-0.128	0.2485	-0.004	**0.4356**	**0.3964**	**0.3913**	**0.3599**	0.0728	-0.016	-0.028	0.0619	0.1582	-0.088	-0.202	-0.17	0.0584	-0.287	-0.281	**-0.396**	0.0255	0.2838	1						
Veg co	-0.164	**0.5213**	-0.254	-0.213	-0.184	**0.569**	**-0.349**	**-0.33**	-0.118	-0.07	-0.26	-0.191	-0.048	-0.136	0.0775	**0.3068**	-0.119	-0.065	0.1601	**0.5104**	**-0.34**	**0.3851**	**0.5886**	**0.6073**	**-0.69**	**-0.745**	**-0.375**	1					
Bry cov	0.169	-0.105	0.068	-0.007	0.1901	-0.115	0.0936	-0.01	-0.207	-0.18	-0.064	-0.251	-0.231	-0.025	0.1764	0.0381	-0.18	0.1611	0.0627	-0.147	0.1301	-0.074	-0.186	-0.151	-0.11	0.2039	-0.061	-0.051	1				
Asp ea	0.1173	-0.048	-0.226	0.0163	0.1319	-0.053	**-0.311**	0.0253	0.0609	-0.153	**-0.317**	0.279	-0.02	0.1467	-0.119	-0.221	**0.6045**	-0.121	-0.073	-0.226	-0.005	0.1226	0.0335	0.0033	0.1662	-0.152	0.0683	-0.035	-0.084	1			
Alt tud	0.0614	-0.229	0.1628	0.0588	0.0691	-0.25	0.224	0.0911	0.0279	-0.06	0.0637	-0.027	-0.071	-0.091	-0.132	-0.112	0.1174	0.1323	0.1323	-0.223	**0.3292**	-0.061	-0.242	-0.126	0.1182	0.2332	0.015	-0.225	0.0311	0.1017	1		
Age me	**-0.326**	**0.6665**	-0.139	-0.06	**-0.367**	**0.7275**	-0.191	-0.092	-0.088	0.0035	-0.053	0.0807	0.1497	-0.027	0.2655	**0.5641**	-0.097	-0.271	0.0068	**0.4367**	**-0.371**	**0.4712**	**0.521**	**0.5648**	**-0.314**	**-0.5**	-0.056	**0.5306**	-0.154	-0.104	-0.043	1	
	SPEC .	SPEC .	SPEC .	SPEC .	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hve	Dow el	Moi tre	Flu via	Slo pe*	Sol flu	Asp ec	Tra mp	Ani inf	Soi tex	pH* ***	Hum d	Sta dep	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry cov	Asp ea	Alt tud	Age mor		

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.22 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Storbreen high data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sa	STORBREEN HIGH FORELAND																																	
SPEC	1																																	
SPEC	0	1																																
SPEC	0	0	1																															
SPEC	0	0	0	1																														
ENVI A	**0.8899**	0.0087	0.107	0.0889	1																													
ENVI A	0.0097	**0.8006**	-0.062	0.0743	0.0109	1																												
ENVI A	0.1591	-0.083	**0.5986**	-0.067	0.1787	-0.103	1																											
ENVI A	0.1483	0.1115	-0.075	**0.5334**	0.1666	0.1393	-0.126	1																										
Sno lie	**-0.486**	0.0775	-0.228	0.0897	**-0.546**	0.0968	**-0.381**	0.1681	1																									
Pos en	**-0.496**	0.0975	-0.221	0.1331	**-0.557**	0.1217	**-0.369**	0.2495	**0.8356**	1																								
Fro hve	-0.23	0.2085	**-0.299**	0.132	-0.258	**0.2605**	**-0.499**	0.2474	**0.6249**	**0.6589**	1																							
Dow el	-0.169	-0.116	-0.06	-0.076	-0.19	-0.145	-0.1	-0.142	**0.4508**	**0.3875**	0.2551	1																						
Moi tre	**-0.456**	0.1882	-0.217	-0.037	**-0.512**	0.2351	**-0.362**	-0.07	**0.5367**	**0.672**	**0.5573**	0.2462	1																					
Flu via	**0.4798**	0.0621	0.0762	-0.021	**0.5392**	0.0776	0.1274	-0.039	-0.184	-0.255	-0.085	-0.061	-0.17	1																				
Slo pe*	-0.199	0.2208	0.007	-0.006	-0.224	**0.2758**	0.0117	-0.01	0.0842	0.1936	0.1325	-0.094	**0.3659**	-0.189	1																			
Sol flu	-0.024	0.0233	-0.168	-0.036	-0.027	0.029	**-0.28**	-0.068	0.0314	0.0987	**0.3349**	-0.097	0.2823	-0.174	**0.5498**	1																		
Asp ec	0.0874	0.004	-0.094	0.1769	0.0982	0.005	-0.158	**0.3317**	0.1872	0.0918	0.0946	0.0758	0.1935	0.0524	0.0726	0.0208	1																	
Tra mp	0.2328	-0.097	-0.011	0.1081	**0.2616**	-0.121	-0.018	0.2027	0.2133	0.1773	**0.2868**	**0.3048**	0.1433	0.0806	-0.009	0.1201	0.2292	1																
Soi tex	**-0.463**	**-0.296**	0.219	-0.197	**-0.52**	**-0.37**	**0.3659**	**-0.37**	-0.008	-0.024	-0.183	0.0505	0.048	-0.13	0.1288	0.0073	-0.019	-0.183	1															
pH* ***	**0.3044**	-0.122	-0.155	0.1477	**0.3421**	-0.152	-0.259	**0.277**	-0.021	-0.131	0.1396	-0.038	-0.07	0.0921	-0.051	0.2371	0.0976	0.2235	**-0.258**	1													
Hum d	0.018	**-0.445**	0.2929	-0.108	0.0202	**-0.556**	**0.4893**	-0.202	**-0.272**	**-0.384**	**-0.573**	-0.052	**-0.395**	-0.031	-0.073	-0.153	-0.041	-0.172	**0.2724**	-0.057	1												
Sta dep	-0.213	**-0.603**	0.1246	**-0.284**	-0.24	**-0.753**	0.2082	**-0.531**	-0.166	-0.224	**-0.435**	0.0423	-0.078	-0.093	-0.037	-0.07	-0.104	-0.172	**0.63**	-0.046	**0.6462**	1											
Roo de	0.007	**-0.437**	0.131	-0.177	0.0078	**-0.546**	0.2189	**-0.332**	-0.253	-0.264	**-0.422**	-0.041	**-0.332**	-0.003	-0.077	-0.046	-0.104	-0.112	**0.3092**	-0.026	**0.6101**	**0.5778**	1										
Bar bo	-0.034	**0.3551**	0.0943	-0.097	-0.038	**0.4436**	0.1576	-0.182	-0.178	-0.103	-0.082	-0.202	0.0388	0.0041	0.2555	0.1949	-0.03	-0.168	0.0719	-0.1	-0.006	-0.048	-0.028	1									
Bar gra	-0.054	**0.3248**	-0.232	0.0372	-0.061	**0.4057**	**-0.388**	0.0696	**0.2816**	**0.3231**	**0.5223**	0.1698	0.2654	0.0896	0.0262	-0.07	0.0297	0.1591	**-0.346**	-0.083	**-0.522**	**-0.546**	**-0.513**	-0.057	1								
Bar fin	0.2263	0.1224	-0.126	0.0574	0.2543	0.1529	-0.211	0.1076	**0.2611**	0.1757	**0.3985**	0.1111	0.2318	0.1794	0.0781	0.0902	**0.2663**	**0.4157**	**-0.369**	0.058	**-0.322**	**-0.356**	**-0.317**	-0.11	**0.3565**	1							
Veg co	0.0298	**-0.453**	0.202	0.0024	0.0335	**-0.566**	**0.3375**	0.0045	-0.168	-0.229	**-0.435**	-0.023	-0.267	-0.088	-0.167	-0.108	-0.078	-0.075	**0.2983**	0.0988	**0.4545**	**0.5025**	**0.4684**	**-0.492**	**-0.79**	**-0.373**	1						
Bry cov	-0.094	0.16	-0.161	0.031	-0.106	0.1999	**-0.269**	0.0581	**0.3256**	0.2571	**0.3839**	0.2658	0.1285	-0.13	-0.119	-0.121	0.0045	0.177	**-0.292**	-0.215	**-0.365**	**-0.338**	**-0.378**	-0.139	**0.3646**	**0.2927**	-0.257	1					
Asp ea	0.106	0.077	0.0762	0.0619	0.1191	0.0962	0.1273	0.1159	-0.181	-0.119	0.0318	-0.055	-0.245	0.0669	-0.134	-0.029	**-0.759**	0.0462	-0.111	-0.036	-0.149	-0.199	-0.047	0.0661	0.0608	-0.063	-0.049	0.075	1				
Alt tud	-0.079	-0.176	**0.338**	-0.224	-0.089	-0.219	**0.5647**	**-0.42**	-0.009	0.0522	-0.029	0.1489	0.1109	0.0094	0.2015	0.2522	-0.105	0.0211	**0.4648**	-0.212	0.2035	**0.2655**	0.0975	0.1706	-0.06	-0.047	-0.039	-0.201	-0.07	1			
Age mo	**-0.552**	**-0.408**	0.1746	**-0.298**	**-0.62**	**-0.509**	**0.2917**	**-0.558**	0.0576	0.0388	-0.254	0.0883	0.1218	-0.228	0.1398	0.0679	-0.186	**-0.261**	**0.7503**	**-0.288**	**0.4845**	**0.7674**	**0.4103**	0.0639	**-0.386**	**-0.364**	**0.3202**	**-0.275**	-0.206	**0.5216**	1		
	SPEC	SPEC	SPEC	SPEC	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hve	Dow el	Moi tre	Flu via	Slo pe*	Sol flu	Asp ec	Tra mp	Soi tex	pH* ***	Hum d	Sta dep	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry cov	Asp ea	Alt tud	Age mo			

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.23 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Høgvaglbreen data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

**** Weighted correlation matrix (weight = sample total) ****	HØGVAGLBREEN																																		
SPEC .	1																																		
SPEC .	0	1																																	
SPEC .	0	0	1																																
SPEC .	0	0	0	1																															
ENVI A	**0.9062**	-0.052	-0.026	0.0655	1																														
ENVI A	-0.052	**0.9109**	0.0132	0.0306	-0.057	1																													
ENVI A	-0.036	0.0184	**0.6562**	-0.099	-0.039	0.0202	1																												
ENVI A	0.0898	0.0422	-0.098	**0.6611**	0.0991	0.0463	-0.15	1																											
Sno lie	**-0.563**	**-0.371**	0.075	-0.047	**-0.621**	**-0.407**	0.1142	-0.072	1																										
Pos en	**-0.455**	**-0.414**	0.1125	-0.208	**-0.502**	**-0.454**	0.1714	-0.315	**0.7969**	1																									
Fro hve	-0.172	-0.289	-0.141	-0.086	-0.19	-0.317	-0.215	-0.131	0.0765	0.1038	1																								
Dow el	-0.219	**-0.35**	0.2253	-0.128	-0.242	**-0.385**	**0.3434**	-0.193	**0.4954**	**0.416**	0.1038	1																							
Moi tre	-0.123	**-0.338**	0.0225	-2E-04	-0.136	**-0.371**	0.0343	-4E-04	**0.3521**	**0.4084**	-0.152	0.2131	1																						
Flu via	**0.4538**	0.0195	-0.031	0.2166	**0.5008**	0.0215	-0.048	**0.3276**	-0.092	-0.102	0.006	-0.035	-0.073	1																					
Slo pe'	-0.249	0.2683	0.0044	0.0268	-0.275	0.2945	0.0067	0.0405	0.1649	0.2137	0.0516	-0.154	-0.305	-0.064	1																				
Sol flu	-0.205	0.0757	-0.166	-0.026	-0.226	0.0831	-0.252	-0.039	0.1871	0.3086	-0.132	-0.016	-0.1	-0.097	**0.6509**	1																			
Asp ec	-0.136	-0.074	-0.248	0.0776	-0.15	-0.082	**-0.378**	0.1174	0.1093	0.0396	-0.056	0.005	0.2768	-0.016	**-0.444**	-0.144	1																		
Tra mp	**-0.388**	0.0165	0.0019	0.0411	**-0.428**	0.0181	0.0029	0.0622	**0.3548**	0.3096	0.0743	-0.02	0.0552	-0.026	-0.058	-0.076	0.2454	1																	
Ani inf	0.1885	-0.055	0.1878	-0.02	0.208	-0.061	0.2862	-0.03	-0.047	0.0575	-0.119	-0.039	0.0008	0.1172	-0.009	0.0563	0.0569	-0.034	1																
Soi tex	**-0.407**	**0.3394**	0.1096	0.0349	**-0.449**	**0.3726**	0.167	0.0528	0.0935	-0.047	-0.023	0.0727	**-0.409**	-0.103	0.237	0.1808	-0.032	0.2555	-0.134	1															
pH* ***	**0.4058**	**-0.688**	-0.088	-0.03	**0.4478**	**-0.755**	-0.134	-0.046	0.0383	0.1196	0.2016	**0.3546**	0.2682	0.0719	**-0.376**	-0.118	0.0845	**-0.351**	0.16	**-0.486**	1														
Hum d	-0.112	**0.6063**	0.0299	-0.147	-0.124	**0.6656**	0.0456	-0.222	-0.207	**-0.352**	-0.142	-0.165	**-0.372**	-0.052	-0.069	-0.278	0.0865	0.0537	-0.067	**0.4136**	**-0.589**	1												
Sta dep	-0.269	**0.6847**	0.1298	-0.056	-0.296	**0.7516**	0.1978	-0.085	-0.09	-0.214	-0.195	-0.264	-0.301	-0.099	0.2035	-0.064	-0.037	0.1747	-0.118	**0.4673**	**-0.782**	**0.7894**	1											
Roo de	-0.232	**0.5877**	0.036	-0.169	-0.256	**0.6452**	0.0549	-0.255	-0.14	-0.265	-0.154	-0.278	**-0.36**	-0.118	0.0943	-0.108	-0.025	0.083	-0.128	**0.4424**	**-0.751**	**0.8848**	**0.8598**	1										
Bar bo	**0.3337**	-0.127	0.0333	-0.087	**0.3682**	-0.14	0.0507	-0.132	-0.038	0.1158	-0.202	-0.105	0.2219	0.0674	0.0573	0.1622	-0.249	0.0886	0.0691	-0.215	0.1706	-0.314	-0.269	**-0.322**	1									
Bar gra	**0.3878**	**-0.532**	-0.046	0.2525	**0.428**	**-0.584**	-0.07	**0.3819**	-0.06	0.0254	0.1274	0.0717	0.2939	0.2242	-0.239	-0.216	0.165	-0.279	0.1324	**-0.558**	**0.5973**	**-0.462**	**-0.536**	**-0.567**	0.0915	1								
Bar fin	-4E-04	-0.156	0.06	-0.134	-4E-04	-0.172	0.0915	-0.203	-0.019	0.102	0.0197	0.3058	0.076	0.0864	0.0296	0.1172	-0.114	0.001	0.0587	-0.133	0.1628	-0.192	-0.208	-0.276	0.0591	0.0293	1							
Veg co	**-0.518**	**0.5267**	-0.009	-0.167	-0.571	**0.5783**	-0.014	-0.253	0.0559	-0.094	0.0189	-0.049	-0.304	-0.239	0.1489	0.0866	0.0046	0.1701	-0.161	**0.5544**	**-0.601**	**0.5615**	**0.613**	**0.6637**	**-0.52**	**-0.853**	-0.116	1						
Bry cov	0.0487	-0.138	0.0334	-0.236	0.0537	-0.151	0.051	**-0.357**	-0.281	-0.166	0.3034	0.0215	-0.235	-0.132	-0.083	-0.071	-0.263	**-0.339**	-0.08	-0.102	0.1587	0.057	-0.041	0.1415	-0.316	-0.123	0.0148	0.2909	1					
Alt eas	-0.114	0.0982	-0.095	-0.124	-0.126	0.1078	-0.145	-0.188	0.0879	0.035	-0.091	-0.124	0.188	-0.059	**-0.343**	-0.171	**0.7924**	0.2366	0.0292	0.1449	-0.147	0.25	0.2058	0.2423	-0.14	-0.101	-0.319	0.1576	-0.235	1				
Alt tud	**0.6165**	**-0.553**	-0.179	0.0445	**0.6803**	**-0.607**	-0.272	0.0673	-0.185	-0.073	0.0688	-1E-04	0.2014	0.2135	**-0.371**	-0.151	0.065	**-0.375**	0.2584	**-0.727**	**0.8286**	**-0.496**	**-0.692**	-0.615	0.2419	**0.6561**	0.0889	**-0.679**	0.1328	-0.176	1			
Age mo	**-0.586**	**0.4798**	0.2184	-0.02	**-0.647**	**0.5267**	**0.3329**	-0.03	0.1459	0.0575	-0.027	0.0827	-0.064	-0.218	0.3064	0.0992	-0.032	0.288	-0.272	**0.5643**	**-0.771**	**0.4426**	**0.5723**	**0.5006**	-0.218	**-0.476**	0.0539	**0.5267**	-0.123	0.1033	**-0.916**	1		
	SPEC .	SPEC .	SPEC .	SPEC .	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hve	Dow el	Moi tre	Flu via	Slo pe'	Sol flu	Asp ec	Tra mp	Ani inf	Soi tex	pH* ***	Hum d	Sta dep	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry cov	Alt eas	Alt tud	Age mor			

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.24 **Correlation matrix of Pearson's moment correlation coefficients between the environmental parameters within the Bøverbreen data set (coefficients significant at p <0.001 are in bold).**
Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, downweighting of rare species)

Weighted correlation matrix (weight = sample total) BØVERBREEN

	SPEC	SPEC	SPEC	SPEC	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hv	Dow el	Moi tre	Flu via	Slo pe*	Sol flu	Asp ec	Ani inf	Soi tex	pH* ***	Hum d	Sta de	Roo de	Bar bo	Bar gra	Bar fin	Veg co	Bry co	Asp ea	Alt tud	Age mor
SPEC	1																														
SPEC	0	1																													
SPEC	0	0	1																												
SPEC	0	0	0	1																											
ENVI A	**0.9306**	0.0235	-0.008	-0.055	1																										
ENVI A	0.0266	**0.8249**	0.0758	-0.009	0.0285	1																									
ENVI A	-0.012	0.0965	**0.6478**	-0.005	-0.013	0.1169	1																								
ENVI A	-0.12	-0.017	-0.008	**0.4246**	-0.129	-0.021	-0.012	1																							
Sno lie	-0.261	**0.591**	0.1172	-0.007	-0.281	**0.7165**	0.181	-0.016	1																						
Pos en	0.0972	0.0815	0.1125	-0.023	0.1044	0.0989	0.1737	-0.054	0.1362	1																					
Fro hv	0.0702	0.0738	-0.004	0.0397	0.0754	0.0895	-0.007	0.0934	0.1463	0.1124	1																				
Dow el	0.2088	0.161	0.2858	-0.036	0.2243	0.1952	**0.4412**	-0.085	**0.3539**	0.0558	0.1274	1																			
Moi tre	-0.014	**0.336**	0.1602	0.0389	-0.015	**0.4073**	0.2474	0.0916	**0.3816**	0.0775	**0.3646**	0.2497	1																		
Flu via	**0.3944**	-0.048	**-0.324**	-0.117	**0.4238**	-0.058	**-0.5**	-0.276	-0.263	-0.141	-0.107	-0.096	-0.15	1																	
Slo pe*	-0.012	0.1314	0.0541	0.2345	-0.013	0.1593	0.0836	**0.5524**	0.279	0.1321	0.1942	0.0841	**0.3876**	-0.29	1																
Sol flu	0.2055	0.0775	-0.085	0.1557	0.2208	0.0939	-0.131	**0.3667**	0.1923	0.1406	**0.4825**	0.0519	0.2946	-0.141	**0.5935**	1															
Asp ec	-0.073	-0.17	-0.06	0.2405	-0.079	-0.206	-0.093	**0.5665**	-0.038	0.0442	0.0484	-0.101	0.0666	-0.031	0.2793	0.2201	1														
Ani inf	-0.119	0.0814	-0.067	0.1	-0.127	0.0987	-0.104	0.2355	-0.037	-0.109	0.1883	0.0028	0.1682	0.0362	0.0676	-0.032	-0.14	1													
Soi tex	-0.12	-0.154	-0.034	0.0583	-0.129	-0.187	-0.052	0.1372	-0.111	-0.017	0.0168	-0.138	-0.086	-0.066	0.0761	0.0038	0.0133	0.1707	1												
pH* ***	-0.093	-6E-04	0.1329	0.2356	-0.1	-8E-04	0.2052	**0.5548**	0.1488	0.0883	-0.009	0.1649	0.047	-0.236	0.0875	-0.034	0.1824	0.029	0.014	1											
Hum d	**-0.439**	**-0.4**	-0.053	-0.107	**-0.472**	**-0.485**	-0.082	-0.252	-0.037	-0.033	**-0.427**	-0.228	**-0.442**	-0.145	-0.285	**-0.409**	-0.04	-0.24	0.1778	0.0605	1										
Sta de	**-0.547**	**-0.561**	-0.035	-0.089	**-0.588**	**-0.68**	-0.054	-0.209	-0.247	-0.113	-0.276	-0.279	**-0.466**	-0.118	-0.375	**-0.451**	-0.042	-0.123	0.1699	0.0455	**0.8409**	1									
Roo de	**-0.552**	**-0.373**	-0.084	-0.048	**-0.593**	**-0.452**	-0.13	-0.114	-0.123	-0.127	-0.294	-0.266	-0.246	-0.159	-0.248	**-0.438**	-0.122	0.0684	0.2818	0.0307	**0.7965**	**0.7873**	1								
Bar bo	-0.076	**0.316**	0.0387	0.0079	-0.081	**0.3831**	0.0597	0.0186	0.2749	-0.096	0.1886	**0.0403**	0.2118	-0.107	0.1503	0.0995	-0.18	0.1862	0.0011	0.1459	-0.184	-0.265	-0.109	1							
Bar gra	**0.4275**	**0.3977**	0.1421	0.0229	**0.4594**	**0.4821**	0.2194	0.0539	0.2076	0.0833	0.2521	**0.401**	**0.3265**	-0.006	0.144	0.189	-0.206	0.146	-0.195	0.021	**-0.526**	**-0.626**	**-0.545**	0.0536	1						
Bar fin	**0.3283**	0.1828	**0.4619**	-0.072	**0.3528**	0.2216	**0.713**	-0.169	0.2677	0.1759	0.1156	**0.433**	0.2744	-0.087	0.0635	0.0117	-0.135	-0.092	-0.108	-0.069	-0.207	-0.284	**-0.32**	-0.085	**0.4433**	1					
Veg co	-0.168	**-0.43**	-0.176	-0.045	-0.181	**-0.522**	-0.272	-0.106	-0.208	-0.033	-0.283	-0.187	**-0.476**	0.0982	**-0.338**	**-0.313**	-0.062	0.0352	0.1601	0.0723	**0.548**	**0.6078**	**0.5224**	-0.238	**-0.436**	-0.281	1				
Bry co	0.035	**-0.447**	-0.093	-0.002	0.0376	**-0.542**	-0.143	-0.005	**-0.571**	-0.048	-0.208	-0.26	-0.3	0.235	-0.132	-0.161	0.0731	0.0224	0.0722	-0.007	0.0931	**0.3467**	0.1497	**-0.34**	**-0.32**	-0.174	**0.3496**	1			
Asð ea	0.0257	0.0572	0.2462	-0.007	0.0276	0.0694	**0.38**	-0.017	0.0197	-0.218	-0.146	0.0779	0.1712	-0.114	0.0077	-0.035	-0.029	0.068	-0.025	0.0708	0.0995	-0.08	0.1891	0.0902	0.0405	0.1302	-0.096	0.0211	1		
Alt tud	0.0621	0.0506	0.1169	-0.015	0.0667	0.0614	0.1805	-0.036	0.114	0.081	-0.032	0.0823	0.2847	-0.094	0.12	0.1117	0.2255	0.0445	-0.031	0.1558	-0.101	-0.166	-0.111	-0.002	0.0514	0.0742	-0.065	0.1681	**0.4098**	1	
Age m	**-0.809**	-0.187	-0.015	0.0407	**-0.869**	-0.227	-0.023	0.0958	0.0562	-0.11	-0.22	**-0.369**	-0.16	-0.246	-0.034	-0.201	0.1495	0.0962	0.1865	0.0951	**0.5485**	**0.6496**	**0.6029**	-5E-04	**-0.568**	**-0.343**	0.2382	0.2696	0.1179	0.2045	1

Note : see Appendix 3 for environmental parameter abbreviations.

Table 5.25 Relationship between TWINSPAN "final site groups" and environmental parameters on DCA ordination axes (1) and (2) at selected forelands.

	Parameters at positive end	General sequence of site groups on axis (+ive to-ive)	Parameters at negative end	Most distinct site groups
AUSF AXIS (1)	Root depth, humus depth, age, soil depth, soil texture.	Mature heath → Late intermediate heath → Snowbed → Early intermediate heath → Pioneer	bryophyte cover, frost evidence, bare ground, low snow cover.	Mature herb-rich; Pioneer snowbed; Intermediate lichen heath; Exposed pioneer.
AUSF AXIS (2)	Altitude, bare gravels, pH and fluvial activity.	Exposed pioneer → Pioneer snowbed → Moist heath/low-slope sites → Heath	Age, soil depth, vegetation cover and position	None
FASF AXIS (1)	Fluvial activity, bare ground, dowels, frost pH.	Pioneer → Pioneer snowbed → Lichen heath → Mature heath and woodland.	Soil depth, root depth, age, humus depth, vegetation cover.	Snowbed; Lichen heath.
FASF AXIS (2)	Dryness, low snow cover, bare boulders and gravels, fluvial	Lichen heath → Mature and pioneer → Mature meadow and woodland	Humus depth, root depth, age, easterly aspect, animal influence.	Mature birch woodland; Lichen heath
STLF1 AXIS (1)	Dryness, position, bare gravels, trampling, low snow cover.	Early intermediate lichen heath → Early intermediate snowbed → Late-snow early intermediate heath → Late intermediate snowbed → Mature late-snow heath.	Soil depth, humus depth, age, solifluction, vegetation cover	Mature late-snow heath; Lichen heath.
STLF1 AXIS (2)	Root depth, bare ground, northerly aspect, slope.	Snowbed/ younger late-snow heath → Disordered sequence of increasingly older and high-slope sites (WEAK SEQUENCE)	Solifluction, soil texture, frost activity, age, vegetation cover.	None
STLF2 AXIS (1)	Bare gravels, frost activity, altitude, dryness, low snow.	Exposed lichen heath → Early intermediate lichen heath → Early intermediate snowbed → Late intermediate and mature assemblages	Root depth, vegetation cover, humus depth, soil texture, soil depth, age.	Exposed lichen heath; Mature lichen heath.
STLF2 AXIS (2)	Bare boulders and gravels, fluvial, altitude, bryophytes.	Late intermediate snowbed → Snowbed or early intermediate heath → Mature lichen heath	Vegetation cover, solifluction, position, soil depth.	Late intermediate snowbed; Mature lichen heath.
SVLF AXIS (1)	Fluvial activity, humus depth, soil depth, bryophytes, trampling.	Pioneer → Late-snow heath / mature atypical snowbed → Early intermediate heath → Lichen heath	Low snow, position, frost, dryness, age.	Exposed pioneer snowbed; Exposed pioneer; Early intermediate heath.
SVLF AXIS (2)	Humus, age, soil depth, root depth, vegetation cover.	Mature atypical snowbed → Disordered sequence of heath and snowbed assemblages → Exposed pioneer	pH, bare gravels and boulders, northerly aspect, frost heave.	Mature (atypical) snowbed.
STHF AXIS (1)	Fluvial activity, pH, trampling, bare fines, easterly aspect.	Pioneer → Early intermediate snowbed → Late-snow heath → Mature lichen heath → Early intermediate lichen heath	Age, position, lack of snow, soil texture, dryness.	Pioneer snowbed; Early intermediate lichen heath; Exposed pioneer; Early intermediate snowbed.
STHF AXIS (2)	Bare boulders and gravels, slope, frost heave, dryness, bryophytes.	Early intermediate snowbed → Disordered sequence of assemblages → Mature lichen heath (WEAK SEQUENCE)	Soil depth, vegetation cover, humus depth, root depth, age.	None
HOHF AXIS (1)	Altitude, fluvial, pH, bare gravels and boulders.	Pioneer → Snowbed → Early intermediate lichen heath → Dry lichen heath	Age, lack of snow, vegetation cover, position, soil texture	Dry lichen heath; Pioneer snowbed
HOHF AXIS (2)	Soil depth, humus depth, root depth, vegetation cover, age.	Mature/ late intermediate snowbed → Younger snowbed → Younger heath → Dry lichen heath	pH, altitude, bare gravels, position, low snow , dowels.	Mature/late intermediate snowbed
BOHF AXIS (1)	Gravels, fluvial, fines, dowel heave, solifluction.	Pioneer snowbed→ Exposed pioneer → Snowbed → Late intermediate/mature heath → Exposed lichen heath	Age, root , soil and humus depth, snow cover, vegetation cover.	Exposed pioneer; Pioneer snowbed; Snowbed.
BOHF AXIS (2)	Snowlie, bare gravels, bare fines, dowels, slope, position..	Exposed lichen heath → Exposed snowbed → Lower snowbed sites →	Soil depth, bryophytes, vegetation cover, humus and root depth, age.	Exposed lichen heath; Mature/ late intermediate lichen heath

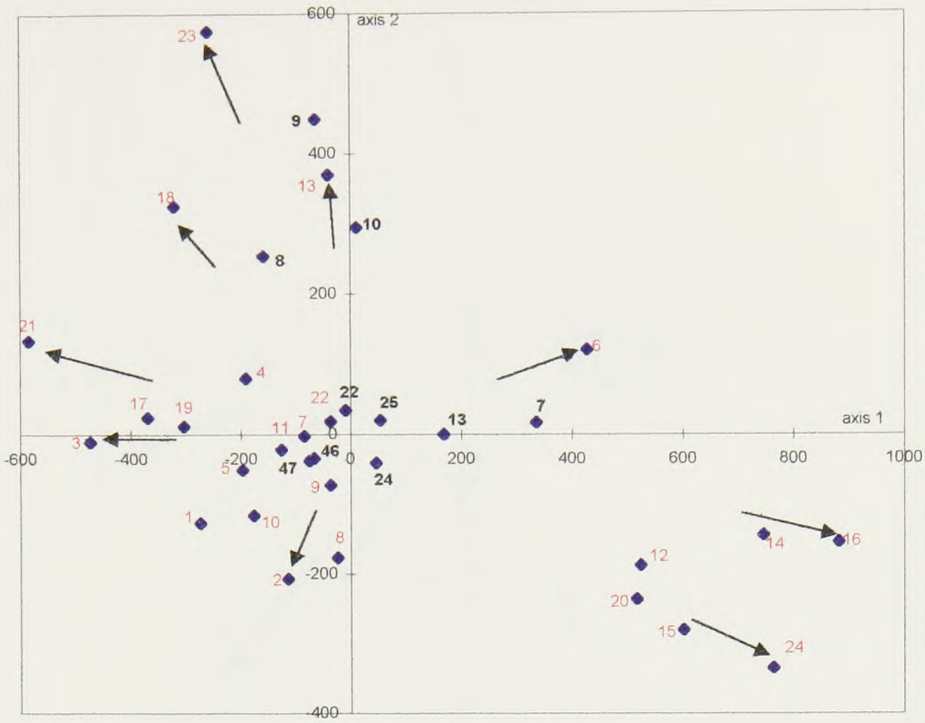
Table 5.26 Relationship between TWINSPAN "final species groups" and environmental parameters on DCA ordination axes (1) and (2) at selected forelands.

	Parameters at positive end	Sequence of species groups on axis (+ive to -ive)	Parameters at negative end	Most distinct species groupings
AUSF AXIS (1)	Root depth, humus depth, age, soil depth, soil texture.	Mature heath → Late intermediate heath → Snowbed → Widespread heath → Pioneer → Early intermediate heath	bryophyte cover, frost evidence, bare ground, low snow cover.	Mature heath; Early intermediate heath
AUSF AXIS (2)	Altitude, bare gravels, pH and fluvial activity.	Pioneer → Moist heath /low-slope sites → High-slope, older heath→ Early intermediate heath (WEAK SEQUENCE)	Age, soil depth, vegetation cover and position	None
FASF AXIS (1)	Fluvial activity, bare ground, dowels, frost pH.	Pioneer → Pioneer snowbed → Early intermediate heath → Mature heath and woodland.	Soil depth, root depth, age, humus depth, vegetation cover.	Pioneer; Pioneer snowbed; Heath.
FASF AXIS (2)	Dryness, low snow cover, bare boulders and gravels, fluvial	Early intermediate heath → Pioneer → Heath and mature heath and woodland	Humus depth, root depth, age, easterly aspect, animal influence.	Mature woodland; Early intermediate heath and lichen heath; Pioneer; Heath.
STLF1 AXIS (1)	Dryness, position, bare gravels, trampling, low snow cover.	Exposed lichen heath → Early intermediate snowbed → Late-snow early intermediate heath → Widespread snowbed → Mature and late intermediate assemblages	Soil depth, humus depth, age, solifluction, vegetation cover	Exposed lichen heath; Early intermediate heath.
STLF1 AXIS (2)	Root depth, bare ground, northerly aspect, slope.	Snowbed assemblages → Disordered sequence of species from increasingly older, high-slope assemblages. (WEAK SEQUENCE)	Solifluction, soil texture, frost activity, age, vegetation cover.	None
STLF2 AXIS (1)	Bare gravels, frost activity, altitude, dryness, low snow.	Exposed lichen heath → Early intermediate lichen heath → Early intermediate snowbed →Widespread heath → Late intermediate and mature assemblages.	Root depth, vegetation cover, humus depth, soil texture, soil depth, age.	Exposed lichen heath;
STLF2 AXIS (2)	Bare boulders and gravels, fluvial, altitude, bryophytes.	Late intermediate snowbed → Snowbed or early intermediate heath → early intermediate lichen heath → Mature lichen heath	Vegetation cover, solifluction, position, soil depth.	Mature lichen heath; Late intermediate snowbed.
SVLF AXIS (1)	Fluvial activity, humus depth, soil depth, bryophytes,trampling.	Pioneer and snowbed→ early intermediate and mature atypical snowbed → Heath → Lichen heath	Low snow, position, frost, dryness, age.	Lichen heath; Pioneer snowbed; Exposed pioneer snowbed
SVLF AXIS (2)	Humus, age, soil depth, root depth, vegetation cover.	Mature/widespread snowbed → Mature late-snow heath → Early intermediate and lichen heath → Early intermediate snowbed → Pioneer snowbed	pH, bare gravels and boulders, northerly aspect, frost heave.	Mature snowbed.
STHF AXIS (1)	Fluvial activity, pH, trampling, bare fines, easterly aspect.	Pioneer → Early intermediate snowbed → Late-snow and widespread heath → Lichen heath	Age, position, lack of snow, soil texture, dryness.	Lichen heath.
STHF AXIS (2)	Bare boulders and gravels, slope, frost heave, dryness, bryophytes.	Early intermediate snowbed → Disordered sequence of assemblages (WEAK SEQUENCE)	Soil depth, vegetation cover, humus depth, root depth, age.	Pioneer
HOHF AXIS (1)	Altitude, fluvial, pH, bare gravels and boulders.	Pioneer → Widespread heath → Snowbed and late-snow heath → Mature heath → Lichen heath	Age, lack of snow, vegetation cover, position, soil texture	Lichen heath; Pioneer; Mature heath; Widespread heath.
HOHF AXIS (2)	Soil depth, humus depth, root depth, vegetation cover, age.	Mature/late-intermediate assemblages → Widespread heath and pioneer → Early intermediate snowbed and lichen heath (WEAK)	pH, altitude, bare gravels, position, low snow , dowels.	None
BOHF AXIS (1)	Gravels, fluvial, fines, dowel heave, solifluction.	Pioneer → Snowbed → Widespread heath → Early intermediate snowbed → Heath → Mature and exposed lichen heath	Age, root , soil and humus depth, snow cover, vegetation cover.	Pioneer; Snowbed; Widespread heath; Early intermediate snowbed.
BOHF AXIS (2)	Snowlie, bare gravels, bare fines, dowels, slope, position..	Exposed lichen heath → Pioneer and widespread heath assemblages→ Heath and early intermediate snowbed assemblages → Mature late-snow heath	Soil depth, bryophytes, vegetation cover, humus and root depth, age.	Mature late-snow lichen heath; Exposed lichen heath

Table 5.27 Relative influence of age and position on DCA axes (1) and (2) and their correlation with other environmental parameters.

	Important meso-scale parameters on axis (1). Others in [ ]	Important meso-scale parameters on axis (2). Others in [ ]	Parameters positively correlated with age	Parameters negatively correlated with age	Parameters positively correlated with position	Parameters negatively correlated with position	Comments (taken from summary).
AUSF	Age (r = 0.796) Meaningful	Altitude (r = 0.575) Age (r = -0.335) Meaningful	Root depth, humus depth, soil depth, soil texture, vegetation cover. (r = > 0.627)	Altitude, bryophyte cover, bare gravels, frost, bare boulders, dowels. (r = > -0.467)	Frost heave, low snow cover, trampling. (r = > 0.309)	Vegetation cover (r = -0.213)	Position is not an important influence on this foreland. Age and altitude appear to be confounded on axis (2).
FÅSF	Age (r = -0.648) Meaningful	Age (r = -0.346) [Dry (r = 0.323)] Meaningful	Root depth, humus depth, soil depth, vegetation cover, bryophyte cover. (r = > 0.585)	Bare gravels and boulders, fluvial activity, frost activity. (r = > -0.366)	Dryness, solifluction, slope. (r = > 0.295)	Bryophyte cover, fluvial activity (r = > -0.346)	Moisture and snow cover appear to be related to age and not so much to microtopography.
STLF1	Age (r = -0.667) Position (r = 0.523) [Dry (r = 0.696)] Meaningful	Position (r= -0.335) [Solifuction (r = -0.513)] Not meaningful	Humus depth, soil depth, solifluction, vegetation cover. (r = > 0.391)	Bare gravels, bare boulders, pH, slope. (r = > -0.343)	Dryness, low snow cover, frost. (r = > 0.697)	Bryophytic cover, fluvial activity. (r = > -0.398)	On axis (1) high-slope positions are associated with younger ground and on axis (2) with older ground.
STLF2	Age (r = -0.713) Altitude (r = 0.738) Position (r = 0.523) Meaningful	Position (r = -0.23) Meaningful	Root depth, soil texture, humus depth, soil depth, vegetation cover. (r = > 0.555)	Altitude, bare gravels, frost, dryness. (r = > -0.427)	Low snow cover, frost activity, dryness, dowel heave, bare fines. (r = > 0.422)	Bryophyte cover, fluvial activity, vegetation cover, soil depth. (r = > -0.356)	On axis (1) high-slope positions are associated with younger ground and on axis (2) with older ground.
SVLF	Position (r = 0.599) Age (r = -0.326) Distorted but meaningful	Age (r = 0.667) Meaningful	Root depth, solifluction, vegetation , soil and humus depth, soil texture. (r = > 0.437)	Bare gravels, pH, bare boulders. (r = > -0.314)	Low snow cover, frost heave, dryness, bare fines, dowel heave. (r = > 0.433)	Humus depth, root depth, soil depth. (r = > -0.386)	An outlier pioneer group has possibly distorted the results so that micro-topography appears to be more important than age.
STHF	Age (r = -0.552) Position (r = -0.492) Meaningful	Age (r = -0.408) Not very meaningful	Soil depth, soil texture, altitude, humus and root depth. (r = > 0.41)	Bare gravels, bare fines, pH. (r = > -0.288)	Low snow cover, dryness, frost activity, dowels. (r = > 0.433)	Humus and root depth. (r = > -0.253)	Young terrain is associated with low-slope positions and older ground, high-slope positions on axis (1).
HØHF	Altitude (r = 0.612) {Age (r = -0.586) {Position (r = -0.455) Meaningful	Age (r = 0.48) {Altitude (r= -0.553) {Position (r = -0.414) Quite meaningful	Soil depth, soil texture, vegetation cover, root and humus depth. (r = > 0.443)	Altitude, pH, bare gravels. (r = > -0.476)	Low snow cover, dowel heave, dryness. (r = > 0.408)	Humus and root depth. (r = > -0.265)	a) Age and altitude are confounded on a foreland with a very low altitudinal range b) Same comment as BOHF (a).
BØHF	Age (r = -0.609) [low snow (r = -0.201)] Meaningful	[low snow (r = 0.591)] [Soil depth (r = -0.561)] Quite meaningful	Soil depth, root depth, humus depth. (r = > 0.549)	Bare gravels, dowel heave, bare fines. (r = > -0.343)	*Position correlations too low to use* Snow correlated with dryness and dowel heave (r = > 0.354)	*Position correlations too low to use* Snow correlated with bryophytes and fluvial activity. (r = > 0.354)	a) On axis (1) low positions are associated with younger ground and on axis (2) with older ground. b) Position represented by dryness and low snow.

Fig 5.1 Relationship between DCA centroids of TWINSPAN "final site group" and environmental parameter biplot scores on DCA axes (1) and (2) (Austerdalsbreen).



KEY:
Environmental parameters:
1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23- altitude
24 - moraine age

Fig. 5.1
"Final site groups":
site group **7** -
(Ath dis - Pot cra)
site group **8** -
(Ste alp - Ste ves)
site group **9** -
(Car spp - Phl alp)
site group **10** -
(Sal phy - Sal her)
site group **13** -
(Des fle - Vac myr)
site group **22** -
(Vac myr - Bet pub)
site group **24** -
(Des alp - Phy cae)
site group **25** -
(Vac myr - Vac uli)
site group **46** -
(Emp nig - Bet pub)
site group **47** -
(Sol cro)

Fig. 5.9 Relationship between DCA centroids of TWINSPAN "final species group" and environmental parameter biplot plot scores on DCA axes (1) and (2) (Austerdalsbreen).

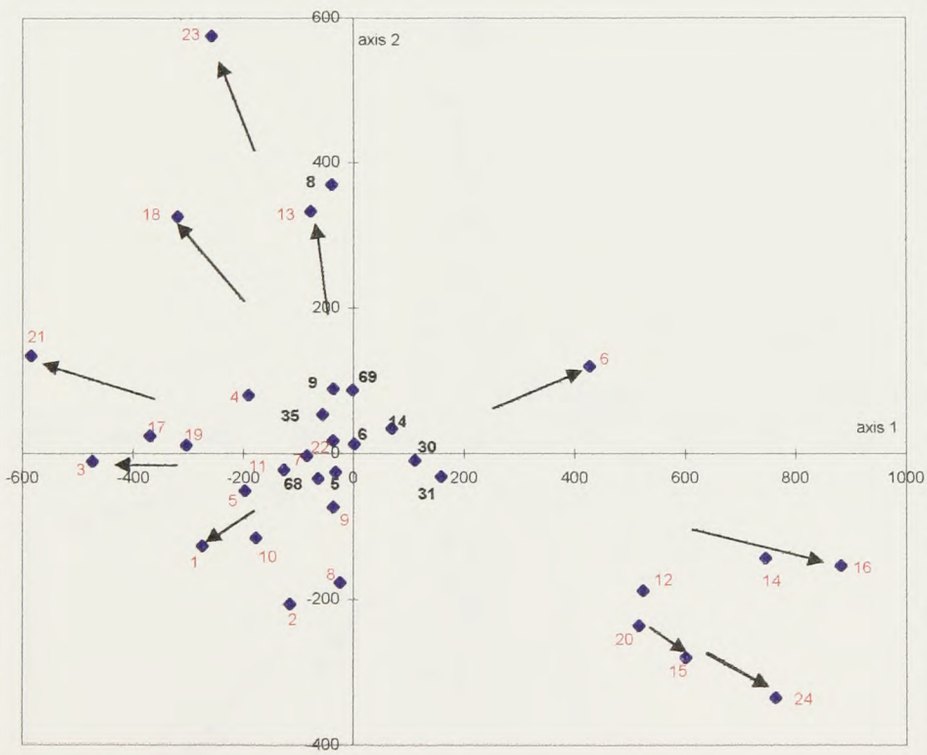


Fig. 5.9
"Final species groups":
species group **31** -
(mature heath)
species group **30** -
(late intermediate heath)
species group **14** -
(late intermediate snowbed)
species group **6** -
(widespread snowbed)
species group **5** -
(widespread heath)
species group **9** -
(early intermediate heath)
species group **35** -
(early intermediate heath)
species group **69** -
(early intermediate late-snow heath)
species group **68** -
(early intermediate heath)
species group **8** -
(pioneer)
(see Appendix 1 for species abbreviations)

Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.1-2 for the plot coordinates and section 5.3.3 for discussion of these diagrams.

Fig. 5.2 Relationship between DCA centroids of TWINSPAN "final site group" and environmental biplot scores on DCA axes (1) and (2) (Fåbergstølsbreen).

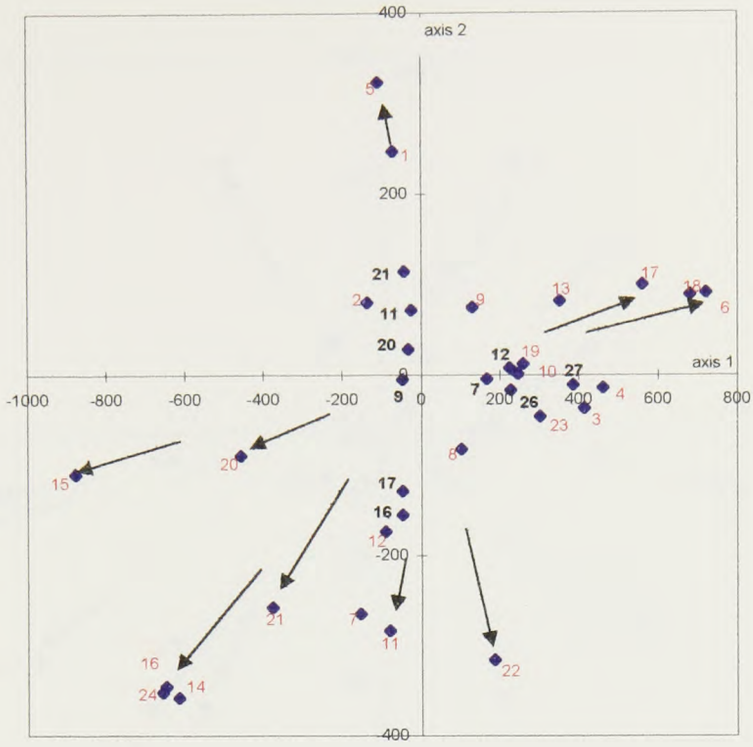
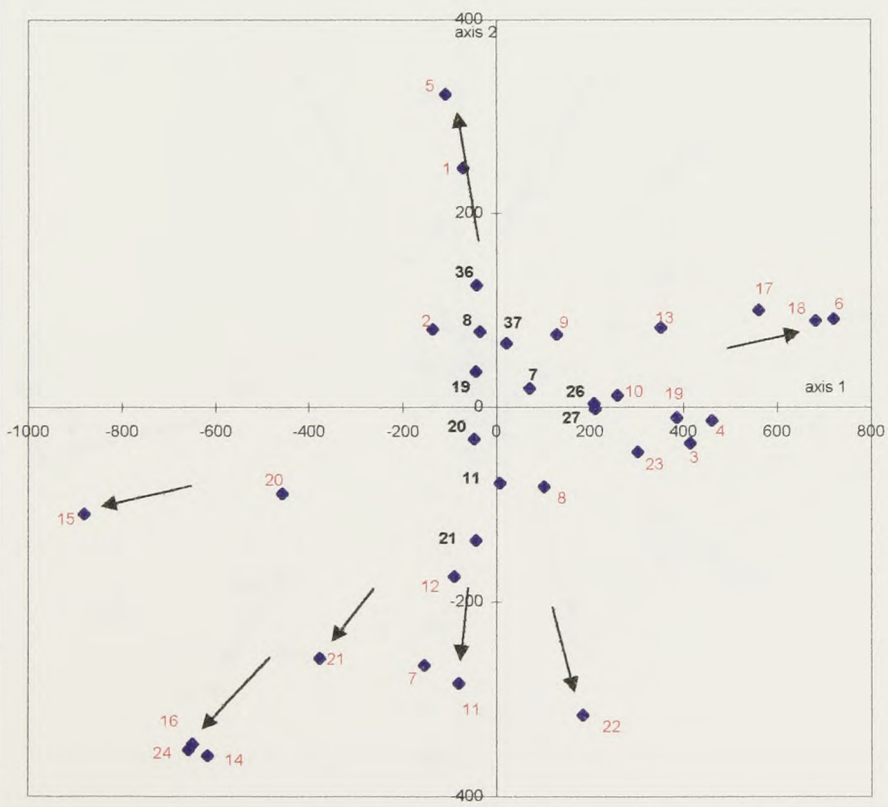


Fig. 5.10 Relationship between DCA centroids of TWINSPAN "final species group" and environmental biplot scores on axes (1) and (2) (Fåbergstølsbreen).



Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.3-4 for the plot coordinates and section 5.4.3 for discussion of these diagrams.

KEY:
Environmental parameters:
1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig. 5.2 "Final site groups":
site group **7** - (Des fle - Epi als)
site group **9** - (Phy cae - Emp nig)
site group **11** - (Cla chl - Cla fim)
site group **12** - (Lot cor - Sal phy)
site group **16** - (Pot cra - Mel syl)
site group **17** - (Bet pub - Gym dry)
site group **20** - (Emp nig - Sal phy)
site group **21** - (Vac vit - Cla ran)
site group **26** - (Phl alp - Lot cor)
site group **27** - (Des alp - Sax ste)

Fig. 5.10 "Final species groups":
species group **20** - (mature heath)
species group **21** - (mature woodland)
species group **11** - (heath)
species group **12** - (heath)
species group **19** - (widespread heath)
species group **37** - (early intermediate lichen heath)
species group **36** - (early intermediate lichen heath)
species group **8** - (early intermediate heath)
species group **7** - (pioneer snowbed)
species group **26** - (pioneer snowbed)
species group **27** (pioneer)
(*see Appendix 1 for species abbreviations*)

Fig. 5.4 Relationship between DCA centroids of TWINSPAN "final site group" and environmental parameter biplot scores on DCA axes (1) and (2), Storbreen low (1).

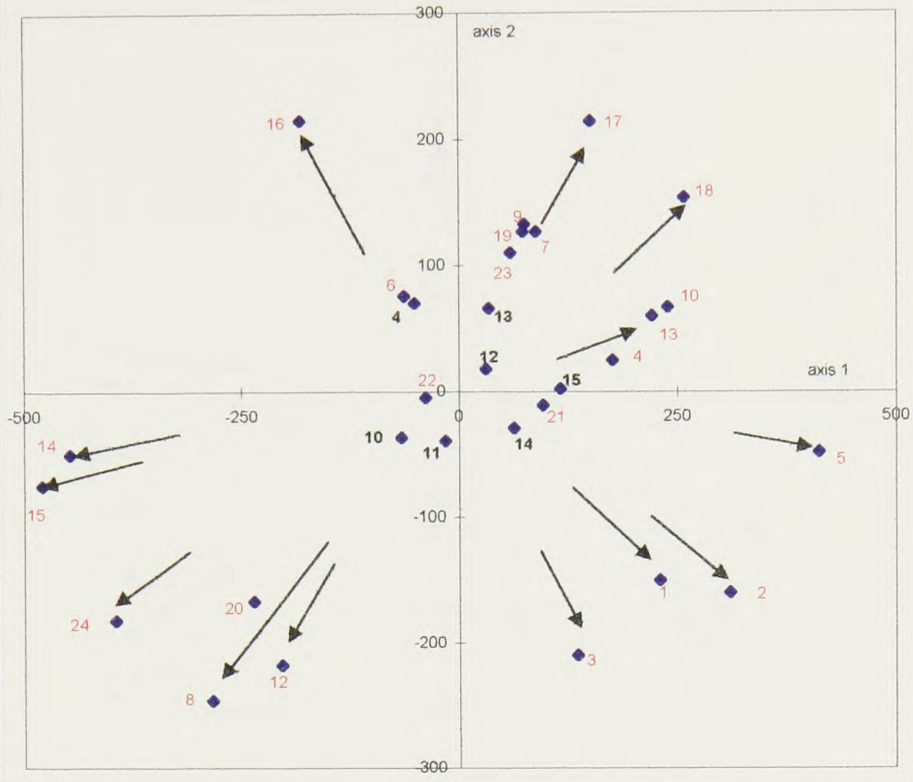
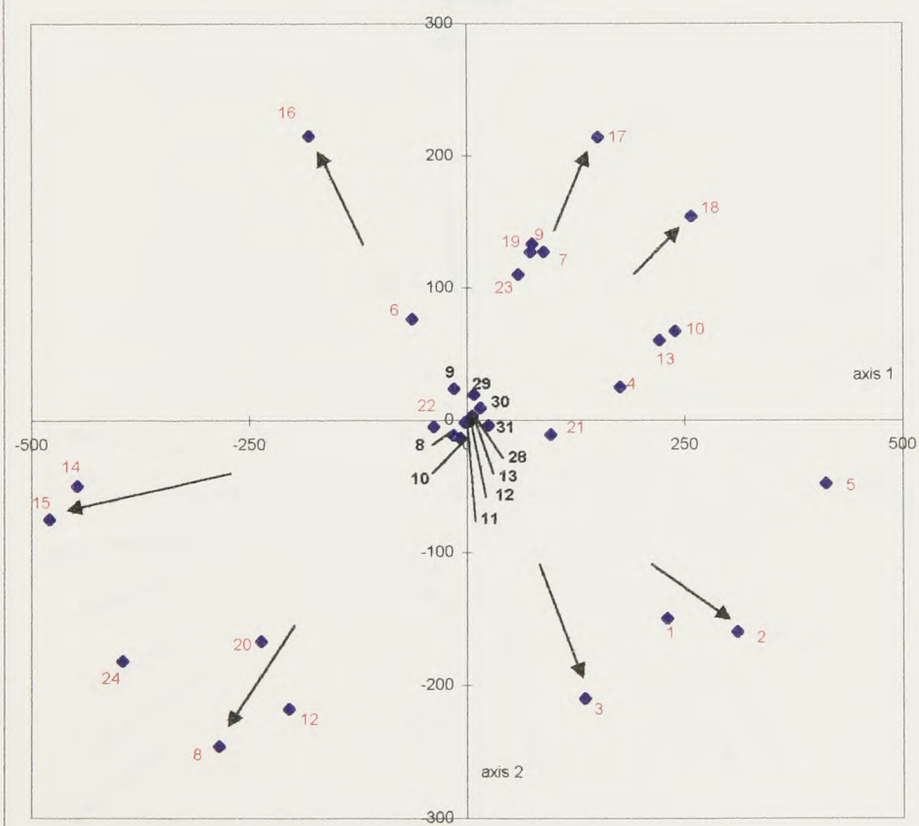


Fig. 5.11 Relationship between DCA centroids of TWINSPAN "final species group" and environmental parameter biplot scores on DCA axes (1) and (2), Storbreen low (1).



Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.5-6 for the plot coordinates and section 5.5.3 for discussion of these diagrams.

KEY:

Environmental parameters:

1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig. 5.4 "Final site groups":

site group **4** - (Sal gla - Ant odo)
site group **10** - (Fes ovi - Sal her)
site group **11** - (Vac uli - Sal lan)
site group **12** - (Emp nig - Ste alp)
site group **13** - (Sal gla - Sal her)
site group **14** - (Phy cae - Cla por)
site group **15** - (Ale och - Cet cuc)

Fig. 5.11 "Final species groups":

species group **8** - (mature heath)
species group **9**- (late intermediate snowbed)
species group **10** - (mature late-snow heath)
species group **11** - (early intermediate heath)
species group **12** - (widespread snowbed)
species group **13** - (widespread heath)
species group **31** - (exposed lichen heath)
species group **30** - (exposed early intermediate snowbed)
species group **28** - (early intermediate late-snow heath)
species group **29** - (early intermediate snowbed)

(*see Appendix 1 for species abbreviations*)

Fig. 5.4 Relationship between DCA centroids of TWINSPAN "final site group" and environmental parameter biplot scores on DCA axes (1) and (2), Storbreen low (2).

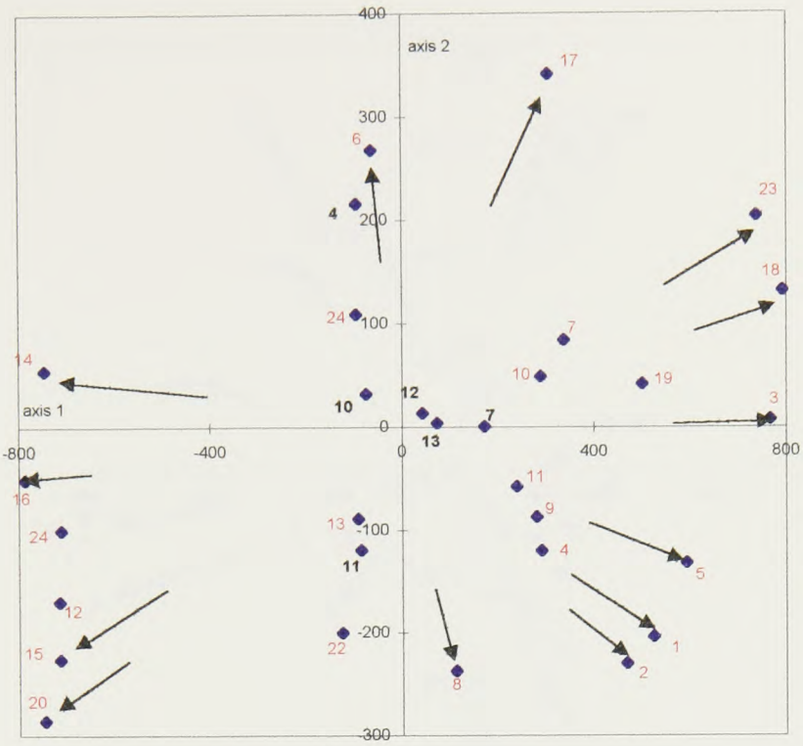
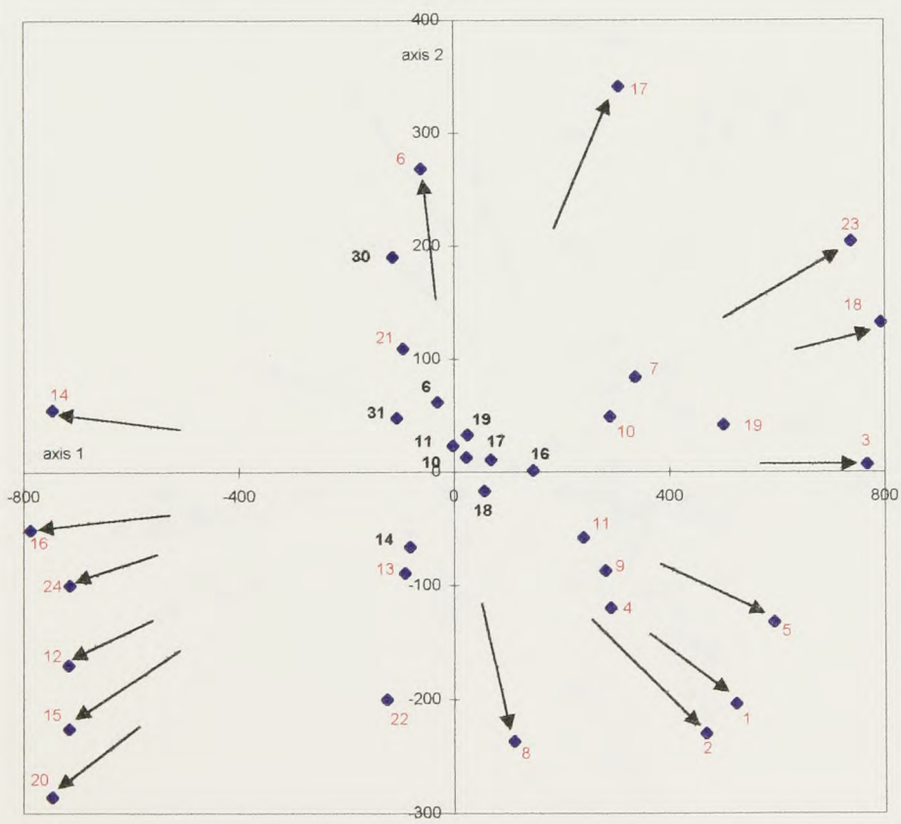


Fig. 5.12 Relationship between DCA centroids of TWINSPAN "final species group" and environmental biplot scores on DCA axes (1) and (2), Storbreen low (2).



Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.7-8 for the plot coordinates and section 5.6.3 for discussion of these diagrams.

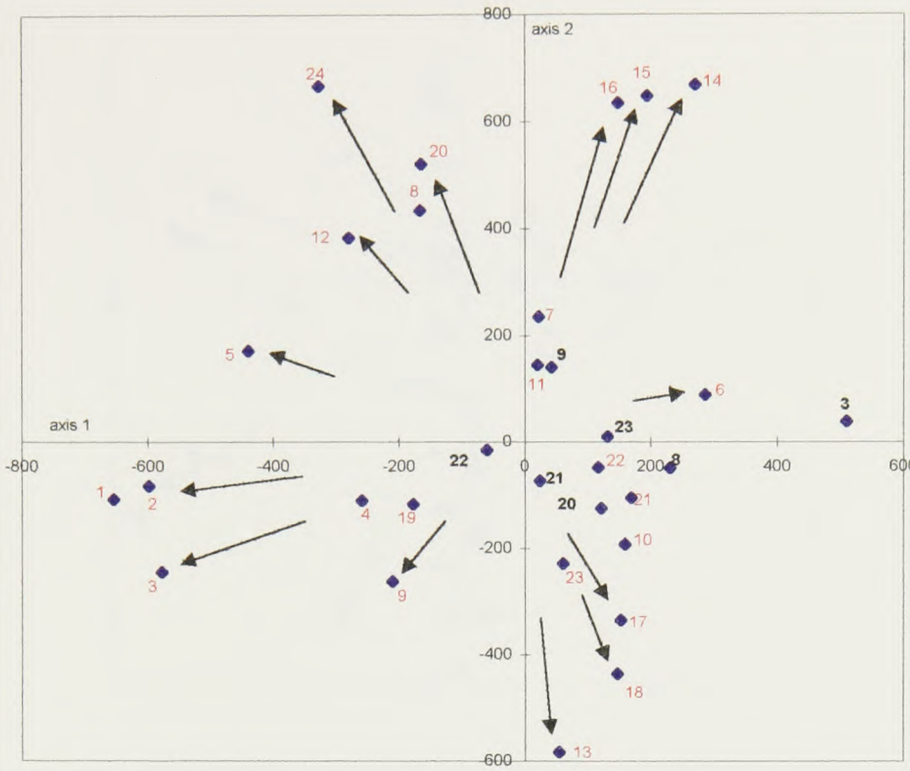
KEY:
Environmental parameters:
1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig. 5.4
"Final site groups":
site group **4** -
(Sal her - Ran acr)
site group **7** -
(Cet niv - Ale och)
site group **10** -
(Sal gla - Vac uli)
site group **11** -
(Cla arb - Cet eri)
site group **12** -
(Cas hyp - Sal her)
site group **13** -
(Cla chl - Cet niv)

Fig. 5.12
"Final species groups":
species group **14** -
(mature lichen heath)
species group **30** -
(late intermediate snowbed)
species group **31** -
(late intermediate late-snow heath)
species group **6** -
(early intermediate snowbed)
species group **11** -
(widespread heath)
species group **19** -
(early intermediate snowbed)
species group **16** -
(exposed lichen heath)
species group **10** -
(exposed early intermediate heath)
species group **18** -
(early intermediate lichen heath)
species group **17**
(exposed early intermediate heath)

(*see Appendix 1 for species abbreviations*)

Fig. 5.5 Relationship between DCA centroids of TWINSPAN "final site group" and environmental biplot scores on axes (1) and (2) (Svellnosbreen).



KEY:

Environmental parameters:

1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig. 5.5 "Final site groups":

site group **3** - (Des alp - Oxy dig)
site group **8** - (Sal gla - Cer cer)
site group **9** - (Sal her - Emp nig)
site group **20** - (Sal gla - Car pet)
site group **21** - (Emp nig - Ste alp)
site group **22** - (Cla por - Phy cae)
site group **23** - (Ale och - Cet cuc)

Fig. 5.13 Relationship between DCA centroids of TWINSPAN "final species group" and environmental parameter biplot scores on axes (1) and (2) (Svellnosbreen).

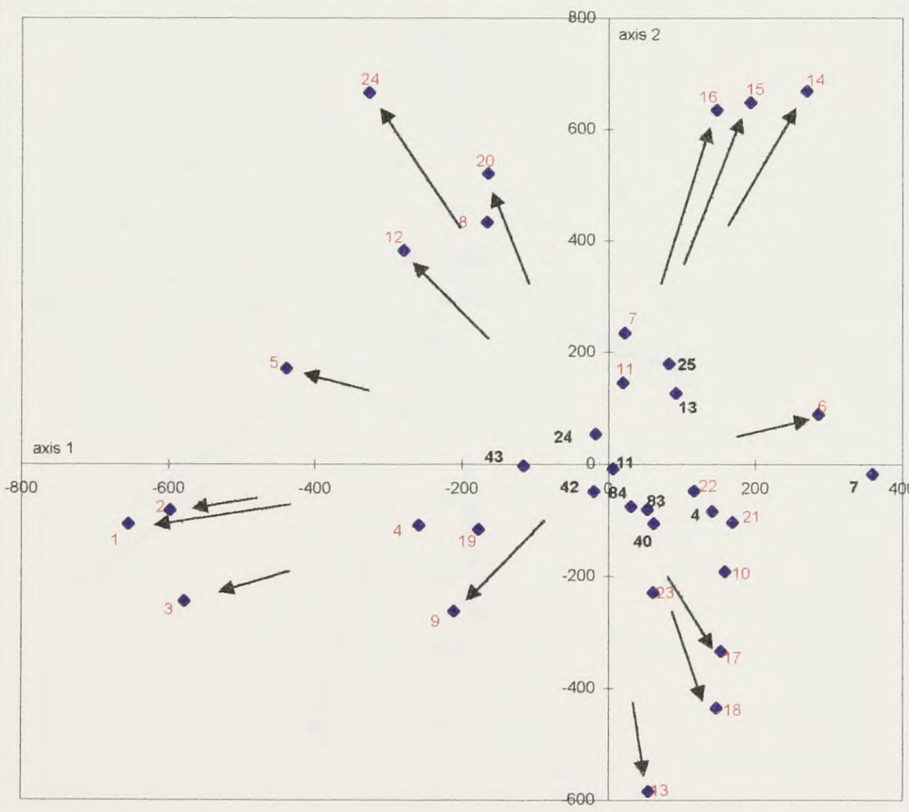


Fig.5.13 "Final species groups":

species group **24** - (mature late-snow heath)
species group **25** - (mature snowbed)
species group **43** - (lichen heath)
species group **13** - (widespread snowbed)
species group **11** - (early intermediate heath)
species group **42** - (early intermediate heath)
species group **84** - (early intermediate heath)
species group **83** - (early intermediate snowbed)
species group **40** - (early intermediatesnowbed)
species group **4** - (pioneer snowbed)
species group **7** - (exposed pioneer snowbed)

(*see Appendix 1 for species abbreviations*)

Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.9-10 for the plot coordinates and section 5.7.3 for discussion of these diagrams.

Fig. 5.6 Relationship between DCA centroids of TWINSPAN "Final site group" and environmental paramter biplot scores on axes (1) and (2) (Storbreen high).

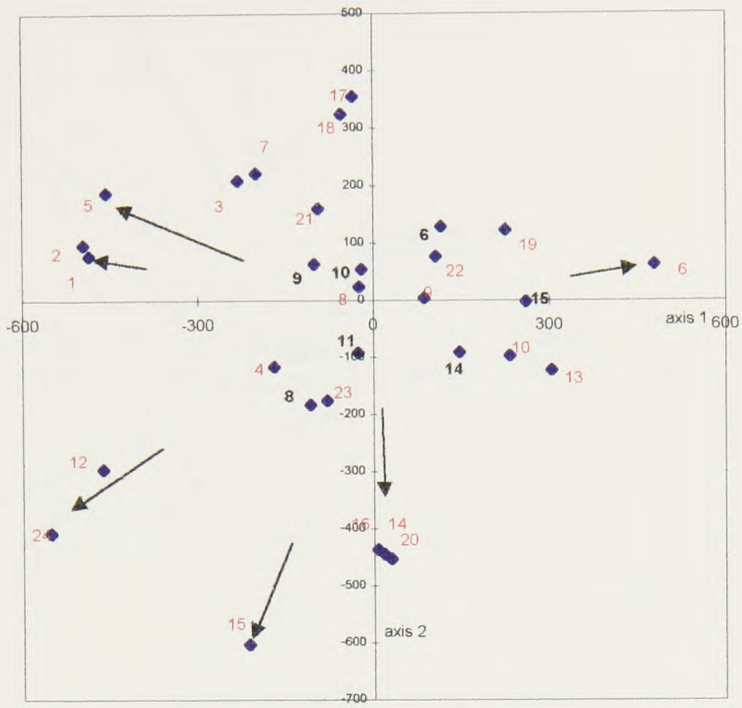
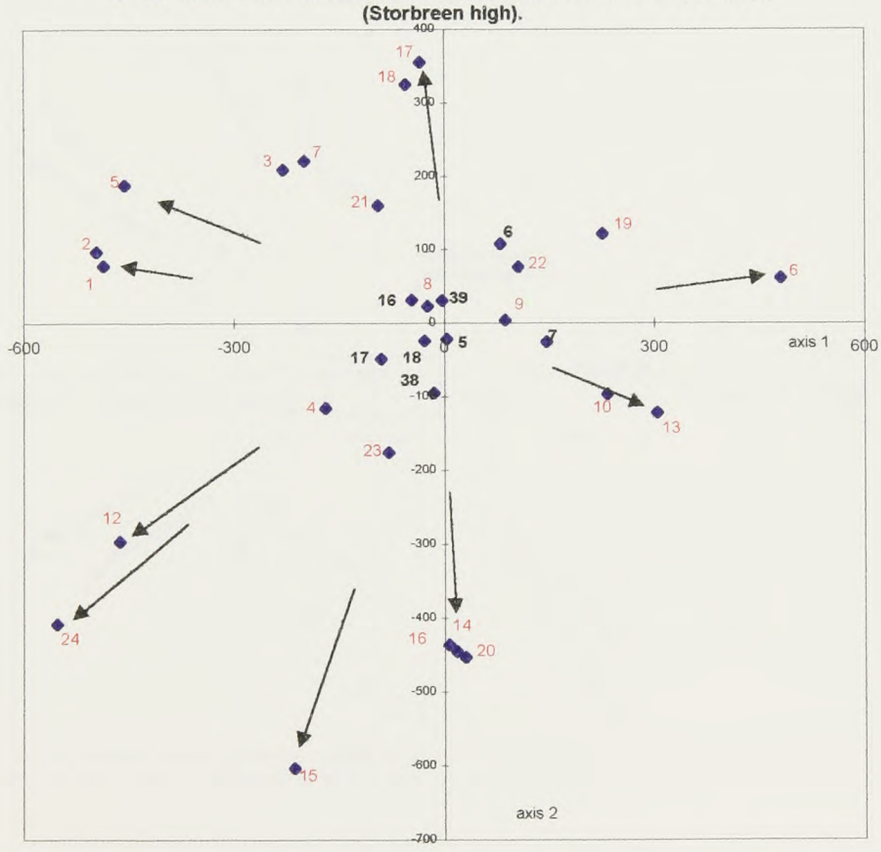


Fig. 5.14 Relationship between DCA centroids of TWINSPAN "final species group" and environmental parameter biplot scores on axes (1) and (2) (Storbreen high).



KEY:

Environmental parameters:

1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig. 5.6 "Final site groups":

site group **6** - (Sal gla - Sal her)
site group **8** - (Bet nan - Vac vit)
site group **9** - (Phy cae - Sol cro)
site group **10** - (Sal gla - Cet niv)
site group **11** - (Sal her - Cet isl)
site group **14** - (Ste alp - Fes ovi)
site group **15** - (Oxy dig - Des alp)

Fig. 5.14 "Final species groups":

species group **18** - (late intermediate late-snow heath)
species group **38** - (late-snow early intermediate heath)
species group **39** - (late-snow early intermediate heath)
species group **16** - (widespread heath)
species group **17** - (lichen heath)
species group **5** - (widespread heath)
species group **6** - (early intermediate snowbed)
species group **7** - (pioneer)

(see Appendix 1 for species abbreviations)

Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.11-12 for the plot coordinates and section 5.8.3 for discussion of these diagrams.

Fig. 5.7 Relationship between DCA centroids of TWINSPAN "final site groups" and environmental parameter biplot scores on axes (1) and (2) (Høgvagibreen).

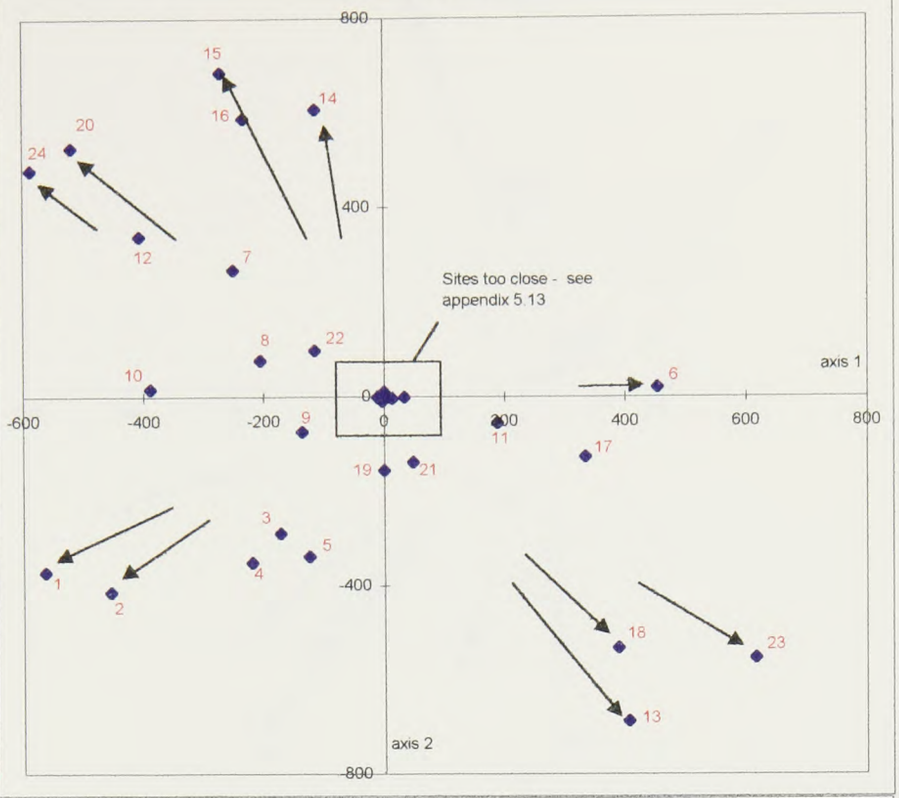
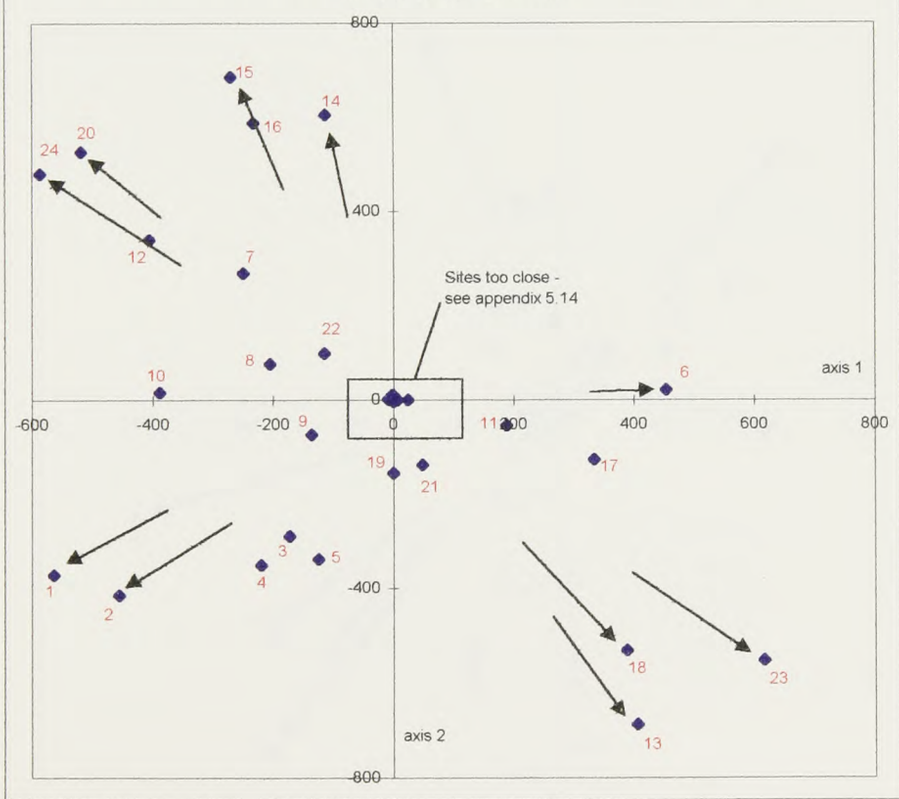


Fig 5.15 Relationship between DCA centroids of TWINSPAN "final species groups" and environmental parameter biplot scores on axes (1) and (2) (Høgvagibreen).



KEY:

Environmental parameters:

1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig.5.7
"Final site groups":

site group **4** -
(Tha ver - Ale och)
site group **6** -
(Sol cro - Oxy dig)
site group **7** -
(Sal gla - Cet niv)
site group **11** -
(Cla gra - Sal her)
site group **20** -
(Cor acu - Cet niv)
site group **21** -
(Cas hyp - Cla chl)

Fig. 5.15
"Final species groups":

species group **36** -
(mature heath)
species group **39** -
(mature snowbed)
species group **38** -
(early intermediate snowbed)
species group **37** -
(late-snow heath)
species group **8** -
(lichen heath)
species group **5** -
(widespread heath)
species group **3** -
(pioneer)

(*see Appendix 1 for species abbreviations*)

Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: It is necessary to refer to Appendix 5.13-14 for the plot coordinates and section 5.9.3 for discussion of these diagrams.

Fig. 5.8 Relationship between DCA centroids of TWINSPAN "final site group" and environmental parameter biplot scores on DCA axes (1) and (2) (Bøverbreen).

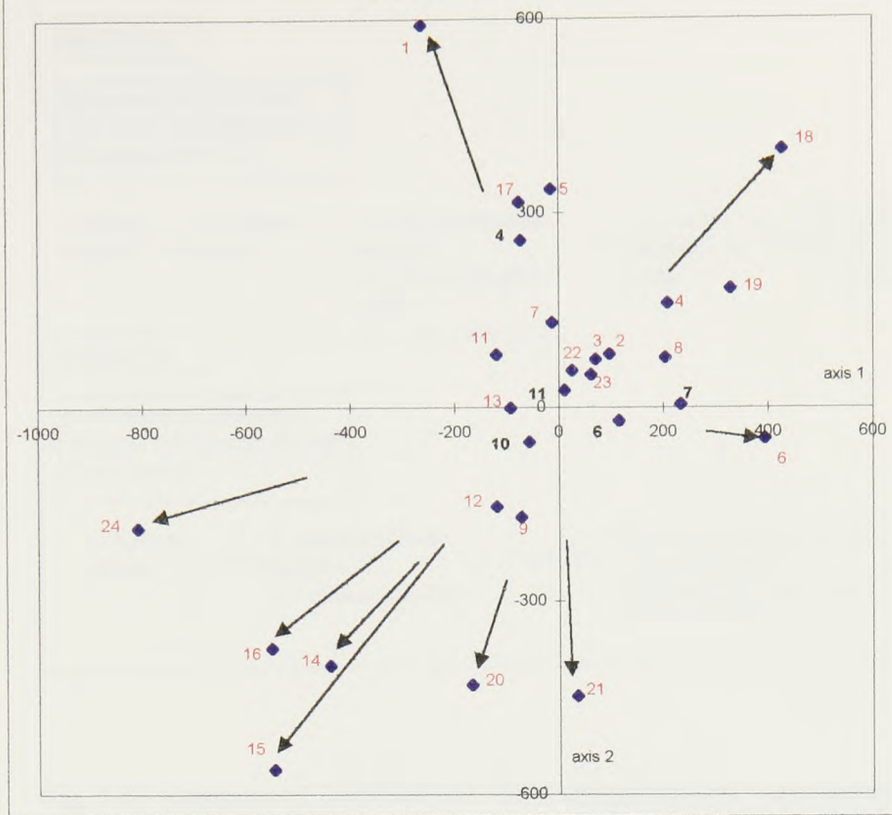
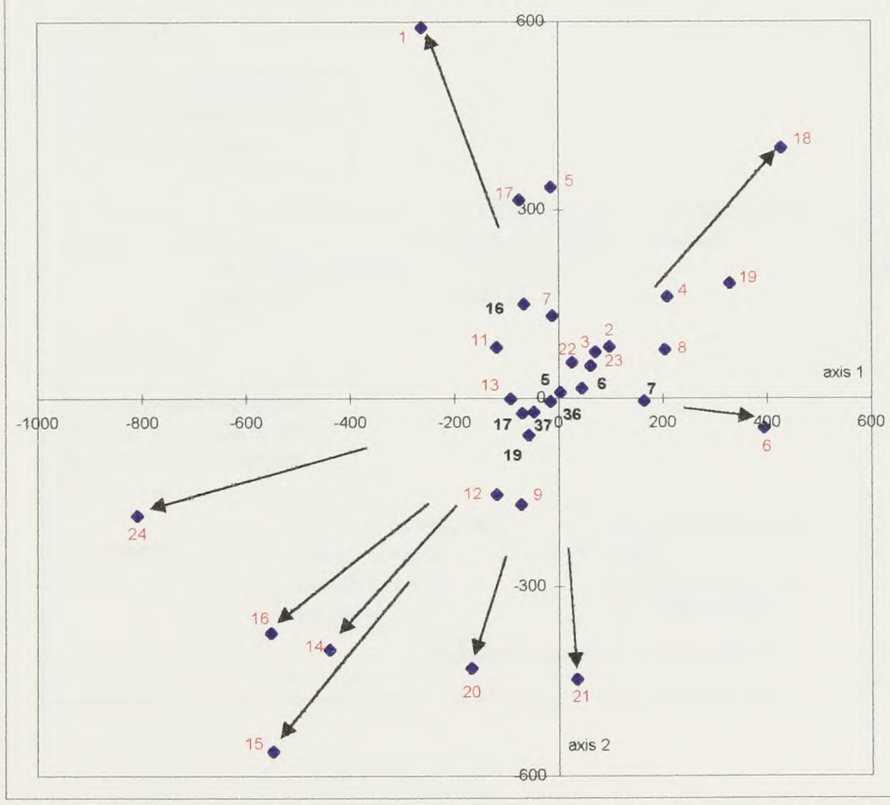


Fig. 5.16 Relationship between DCA centroids of TWINSPAN "final species group" and environmental parameter biplot scores on DCA axes (1) and (2) (Bøverbreen).



KEY

Environmental parameters:

1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

Fig. 5.8
"Final site groups":

site group **4** -
(Ale och - Cor acu)
site group **6** -
(Cer alp)
site group **7** -
(Oxy dig - Poa alp)
site group **10** -
(Cet isl - Cet eri)
site group **11** -
(Tri spi - Gna sup)

Fig. 5.16
"Final species groups":

species group **19** -
(mature late-snow lichen heath)
species group **17** -
(mature late-snow lichen heath)
species group **36** -
(early intermediate snowbed)
species group **37** -
(heath)
species group **16** -
(exposed lichen heath)
species group **6** -
(snowbed)
species group **5** -
(widespread heath)
species group **7** -
(pioneer)

(see Appendix 1 for species abbreviations)

Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 5.15-16 for the plot coordinates and section 5.10.3 for discussion of these diagrams.

Fig. 5.17 Sequence of TWINSPAN "final site groups", and associated environmental parameters, on DCA ordination axes (1) and (2), Austerdalsbreen.

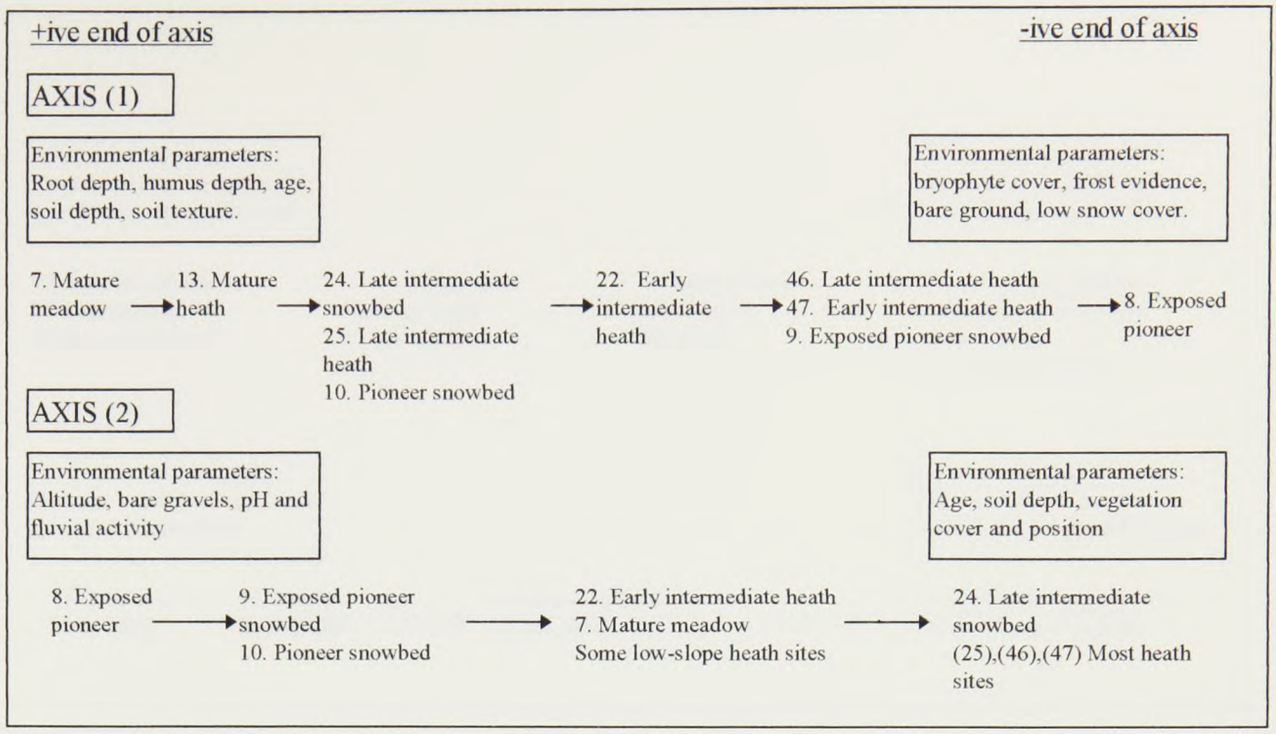


Fig. 5.25 Sequence of TWINSPAN "final species groups" and associated environmental parameters, on DCA ordination axes (1) and (2), Austerdalsbreen.

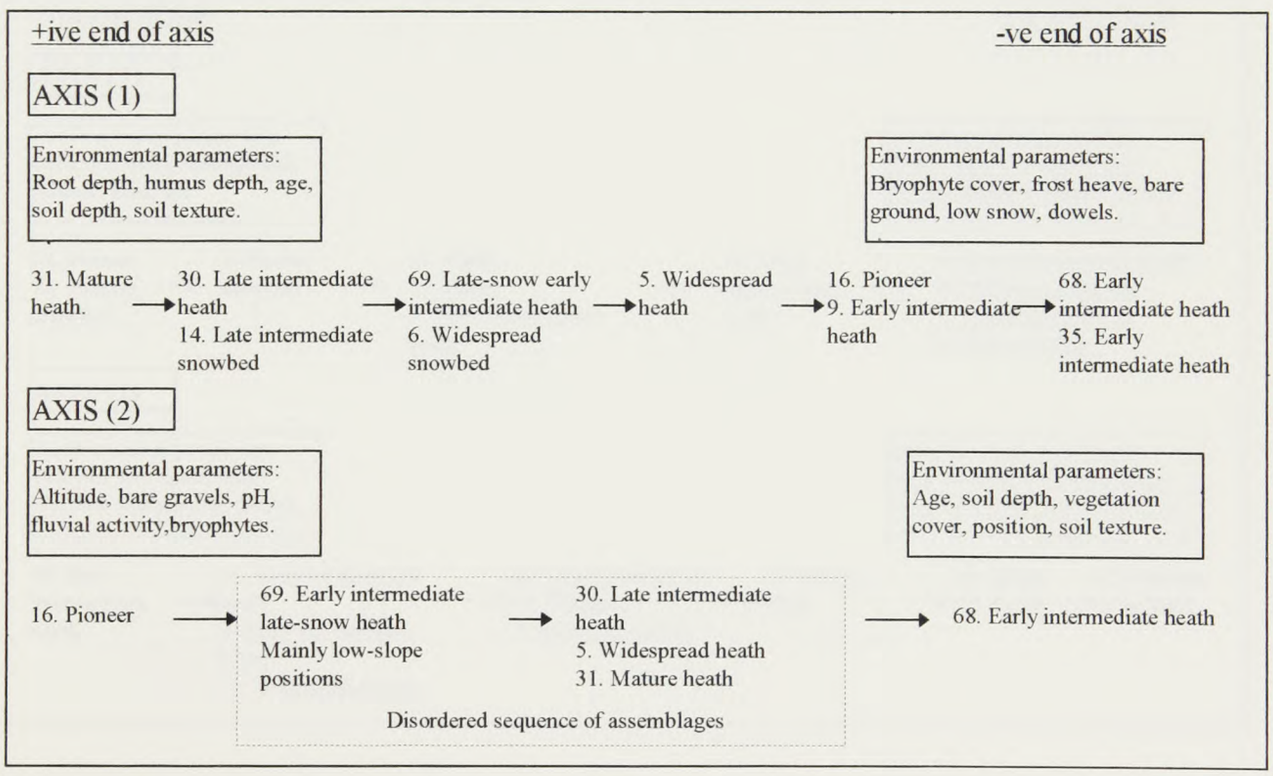


Fig. 5.18 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Fåbergstølsbreen.

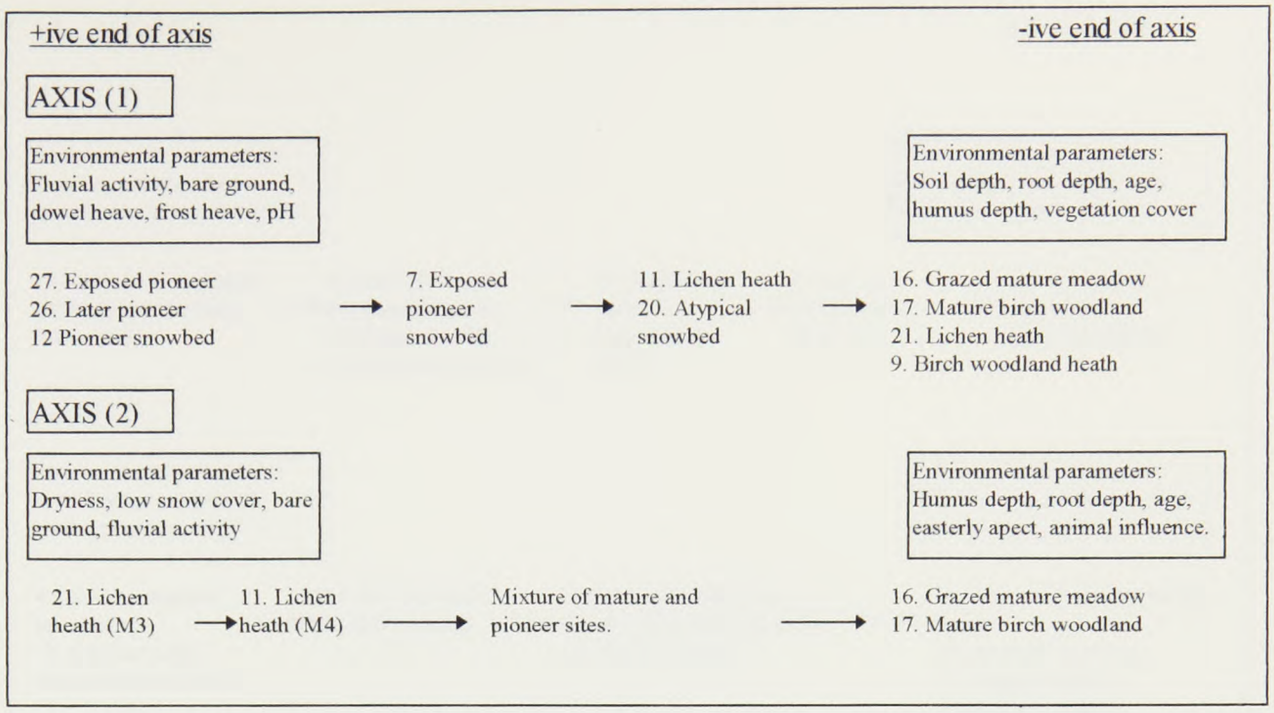


Fig. 5.26 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Fåbergstølsbreen.

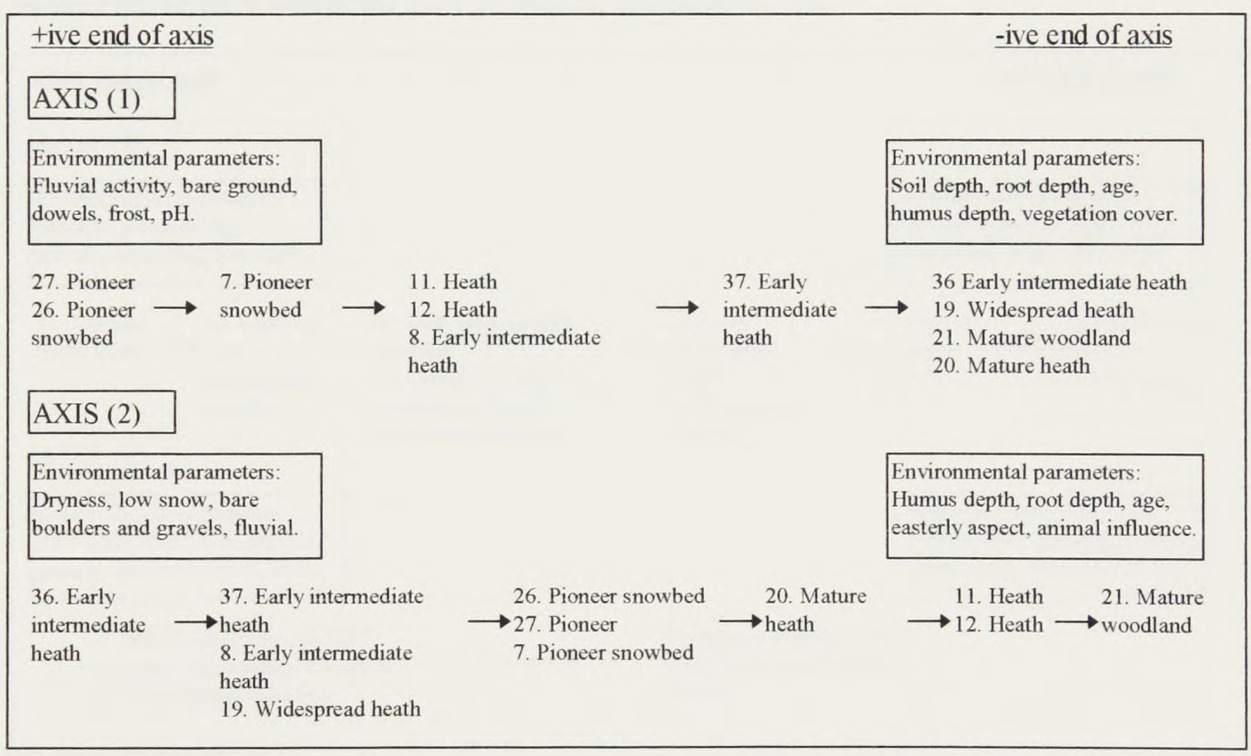


Fig. 5.19 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Storbreen low (1).

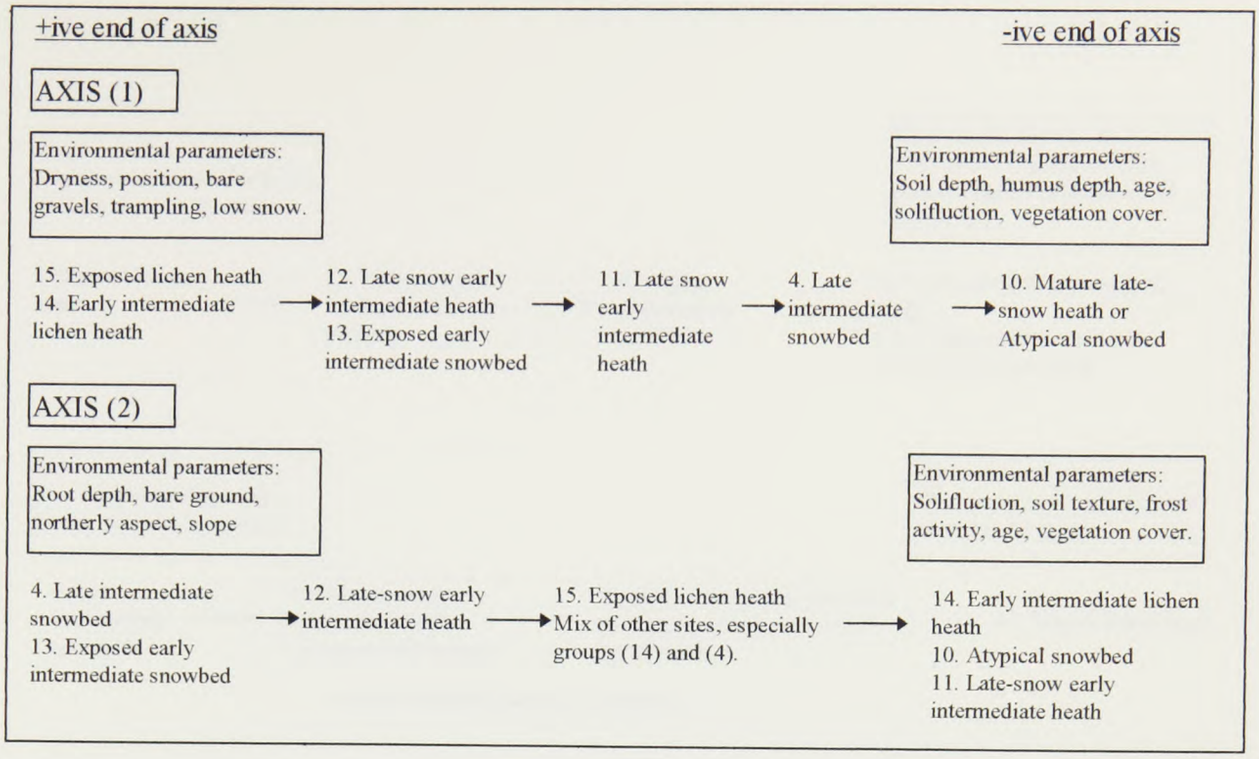


Fig. 5.27 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Storbreen low (1).

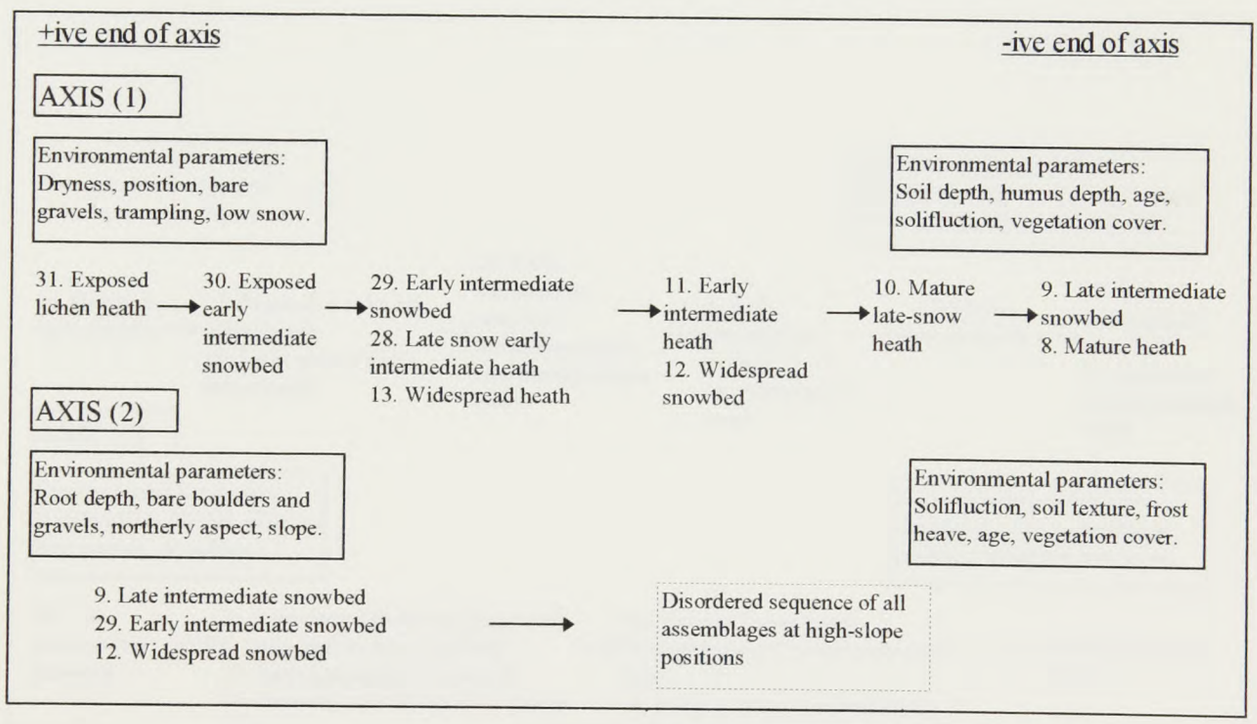


Fig. 5.20 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Storbreen low (2).

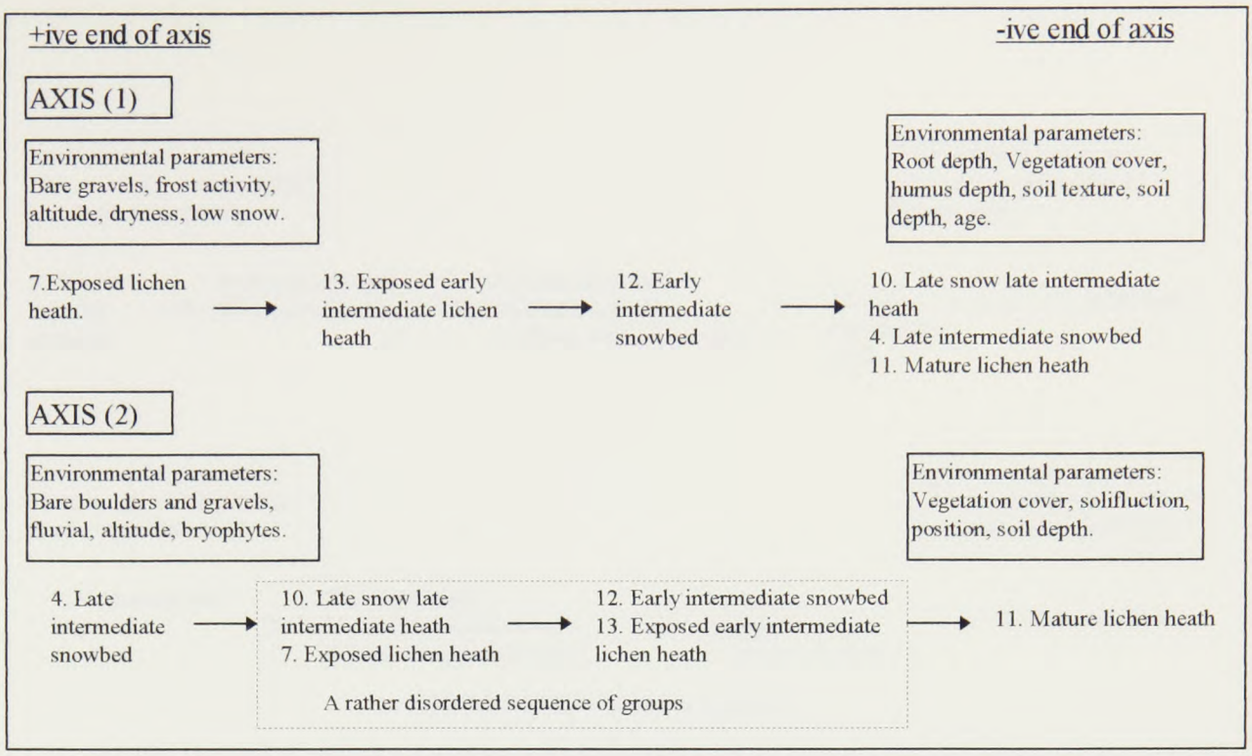


Fig. 5.28 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Storbreen low (2).

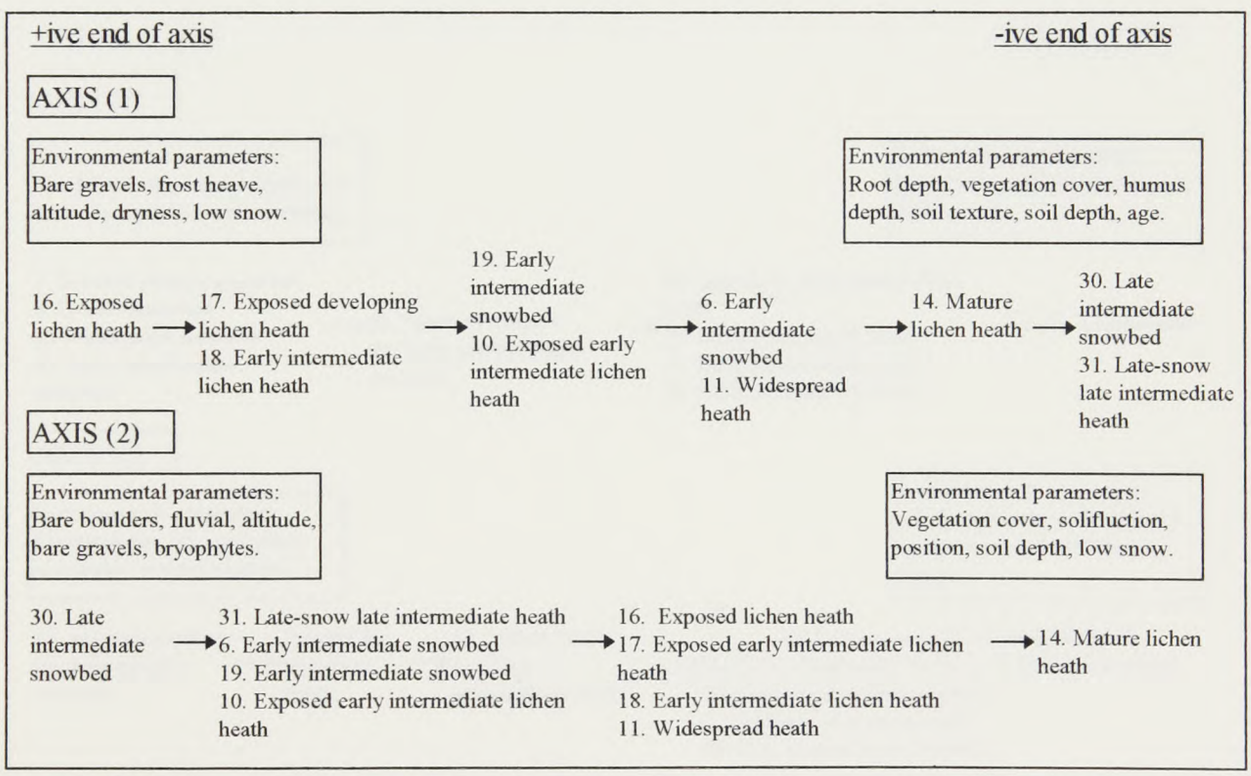


Fig. 5.21 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Svellnosbreen.

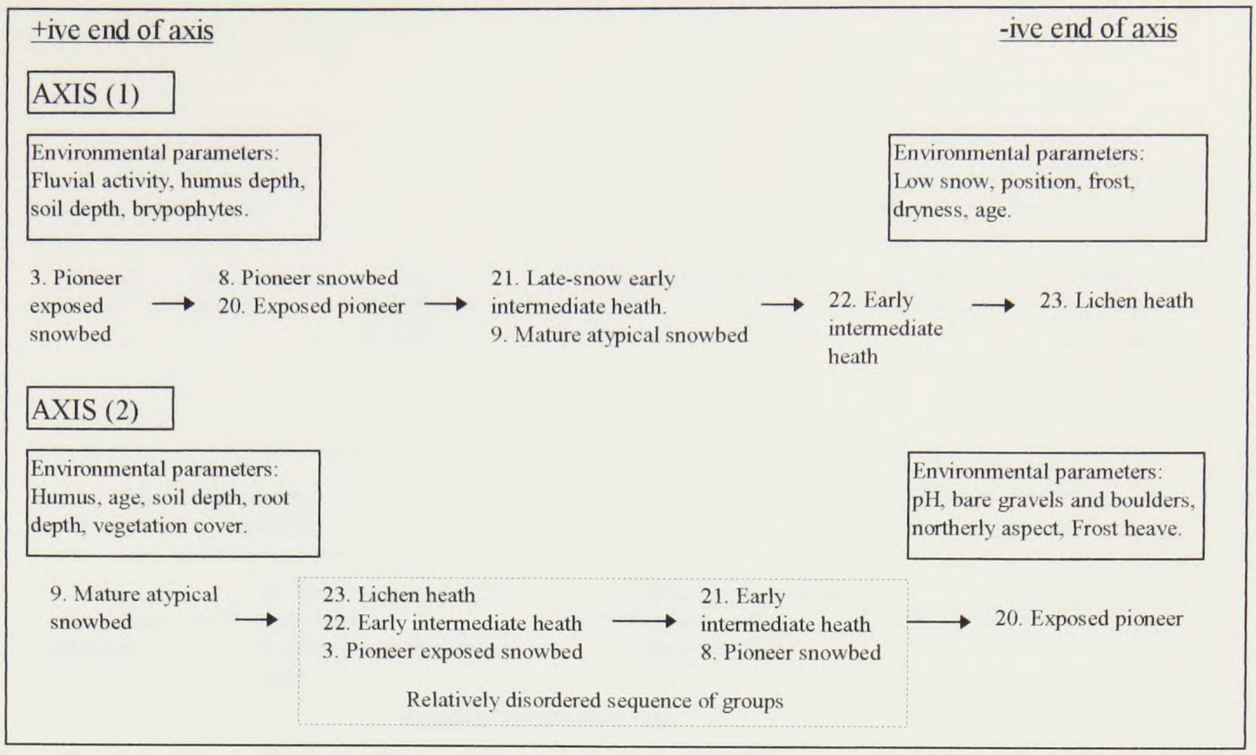


Fig. 5.29 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Svellnosbreen.

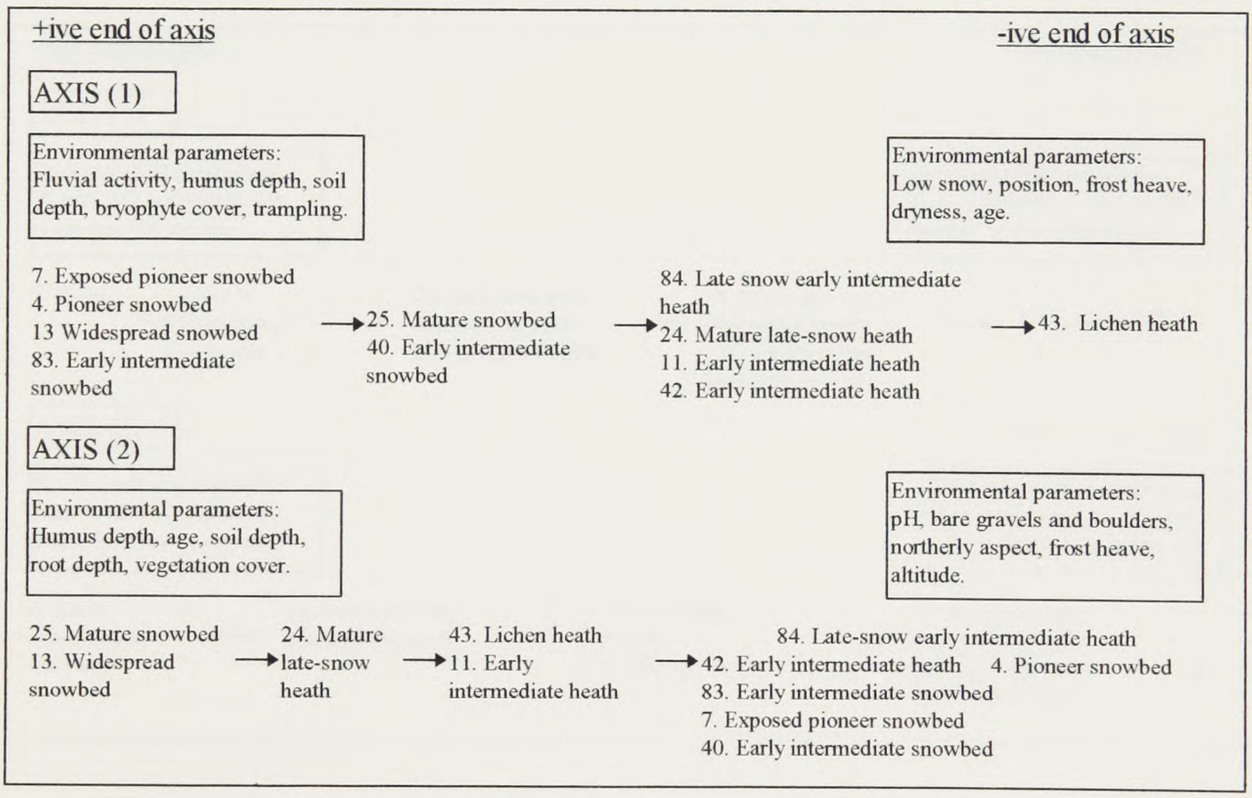


Fig. 5.22 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Storbreen high.

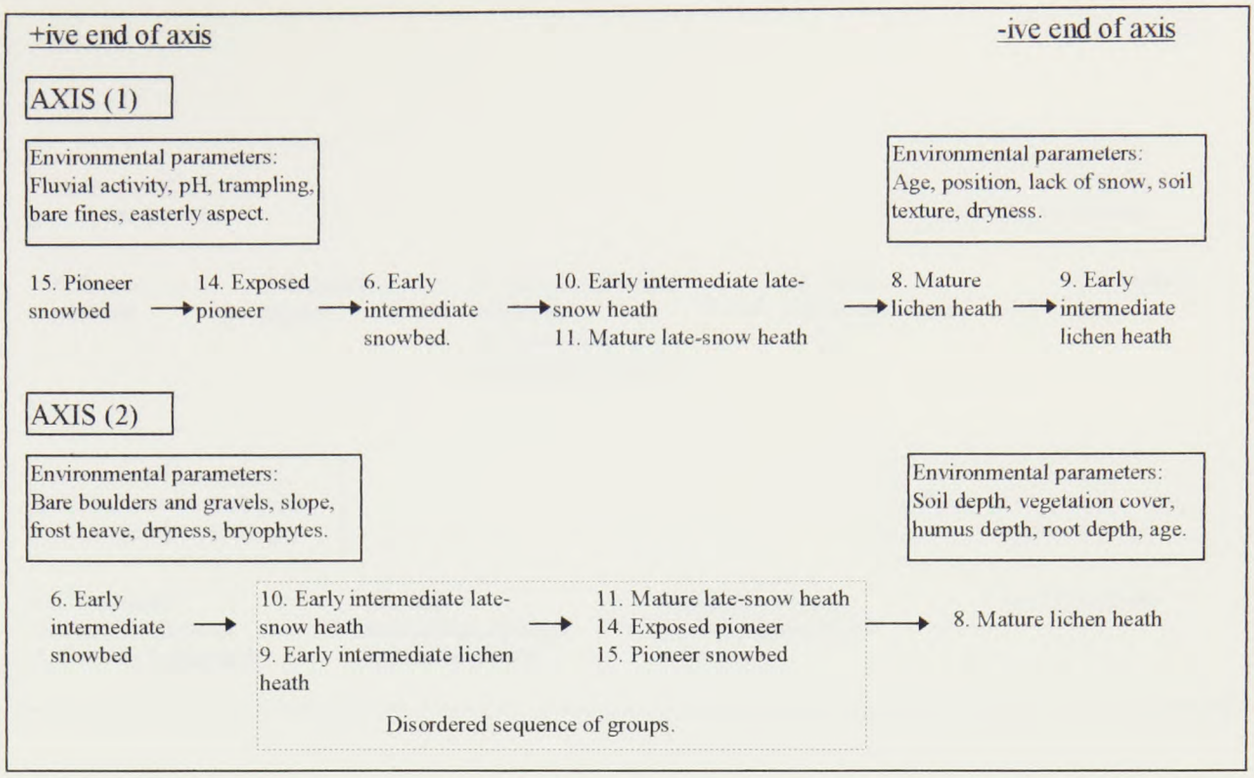


Fig. 5.30 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Storbreen high.

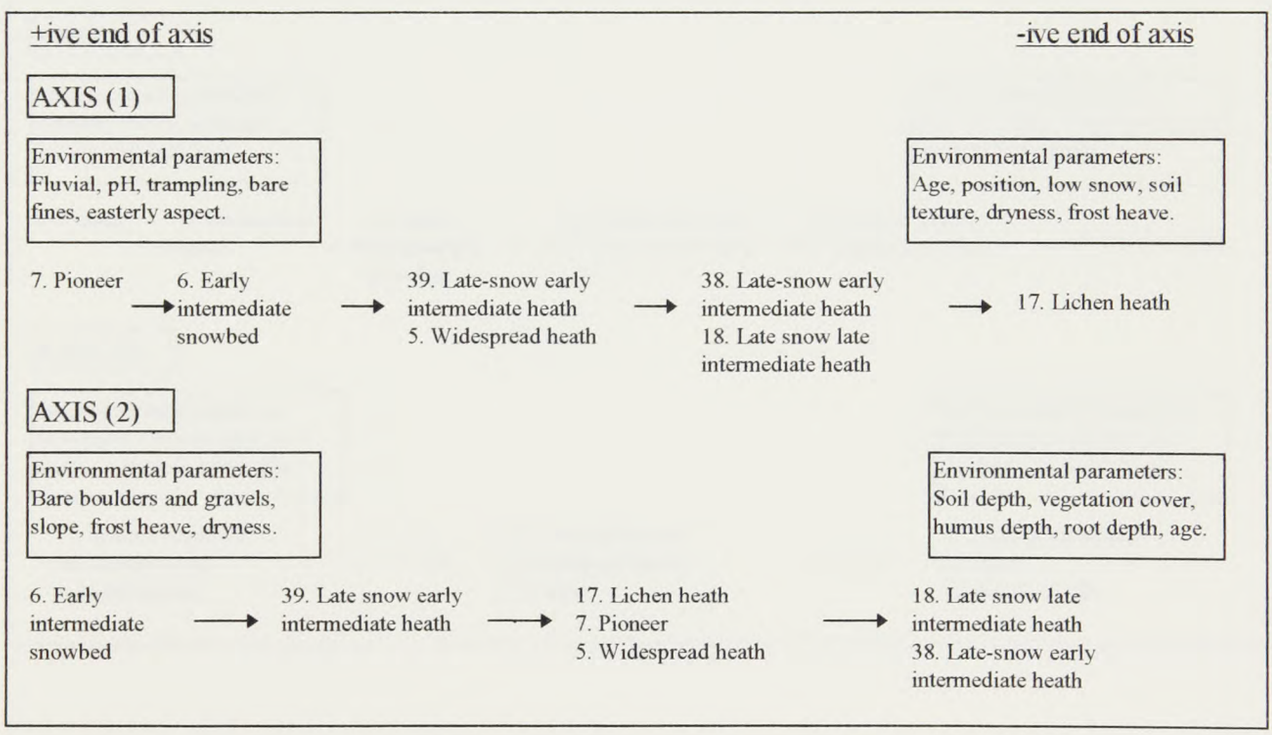


Fig. 5.23 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Høgvaglbreen.

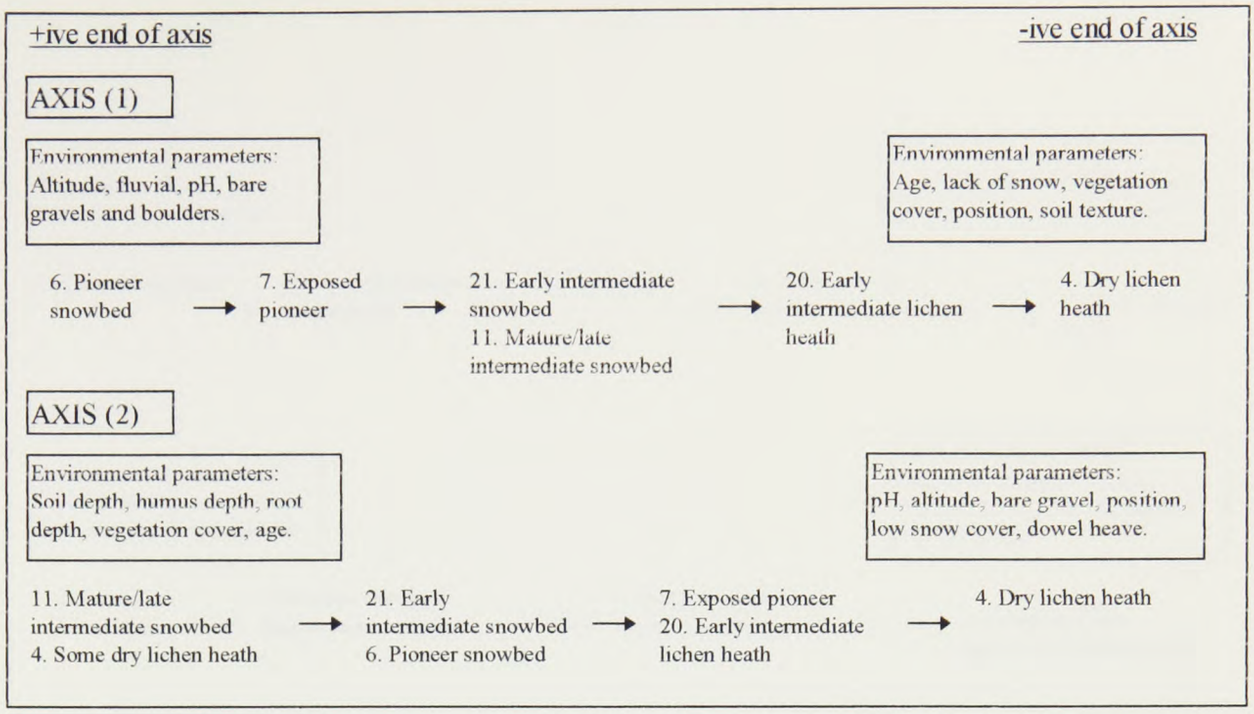


Fig. 5.31 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Høgvaglbreen.

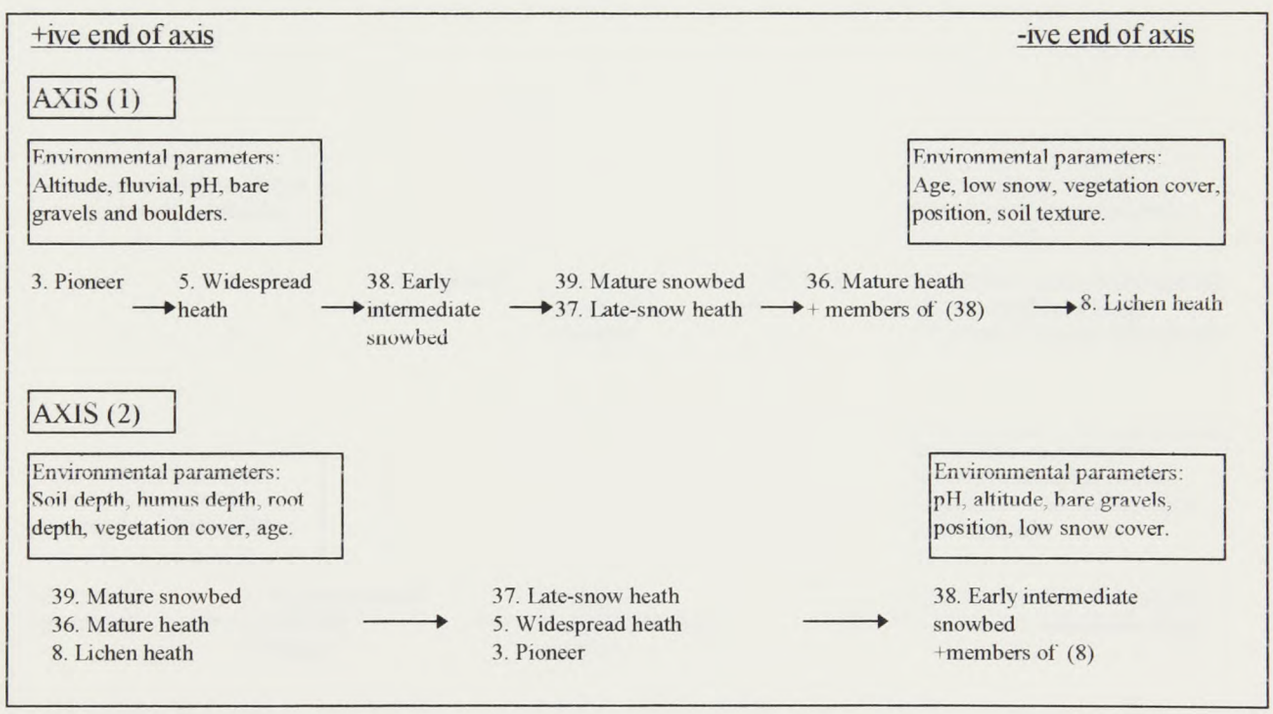


Fig. 5.24 Sequence of TWINSPAN "final site groups" and associated environmental parameters on DCA ordination axes (1) and (2), Bøverbreen.

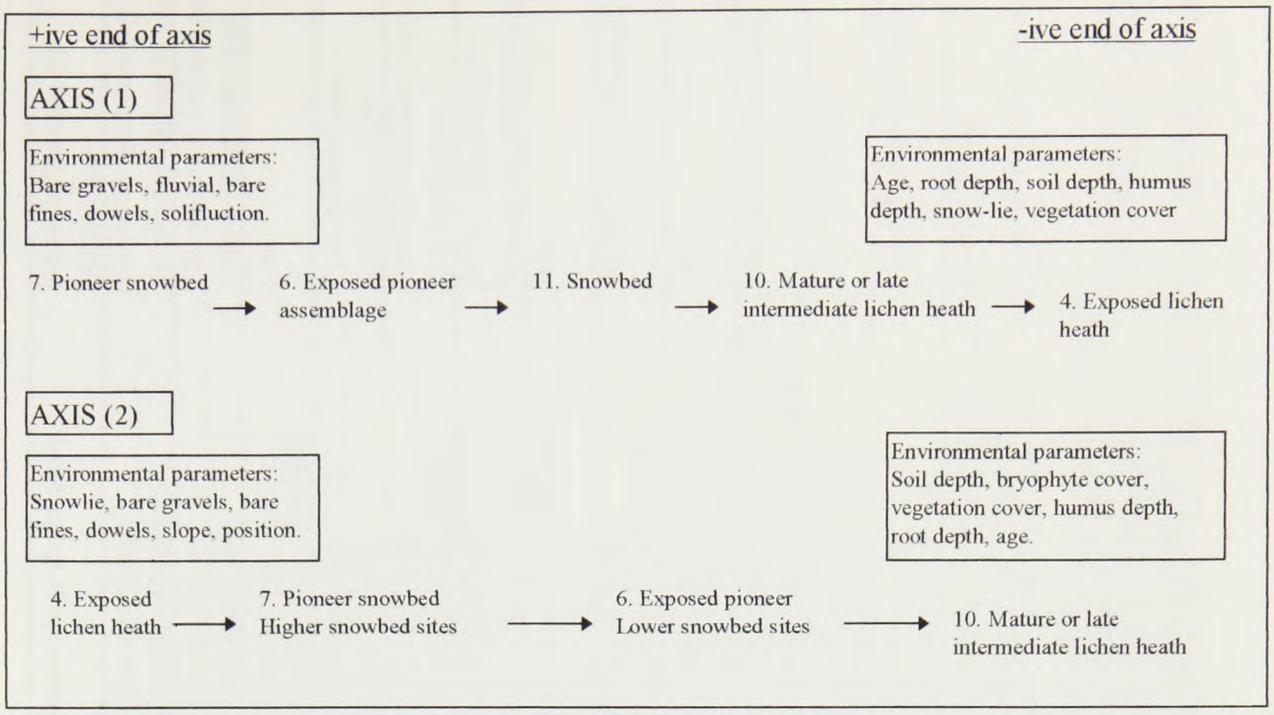


Fig. 5.32 Sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA ordination axes (1) and (2), Bøverbreen.

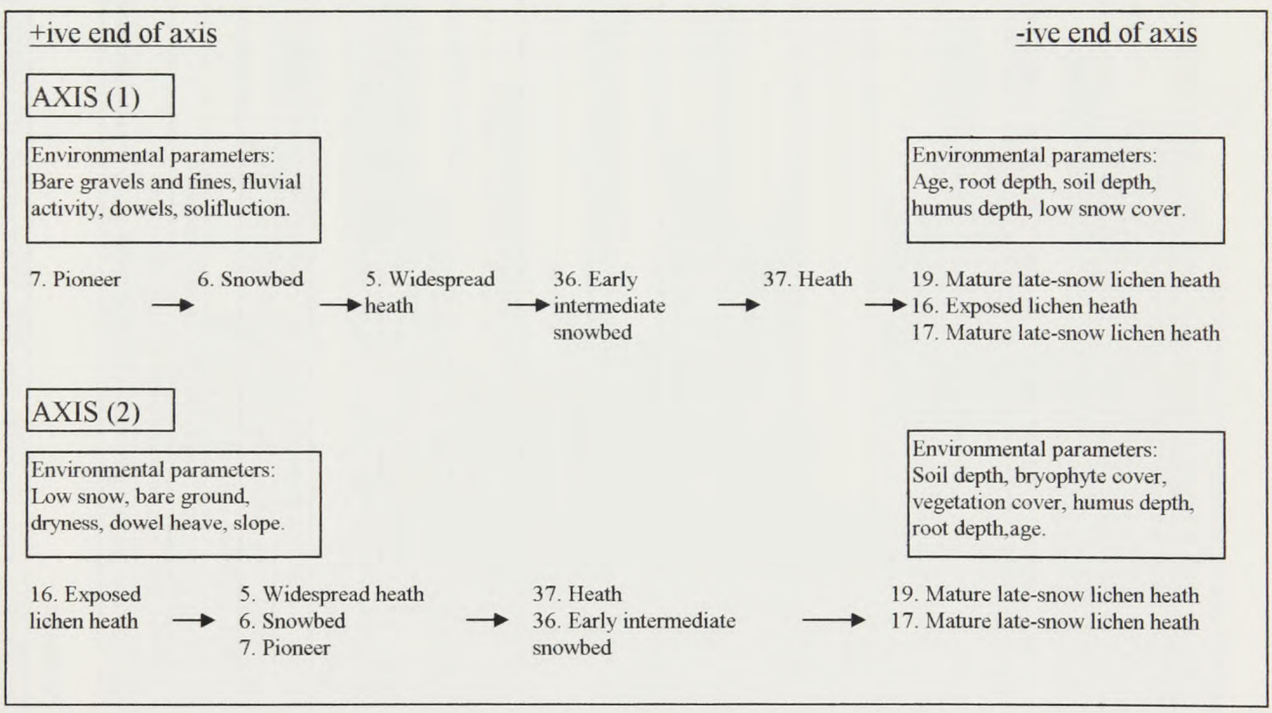


Table 6.1. Summary of the TWINSPAN site groups for the combined foreland data set.

Level *Eigenvalue*	Group	Assemblage name	Location	Assemblage description	Main influences on separation
2	2	**Ste alp - Sal her**	Alpine, pioneer (M5-6); high-slope M4 FÅSF; high- M3-4 & low-slope proximal M2 AUSF.	Alpine assemblages	Altitude but age and microtopography
0.523	3	**Vac myr - Bet pub**	Mature and early intermediate terrain at FÅSF and AUSF.	Subalpine assemblages	at subalpine altitude as well
3	4	**Cer cer - Des alp**	M4 and M5 FÅSF; and pioneer quadrats on other forelands.	Disturbed pioneer	Disturbance on pioneer terrain
0.525	5	**Cla chl - Ste alp**	All alpine forelands and most of M7 AUSF	Alpine assemblages	separates from other sites
	6	**Cal vul - Phy cae**	M2-6 AUSF; crest & proximal M2-3 and low-slope M4 FÅSF.	Subalpine heath	Age
0.400	7	**Des fle - Vac myr**	M1 and two quadrats distal M2 AUSF; M1, distal M2 and seven quadrats M5-6 FÅSF.	Subalpine mature woodland	
4	8*	**Agr ten**	Pioneer sites FÅSF.	Disturbed pioneer	Type of disturbance:
0.554	9*	**None**	Miscellaneous pioneer sites on SVLF, AUSF and mid-alpine forelands.	Disturbed pioneer	mudslide -v- fluvial
	10	**Sol cro - Cet niv**	HØHF, BØHF, mature STHF and high-slope young terrain on alpine forelands.	Alpine lichen heath	Altitude, microtopography and,
0.325	11	**Sal gla - Ant odo**	Mature and low-slope positions on low-alpine forelands	Low-alpine late-snow heath	to a lesser extent, age
	12	**None**	Most AUSF and low-slope M4 FÅSF	Subalpine early intermediate heath	Mainly age but could be
0.264	13*	**Mel syl - Vac vit**	Distal M3 AUSF; crest proximal M2, M3 and one quadrat M4 FÅSF.	Subalpine late intermediate heath	between -foreland differences
	14	**Vac myr**	M1 AUSF; M1 and distal M2 FÅSF.	Subalpine mature woodland	Age
0.666	15*	**None**	One quadrat M5 and six quadrats M6 FÅSF	Subalpine pioneer	
5	20	**Sal her**	Low-slope positions on mid-alpine forelands + a few other quadrats on other forelands.	Mid-alpine snowbed	Altitude and microtopography
0.345	21	**Cet niv - Ale och**	High-slope positions on alpine forelands.	Alpine exposed lichen heath	
	22	**Sal gla**	Low-slope positions on early intermediate and pioneer terrain.	Low-alpine pioneer snowbed	Age
0.313	23	**Cla por - Cla gra**	Low-slope positions M1-3 or distal positions on early intermediate low-alpine forelands.	Low-alpine late intermediate snowbed	
	24*	**Vac myr - Fes ovi**	Older and low-slope positions on subalpine forelands.	Subalpine late intermediate late-snow heath	Age and microtopography
0.271	25*	**Cal vul - Cet isl**	Younger and high-slope positions on subalpine forelands.	Subalpine early intermediate heath	
	28*	**None**	M1 AUSF; M1, distal M2 FÅSF.	Subalpine mature woodland	Microtopography
0.464	29*	**Ath dis**	Toe-slope sites AUSF.	Subalpine mature snowbed	
6	40*	**Oxy dig**	Mid-alpine young sites; and AUSF exposed young sites.	Mid-alpine pioneer	Age and microtopography
0.346	41*	**Cla chl - Sal her**	Low-slope positions at Høgvaglbreen and Bøverbreen.	Mid-alpine snowbed	
	42*	**Cor div - Cor acu**	Mature and late intermediate high-slope positions on mid-alpine forelands.	Mid-alpine exposed lichen heath	Altitude and age
0.321	43*	**Emp nig**	Exposed low-alpine high-slope positions (+ a few other sites)	Low-alpine early intermediate heath	
	44*	**Ste alp - Phy cae**	Low-slope positions on younger terrain on low-alpine forelands; young terrain on SVLF; and young and low-slope positions on AUSF	Sub- to low-alpine early intermediate and pioneer snowbed	Age
0.303	45*	**Sal gla - Sol vir**	Low-slope positions on late intermediate terrain on low-alpine forelands	Low-alpine late intermediate late-snow heath	
	46*	**Ste alp - Sal gla**	Low-slope and shoulder-slope positions on low-alpine forelands	Low-alpine widespread heath	Age and microtopography
0.268	47*	**Sal her - Fes ovi**	Low-slope positions on the oldest terrain on low-alpine forelands	Low-alpine mature snowbed	

Notes: *See Appendix 1 for species abbreviations; and Appendix 2 for foreland abbreviation. The colour boxes on the chart represent the colours used in the combined foreland profile diagram 6.1a-h. Eigenvalues for group divisions are given in italics. Final groups are marked with * - the site groups are described in detail in section 6.3.*

Table 6.2 Summary of TWINSPAN "final species groups" (combined data set).

Group no.	"final species group" name	*n*	Location on forelands and type of distribution across forelands (plus eigenvalue)	Dominant species (as shown by Figs 6.3 - 6.14)	Correspondence with site groups (see table 6.1.)
Group 32	Alpine exposed lichen heath.	27	Tight distribution on mid-alpine high-slope positions and older terrain and on low-alpine high-slope positions and younger terrain. (0.08)	128 *Cetraria nivalis* 59 *Cetraria ericetorum* 153 *Alectoria ochroleuca*	Alpine lichen heath site group 10 (Sol cro - Cet niv)
Group 33	Alpine snowbed.	9	Tight on mid-alpine low-slope positions but widespread over alpine forelands. (0.08)	34 *Salix herbacea* 44 *Stereocaulon alpinum*	Alpine assemblages site group 5 (Cla chl - Ste alp)
Group 34:	Low-alpine late intermediate late-snow heath.	68	Loose on mature terrain and low-slope positions on low-alpine forelands. (0.186)	40 *Betula nana* 81 *Stereocaulon botreosum*	Low-alpine late-snow heath group 11 (Sal gla - Ant odo)
Group 35	Pioneer and snowbed.	15	Quite tight on pioneer and low-slope positions at all altitudes. (0.186)	82 *Oxyria digyna* 116 *Luzula spicata* 144 *Poa alpina*	Low-alpine pioneer snowbed site group 22 and mid-alpine pioneer site group 40*.
Group 18:	Low-alpine late-snow heath.	10	Tight on low-alpine low-slope positions on older terrain (0.136)	4 *Salix glauca* 39 *Festuca ovina*	Low-alpine late-snow heath site group 11 (Sal gla - Ant odo)
Group 19	Alpine lichen heath.	9	Tightest on low-slope positions on mid-alpine forelands and high-slope positions on low-alpine forelands. (0.136)	65 *Solorina crocea* 27 *Cladonia gracilis*	Alpine lichen heath site group 10 (Sol cro - Cet niv)
Group 5:	Low- and subalpine late intermediate snowbed.	13	Tight on mature and low-slope sites on low-alpine forelands and also intermediate terrain on subalpine forelands. (0.208)	45 *Cladonia portentosa* 30 *Cladonia fimbriata*	Low-alpine late-snow heath site group 11 (Sal gla - Ant odo)
Group 6:	Low- and subalpine late-snow heath.	7	Tight on mature and low-slope positions on low-alpine forelands but widespread at other altitudes. (0.551)	1 *Empetrum nigrum* 2 *Phyllodoce caerula*	Low-alpine late-snow heath site group 11 (Sal gla - Ant odo)
Group 14	Subalpine early intermediate lichen heath	4	Loose on intermediate terrain on subalpine forelands and mature terrain on mid-alpine forelands. (0.320)	26 *Cladonia squamosa*	Site groups 12, 13* and 41* (see table 6.1)
Group 30	Sub- to low-alpine late-snow heath.	9	Quite loose on mature and low-slope sites on subalpine forelands and widespread across low-alpine older and intermediate terrain. (0.209)	55 *Vaccinium vitis-idaea* 42 *Salix phylicifolia*	Site groups 11, 24*, and 28* (see table 6.1)
Group 62	Subalpine mature/late intermediate woodland heath.	22	Tight on mature/late intermediate subalpine terrain; also mature/late intermediate low-alpine and other subalpine sites. (0.191)	7 *Vaccinium myrtillus*	Subalpine mature woodland site group 14 (Vac myr)
Group 63	Subalpine woodland heath.	17	Tight on intermediate terrain at Austerdalsbreen and mature and late intermediate terrain at Fåbergstølsbreen. (0.191)	5 *Betula pubescens (ssp tortuosa)*	Subalpine assemblage group 3 (Vac myr - Bet pub)

Note: The colours displayed, which are representative of each of the species assemblages in this diagram (using WORD), are comparable to those used to represent each of the same assemblages in Table 6.4 and Table 6.5 (using EXCEL). Differences (between the diagrams) in colour used for any particular assemblage are due to the differences in colour formatting in "Microsoft Word" and "Microsoft Excel". The assemblages are described in detail in section 6.5.

Table 6.3 (sheet 1). Species comprising the TWINSPAN "final species groups" (including group eigenvalues) within the combined and the individual foreland data sets.

Colour coded key:

Differentiates the TWINSPAN "final species groups" and also shows the general location of each assemblage across the selected forelands, as shown by the TWINSPAN analysis. The assemblage group number of every species is given in each of the cells along with the eigenvalue, of the group, in brackets.

Mature = >250 yrs - moraine 1 (+2)

Intermediate = 100 - 250 yrs - moraines 2 - 4 (5 - StH)

Pioneer = 0 - 100 - moraines 5 - 8

Low-slope positions = Toe, base- and mid-slope.

High-slope positions = Mid- and shoulder-slope and crest.

*Note1: The position codes for the **combined data set** correspond with the individual foreland codes (see Fig. 6.5)*

Note 2: See Appendix 1 for species abbreviations; Appendix 2 for foreland abbreviations; and Appendix 3 for environmental parameter abbreviations.

- Mature assemblages at general positions
- Intermediate assemblages at general positions
- Intermediate to pioneer assemblages at general positions
- Pioneer assemblages at general positions
- Intermediate/ pioneer assemblages at high-slope or exposed positions
- Widespread assemblages at high-slope positions
- Widespread assemblages at general positions
- Widespread assemblages at general positions
- Mature and intermediate Low-slope positions
- Mostly intermediate low-slope assemblages
- Widespread low-slope and snowbed assemblages

	SPECIES		AUSF	FASF	STLF1	STLF2	SVLF	STHF	HOHF	BOHF
59	Cet eri	32 (.08)	68 (0.043)		12 (0.321)	16 (0.430)	46 (0.054)	17 (0.205)	37 (0.142)	19 (0.105)
60	Ste con	32 (.08)	68 (0.043)		31 (0.253)	18 (0.210)	43 (0.054)	17 (0.205)	3 (0.503)	37 (0.159)
86	Ste ves	32 (.08)	8 (0.175)							
108	Cet cuc	32 (.08)	X	38 (0.076)	31 (0.253)	16 (0.218)	43 (0.054)	17 (0.205)	8 (0.275)	19 (0.176)
128	Cet niv	32 (.08)	X		31 (0.253)	16 (0.218)	43 (0.054)	17 (0.205)	8 (0.275)	16 (0.178)
131	Tha ver	32 (.08)	X		10 (0.310)	16 (0.218)	43 (0.054)	17 (0.205)	8 (0.275)	17 (0.178)
132	Cor acu	32 (.08)	X		31 (0.253)	16 (0.218)		17 (0.205)	8 (0.275)	16 (0.178)
133	Sph glo	32 (.08)	X		6 (0.324)	16 (0.218)	43 (0.054)		8 (0.275)	16 (0.178)
136	Arc alp	32 (.08)	68 (0.043)		31 (0.253)	16 (0.218)	43 (0.054)	7 (0.380)		16 (0.178)
137	Arc uva	32 (.08)	X		31 (0.253)	17 (0.218)	43 (0.054)			
145	Ale cha	32 (.08)	X		31 (0.253)					
152	Cor div	32 (.08)	X		31 (0.253)	16 (0.218)	43 (0.054)	17 (0.205)	8 (0.275)	16 (0.178)
153	Ale och	32 (.08)	X		31 (0.253)	16 (0.218)	43 (0.054)	17 (0.205)	8 (0.275)	16 (0.178)
156	Sph fra	32 (.08)	X		29 (0.299)	19 (0.210)		17 (0.205)	39 (0.098)	37 (0.159)
158	Ale nig	32 (.08)	X		31 (0.253)	16 (0.218)	43 (0.054)	17 (0.205)	8 (0.275)	16 (0.178)
178	Ste spp	32 (.08)	X			16 (0.430)			39 (0.098)	19 (0.105)
181	Dry oct	32 (.08)	X			17 (0.218)				
182	Cla fri	32 (.08)	X			17 (0.218)				
184	Ane ver	32 (.08)	X				46 (0.054)			
189	Cor aca	32 (.08)	X				43 (0.054)			
200	Phy sch	32 (.08)	X					17 (0.205)		
204	Ale spp	32 (.08)	X					39 (0.126)		
207	Ran gla	32 (.08)	X						38 (0.098)	19 (0.105)
208	Nar spp	32 (.08)	X						38 (0.098)	
209	Unn cup	32 (.08)	X							17 (0.178)
210	War red	32 (.08)	X							19 (0.105)
34	Sal her	33 (.08)	6 (0.260)	7 (0.377)	12 (0.321)	19 (0.210)	13 (0.182)	5 (0.352)	37 (0.142)	5 (0.274)
44	Ste alp	33 (.08)	8 (0.175)	8 (0.154)	38 (0.299)	18 (0.210)	11 (0.157)	5 (0.352)	5 (0.438)	6 (0.510)
49	Cla unc	33 (.08)	30 (0.148)		13 (0.321)	14 (0.283)	84 (0.070)	38 (0.126)	38 (0.142)	19 (0.105)
64	Cla ver	33 (.08)	68 (0.043)	37 (0.076)	29 (0.299)	17 (0.218)	84 (0.070)	39 (0.126)	38 (0.098)	19 (0.105)
113	Hie spp	33 (.08)	X	26 (0.063)			25 (0.093)	38 (0.126)	39 (0.098)	16 (0.178)
122	Cas hyp	33 (.08)	X		28 (0.359)	19 (0.210)	11 (0.157)	18 (0.129)	38 (0.098)	36 (0.159)
142	Cam rot	33 (.08)	X		9 (0.324)		93 (0.054)			
154	Tri spi	33 (.08)	X		29 (0.299)	16 (0.430)	83 (0.070)	7 (0.380)	3 (0.503)	6 (0.510)
164	Sph mel	33 (.08)	X		29 (0.299)			39 (0.126)		
36	Leo aut	34 (.186)	30 (0.148)		9 (0.324)	31 (0.205)				
40	Bet nan	34 (.186)	30 (0.148)		10 (0.310)	14 (0.283)	43 (0.054)	17 (0.205)		
41	Ran spp	34 (.186)	30 (0.148)							
57	ARc alp	34 (.186)	68 (0.043)							
58	Car spp	34 (.186)	8 (0.175)	27 (0.063)	6 (0.324)	30 (0.205)	25 (0.093)	5 (0.352)	37 (0.142)	17 (0.178)
81	Ste bot	34 (.186)	8 (0.175)	37 (0.076)	29 (0.299)	14 (0.283)	84 (0.070)	7 (0.380)	5 (0.438)	36 (0.159)
85	Sax aiz	34 (.186)	8 (0.175)							
87	Ver alp	34 (.186)	69 (0.043)		12 (0.321)	31 (0.205)	25 (0.093)	39 (0.126)		
88	Pyr nor	34 (.186)	69 (0.043)				25 (0.093)			
92	Pol viv	34 (.186)	X	21 (0.108)	9 (0.324)	30 (0.205)	25 (0.093)	6 (0.380)	38 (0.098)	
94	Alc glo	34 (.186)	X				25 (0.093)			
123	Sed ros	34 (.186)	X		9 (0.324)	30 (0.205)	25 (0.093)			
124	Hie alp	34 (.186)	X		6 (0.324)	14 (0.283)				
125	Ant alp	34 (.186)	X		9 (0.324)	19 (0.210)	11 (0.157)	39 (0.126)	38 (0.098)	5 (0.274)
126	Des cae	34 (.186)	69 (0.043)		12 (0.321)					
127	Lyc alp	34 (.186)	X		6 (0.324)	14 (0.283)	25 (0.093)			
129	Cet ste	34 (.186)	X		9 (0.324)					
130	Cet del	34 (.186)	X			17 (0.218)		39 (0.126)		19 (0.105)

Continued on sheet 2 ...

Table 6.3 (Sheet 2)

SPECIES		COMBINED	AUST	FAB	STOR1	STOR2	SVELL	STORH	HOGV	BOV
134	Nep arc	34 (.186)			12 (0.321)		84 (0.070)	38 (0.126)		10 (.053)
138	Eup fri	34 (.186)			9 (0.324)	31 (0.205)	84 (0.070)			
139	Tar off	34 (.186)			9 (0.324)					
140	Hie alp	34 (.186)			8 (.120)	13 (0.282)				
141	Ran acr	34 (.186)			9 (0.324)	30 (0.205)				
143	Bar alp	34 (.186)			9 (0.324)	31 (0.205)	24 (0.093)			
146	Pso hyp	34 (.186)			28 (0.299)	17 (0.218)	84 (0.070)	38 (0.126)		36 (0.159)
147	Sil aca	34 (.186)			9 (0.324)	31 (0.205)	84 (0.070)		37 (0.142)	
148	Pet fri	34 (.186)			9 (0.324)					
149	Tof pur	34 (.186)			9 (0.324)					
150	Ped lap	34 (.186)			9 (0.324)	31 (0.205)				
151	Coe vir	34 (.186)			9 (0.324)					
155	Cla pyx	34 (.186)			31 (0.251)		83 (0.070)			
157	Pan pez	34 (.186)			29 (0.299)	19 (0.210)	84 (0.070)	6 (0.380)		19 (0.129)
161	Cla cen	34 (.186)			30 (0.253)		25 (0.093)			
162	Cla sym	34 (.186)			29 (0.299)					
163	Car bel	34 (.186)			29 (0.299)	19 (0.210)	84 (0.070)	18 (0.129)		
166	Jun spp	34 (.186)				31 (0.205)				
168	Ped spp	34 (.186)				31 (0.205)				
169	Luz tri	34 (.186)				30 (0.205)				
170	War gra	34 (.186)				13 (0.205)				
171	Far red	34 (.186)				14 (0.282)				
172	Mel rub	34 (.186)				30 (0.205)				
173	Sau alp	34 (.186)				30 (0.205)				
174	Ran pyg	34 (.186)				30 (0.205)				
175	pel pol	34 (.186)			11 (0.310)					
176	Squ cup	34 (.186)				31 (0.205)				
177	Tof pus	34 (.186)				14 (0.282)	84 (0.070)			
179	Lyc sol	34 (.186)				19 (0.210)				
180	Gre cla	34 (.186)				17 (0.218)				
183	Ant dio	34 (.186)					24 (0.093)			
185	Ran niv	34 (.186)					25 (0.093)			
186	Leo spp	34 (.186)					25 (0.093)			
187	Rum ari	34 (.186)					25 (0.093)			
188	Cet Del	34 (.186)			11 (0.310)		11 (0.157)			
190	Sal myr	34 (.186)					84 (0.070)			
191	Sax opp	34 (.186)					84 (0.070)			
192	Sax cer	34 (.186)					84 (0.070)			
193	Vis alp	34 (.186)					84 (0.070)			
194	Dra alp	34 (.186)					84 (0.070)			
195	Sal ret	34 (.186)					84 (0.070)	39 (0.126)		
197	Lyc spp	34 (.186)						38 (0.126)		
198	Dry exp	34 (.186)						39 (0.126)		
199	Pyr spp	34 (.186)						39 (0.126)		
201	Ran alp	34 (.186)						38 (0.126)		
202	Lec qua	34 (.186)						38 (0.126)		
203	Och fri	34 (.186)						38 (0.126)		
205	Woo alp	34 (.186)						6 (0.380)		
82	Oxy dig	35 (.186)	9 (0.175)	27 (0.063)	30 (0.253)	10 (0.430)	4 (0.263)	7 (0.380)	3 (0.503)	7 (0.510)
83	Phl alp	35 (.186)	8 (0.175)	26 (0.063)		6 (0.326)	25 (0.093)	7 (0.380)	38 (0.098)	
111	Gna sup	35 (.186)		27 (0.063)	3 (0.324)	6 (0.326)		38 (0.126)	39 (0.098)	36 (0.159)
112	Cry cri	35 (.186)		27 (0.063)						
115	Sag sag	35 (.186)		26 (0.063)		17 (0.218)		7 (0.380)		19 (0.105)
116	Luz spi	35 (.186)		27 (0.063)	29 (0.299)	6 (0.373)	84 (0.070)	6 (0.380)	38 (0.098)	37 (0.159)
117	Uln gla	35 (.186)		26 (0.063)						
119	Epi ang	35 (.186)		27 (0.063)						
120	Rus spp	35 (.186)		27 (0.063)						
121	Cer alp	35 (.186)		27 (0.063)	31 (0.253)	10 (0.430)	83 (0.070)	6 (0.380)		7 (0.510)
144	Poa alp	35 (.186)			29 (0.299)	19 (0.210)	4 (0.263)	7 (0.380)	3 (0.503)	7 (0.510)
159	Car pet	35 (.186)			29 (0.299)	18 (0.218)	4 (0.263)	39 (0.126)		
167	Tar spp	35 (.186)				30 (0.205)	13 (0.182)	6 (0.380)		
196	Ara alp	35 (.186)					84 (0.070)	7 (0.380)		
206	Sax ces	35 (.186)						7 (0.380)		
4	Sal gla	18 (.136)	14 (0.230)	7 (0.377)	28 (0.299)	11 (0.430)	4 (0.263)	6 (0.380)	3 (0.503)	6 (0.510)
35	Pyr min	18 (.136)	6 (0.260)		9 (0.324)	31 (0.205)	84 (0.070)	39 (0.126)		
37	Sib pro	18 (.136)	30 (0.149)	27 (0.063)	3 (0.324)	30 (0.205)	25 (0.093)	38 (0.126)		
39	Fes ovi	18 (.136)	14 (0.230)	27 (0.063)	10 (0.310)	6 (0.326)	25 (0.093)	7 (.380)	37 (0.142)	5 (0.274)
54	Jun tri	18 (.136)	69 (0.043)		3 (0.324)	13 (0.282)	84 (0.070)	18 (0.129)	3 (0.278)	19 (0.176)
78	Sal lan	18 (.136)	69 (0.043)		13 (0.321)	18 (0.218)	84 (0.070)	6 (0.380)		
105	Cla ste	18 (.136)		36 (0.076)		14 (0.282)		17 (0.205)		19 (0.105)
110	Cer cer	18 (.136)		27 (0.063)	29 (0.299)	30 (0.205)	7 (0.318)	7 (.380)		7 (0.510)
18	Des alp	18 (.136)	30 (0.149)	27 (0.063)		31 (0.205)	7 (0.318)	7 (.380)		7 (0.510)
33	Gna nor	18 (.136)	31 (0.149)	26 (0.063)	9 (0.324)	30 (0.205)	25 (0.093)			
25	Cet isl	19 (.136)	5 (0.292)	27 (0.063)	11 (0.310)	6 (0.373)	25 (0.093)	18 (0.129)	39 (0.098)	19 (0.105)
27	Cla gra	19 (.136)	6 (0.175)	36 (0.076)	10 (0.310)	14 (0.282)	24 (0.093)	18 (0.129)	38 (0.142)	19 (0.105)
46	Cla chl	19 (.136)	6 (0.175)	37 (0.076)	28 (0.299)	18 (0.210)	11 (0.157)	18 (0.129)	37 (0.142)	37 (0.159)
50	Lyc sel	19 (.136)	30 (0.149)		3 (0.324)		84 (0.070)		39 (0.098)	36 (0.159)
63	Cla cer	19 (.136)	35 (0.061)		31 (0.253)	17 (0.218)	11 (0.157)	18 (0.129)	38 (0.098)	36 (0.159)
65	Sol cro	19 (.136)	68 (0.043)	37 (0.076)	30 (0.253)	17 (0.218)	24 (0.093)	16 (0.205)	5 (0.438)	7 (0.510)
67	Cla arb	19 (.136)		6 (0.194)	11 (0.310)	14 (0.282)	43 (0.064)	18 (0.129)	38 (0.142)	19 (0.105)
69	Cla pix	19 (.136)	68 (0.043)	37 (0.076)	3 (0.324)	17 (0.218)			39 (0.098)	19 (0.105)
107	Ste pas	19 (.136)		37 (0.076)				17 (0.205)		

Continued on sheet 3 ...

Table 6.3 (Sheet 3)

SPECIES		COMBINED	AUST	FAB	STOR1	STOR2	SVELL	STORH	HOGV	BOV
14	Ant odo	5 (.208)	14 (0.230)	21 (0.108)	9 (0.324)	6 (0.326)	25 (0.093)	6 (0.380)		
17	Rum ace	5 (.208)	31 (0.149)		9 (0.324)	6 (0.326)				
30	Cla fim	5 (.208)	6 (0.260)	37 (0.076)		10 (0.430)	42 (0.054)		38 (0.098)	37 (0.159)
38	Sol vir	5 (.208)	30 (0.149)	11 (0.224)	9 (0.324)	30 (0.205)	25 (0.093)			
45	Cla por	5 (.208)	9 (0.175)	36 (0.076)	11 (0.310)	14 (0.283)	11 (0.157)	18 (0.129)	39 (0.142)	19 (0.178)
56	Pin vul	5 (.208)	36 (0.061)		12 (0.321)	6 (0.373)	84 (0.070)			
62	Cla car	5 (.208)	68 (0.043)	37 (0.076)	8 (0.324)	17 (0.218)	84 (0.070)		39 (0.098)	18 (0.178)
70	Cla ama	5 (.208)	68 (0.043)	36 (0.076)	2 (0.324)	14 (0.283)	84 (0.070)		39 (0.098)	17 (0.178)
74	Cla cri	5 (.208)	68 (0.043)	36 (0.076)	31 (0.253)	84 (0.203)	84 (0.070)	18 (0.129)	39 (0.098)	17 (0.178)
75	Pel pol	5 (.208)	68 (0.043)	11 (0.224)		11 (0.430)	29 (0.093)	6 (0.380)		37 (0.159)
90	Jun com	5 (.208)		21 (0.108)	8 (0.324)	6 (0.373)	28 (0.093)			
100	Cla coc	5 (.208)		37 (0.076)			42 (0.054)		39 (0.098)	
114	Agr ten	5 (.208)		27 (0.063)	9 (0.324)					
1	Emp nig	6 (.551)	5 (0.292)	19 (0.161)	13 (0.321)	11 (0.430)	11 (0.157)	5 (0.352)	38 (0.098)	19 (0.178)
2	Phy cae	6 (.551)	5 (0.292)	19 (0.161)	13 (0.321)	10 (0.430)	83 (0.070)	18 (0.129)	38 (0.098)	36 (0.159)
52	Lis cor	6 (.551)	69 (0.043)	26 (0.063)	29 (0.299)	31 (0.205)				
61	Lou pro	6 (.551)	68 (0.043)		8 (0.324)	16 (0.218)	84 (0.070)			
66	Cla ran	6 (.551)	68 (0.043)	36 (0.076)	10 (0.310)	14 (0.283)	42 (0.054)	17 (0.205)	8 (0.275)	37 (0.159)
72	Cla sul	6 (.551)	68 (0.043)		12 (0.321)	14 (0.283)		39 (0.126)		
104	Cla fur	6 (.551)		36 (0.076)		6 (0.373)	84 (0.070)			36 (0.159)
26	Cla squ	14 (.320)	5 (0.292)	36 (0.076)	8 (0.324)	14 (0.283)		38 (0.126)	39 (0.098)	19 (0.178)
48	Cla dig	14 (.320)	36 (0.061)	36 (0.076)		18 (0.210)	84 (0.070)		39 (0.098)	36 (0.159)
79	Lot cor	14 (.320)	69 (0.043)	26 (0.063)						
101	cla con	14 (.320)	5 (0.292)	37 (0.076)	13 (0.321)	14 (0.283)	42 (0.054)	38 (0.126)		
6	Vac uli	30 (.209)	14 (0.230)	19 (0.161)	9 (0.324)	12 (0.283)	11 (0.157)	5 (0.352)	8 (0.275)	
12	Vio bif	30 (.209)	30 (0.149)	21 (0.108)	8 (0.324)	30 (0.205)				
42	Sal phy	30 (.209)	9 (0.175)	7 (0.377)	11 (0.310)	19 (0.210)	46 (0.085)	5 (0.352)		
55	Vac vit	30 (.209)	68 (0.043)	19 (0.161)	8 (0.324)	14 (0.283)	84 (0.070)	17 (0.205)	8 (0.275)	19 (0.178)
80	Ath dis	30 (.209)	9 (0.175)	27 (0.063)				39 (0.126)		
84	Sax ste	30 (.209)	8 (0.175)	27 (0.063)			25 (0.093)	6 (0.380)		
93	Ger syl	30 (.209)		21 (0.108)			25 (0.093)			
118	Epi als	30 (.209)		27 (0.063)						
7	Vac myr	62 (.191)	14 (0.230)	26 (0.108)	8 (0.324)	14 (0.283)	25 (0.093)	5 (0.352)		
8	Cor sue	62 (.191)	31 (0.149)	21 (0.108)						
9	Mel syl	62 (.191)	31 (0.149)	19 (0.161)						
10	Ath dis	62 (.191)	30 (0.149)							
11	Jun fil	62 (.191)	68 (0.043)							
13	Pot cra	62 (.191)	31 (0.149)	21 (0.108)	9 (0.324)					
15	Des fle	62 (.191)	14 (0.230)	11 (0.224)	8 (0.324)	19 (0.283)		6 (0.380)		
16	Tri eur	62 (.191)	30 (0.149)	21 (0.108)	8 (0.324)	30 (0.205)				
19	Luz arc	62 (.191)	31 (0.149)	26 (0.108)	9 (0.324)		84 (0.070)	38 (0.126)	38 (0.098)	
20	Gym dry	62 (.191)	14 (0.230)	21 (0.108)		30 (0.205)		6 (0.380)		
21	Lyc cla	62 (.191)	31 (0.149)							
22	Nar str	62 (.191)	31 (0.149)	11 (0.224)		31 (0.205)	43 (0.054)	38 (0.126)		
23	Sor auc	62 (.191)	30 (0.149)	26 (0.108)						
24	Cla hyd	62 (.191)	31 (0.149)							
28	Sor cup	62 (.191)	31 (0.149)							
29	Cla lon	62 (.191)	31 (0.149)							
31	Alc alp	62 (.191)	14 (.230)	27 (0.063)	9 (0.324)					
32	Oxa ace	62 (.191)	31 (0.149)							
91	Par pal	62 (.191)		21 (0.108)						
95	Ort sec	62 (.191)		12 (0.228)						
96	Pri spp	62 (.191)		21 (0.108)						
97	Rub ida	62 (.191)		21 (0.108)						
3	Cal vul	63 (.191)	69 (0.043)	36 (0.076)	8 (0.324)	14 (0.283)	25 (0.093)			
5	Bet pub	63 (.191)	9 (0.175)	19 (0.161)	29 (0.299)		43 (0.054)			
43	Mel pra	63 (.191)	30 (0.149)							
51	Eup hel	63 (.191)	68 (0.043)							
53	Lyc ann	63 (.191)	69 (0.043)							
68	Cla def	63 (.191)	68 (0.043)				84 (0.070)			
71	Cla bel	63 (.191)	68 (0.043)	36 (0.076)		30 (0.205)	11 (0.157)		39 (0.098)	19 (0.178)
73	Cla ple	63 (.191)	68 (0.043)	37 (0.076)		17 (0.218)	84 (0.070)	39 (0.126)		
76	Des ces	63 (.191)								
77	Cla arb	63 (.191)	68 (0.043)							
89	Aln glu	63 (.191)	69 (0.043)							
98	Cer spp	63 (.191)		26 (0.108)						
99	Str cup	63 (.191)		26 (0.108)						
102	Cla sbf	63 (.191)		37 (0.076)						
103	Cla crc	63 (.191)		36 (0.076)						
106	Bro cup	63 (.191)		36 (0.076)						
109	Bla cup	63 (.191)		37 (0.076)						

Table 6.4 (sheet 1) Rank of species (and superimposed TWINSPAN "final species groups"), including calculated regression coefficients of environmental parameters, on DCA ordination axes (1) and (2) (combined data set) .

ENVIRON AXIS (1)	Environme rank (1)	SPECIES AXIS (1)	Species rank (1)	ENVIRON AXIS (2)	Environme rank (2)	SPECIES AXIS (2)	Species rank (2)
	0.897	EIG=	0.539		0.687	EIG=	0.409
20 Veg cc	343	91 Rar ste	50	6 Flu via	281	119 Epi br	106
16 Roo de	321	86 Pol vul	49	13 pH* ***	46	112 Cry c	92
14 Hum d	271	8 Cer fon	47	17 Bar bo	35	114 Agr te	92
15 Sta de	246	97 Pyg cra	45	22 Asp ee	28	118 Epi al	86
21 Bry co	205	70 Ran ac	43	19 Bar fin	21	79 Lol col	77
24 Age m	121	23 Gal sa	40	11 Ani inf	11	117 Uln gl	75
11 Ani inf	106	13 Epi ana	37	18 Bar gra	5	84 Sax ste	66
12 Soi tex	95	69 Pot ere	34	9 Asp ect	-19	110 Cer c	60
9 Asp ect	60	24 Cas tre	34	10 Tra mp	-21	18 Des al	54
7 Slo pe*	49	99 Str cup	34	23 Alt tud	-21	66 Cla ran	45
22 Asp ea	2	72 Cla sub	33	8 Sol flu	-26	82 Oxy dig	44
6 Flu via	-11	9 Mel syl	31	14 Hum d	-30	120 Rus s	42
8 Sol flu	-11	42 Sal phy	31	21 Bry co	-30	206 Sax c	42
5 Moi tre	-67	98 Cer sp	31	4 Dow els	-41	33 Gna no	41
10 Tra mp	-84	83 Dap lap	30	12 Soi tex	-41	83 Phl alp	41
2 Pos env	-86	74 Tri spi	30	16 Roo de	-46	115 Sag s	41
19 Bar fin	-136	44 Ver alp	30	7 Slo pe*	-49	196 Ara al	27
4 Dow els	-137	28 Sal cau	30	3 Fro hve	-89	144 Poa a	26
13 pH* ***	-145	48 Cer fon	29	20 Veg cc	-89	205 Woo	26
17 Bar bo	-162	31 Jun sq	28	2 Pos env	-95	10 Ant od	24
1 Sno lie	-299	5 Bet pub	27	5 Moi tre	-99	11 Jun tri	22
3 Fro hve	-392	25 Cla ran	27	15 Sta de	-122	81 Ste bot	22
18 Bar gra	-421	93 Ger syl	25	1 Sno lie	-215	167 Tar sp	20
23 Alt tud	-581	102 Cla sp	25	24 Age m	-258	111 Gna s	19
		26 Cas tet	23			52 Lis cor	17
		7 Vac myr	22			172 Mel n	17
		103 Cla c	22			80 Ath dis	15
		89 Aln glu	21			43 Mel pra	14
		76 Des ce	20			154 Tri sp	14
		51 Eup he	18			160 Des c	14
		53 Lyc an	18			37 Sib pro	13
		3 Cal vul	17			41 Ran sp	13
		12 Vio bif	17			121 Cer a	13
		33 Alc alp	16			113 Hie s	12
		77 Cla art	15			116 Luz s	12
		80 Ath dis	15			173 Sau a	12
		71 Cla bel	13			175 pel po	12
		106 Bro c	13			12 Vio bif	11
		43 Mel pra	12			174 Ran p	11
		109 Bla c	12			185 Ran r	11
		6 Vac uli	11			38 Sol vir	10
		41 Ran sp	11			42 Sal phy	10
		55 Vac vit	11			85 Sax aiz	10
		90 Jun co	11			94 Alc glo	10
		166 Jun s	11			194 Dra a	10
		168 Ped s	11			141 Ran a	9
		38 Sol vir	10			159 Car p	9
		117 Uln gl	9			186 Leo s	9
		172 Mel n	9			187 Rum	9
		52 Lis cor	8			192 Sax c	9
		73 Cla ple	8			199 Pyr sp	9
		112 Cry c	8			191 Sax c	8
		135 Cla al	8			63 Sal her	7
		150 Ped la	8			14 Ant od	7
		47 Cla co	7			10 Ant od	7
		57 ARc al	7			17 Rum a	7
		61 Lou pr	7			35 Pyr mi	7
		68 Cla de	7			88 Pyr no	7
		72 Cla sul	7			169 Luz t	7
		120 Rus s	7			198 Dry e	7
		126 Des c	7			4 Sal gla	6
		151 Coe v	7			29 Cet is	6
		169 Luz t	7			28 Sal ca	6
		36 Leo au	6			179 Lyc s	6
		42 Sal phy	6			32 Nar st	5
		66 Cla ran	6			36 Leo au	5
		79 Lol col	6			87 Ver alp	5
		84 Sax ste	6			92 Pol viv	5
		85 Sax aiz	6			93 Ger sy	5
		118 Epi al	6			123 Sed r	5
		123 Sed r	6			157 Pan p	5
		173 Sau a	6			39 Fes ov	4
		175 pel po	6			97 Pyg cra	4
		14 Ant od	5			201 Ran a	4
		17 Rum a	5			204 Rie sc	4
		76 Pel pol	5			76 Tri sub	3
		114 Agr te	5			31 Jun sq	3
		141 Ran a	5			44 Ver alp	3
		101 Cla ch	4			69 Pot ere	3
		105 Cla s	4			125 Ant al	3
		124 Hie a	4			139 Tar o	3
		127 Lyc a	4			163 Car b	3
		138 Eup f	4			197 Lyc s	3
		139 Tar o	4			58 Car sp	2
		140 Hie a	4			81 Ste bot	2
		148 Pet fr	4			140 Hie a	2
		149 Tof pu	4			202 Lec g	2
		162 Cla s	4			19 Luz pi	1
		171 Far r	4			26 Cas tet	1
		2 Phy cae	3			34 Sal her	1
		33 Gna no	3			44 Ste alp	1
		70 Cla am	3			75 Pel pol	1
		92 Pol viv	3			89 Aln glu	1
		104 Cla fu	3			91 Pyr ap	1
		170 War s	3			135 Cla al	1
		1 Emp nig	2			143 Bar a	1
		26 Cla sub	2			147 Sil ac	1
		35 Pyr mi	2			148 Pet fr	1
		37 Sib pro	2			150 Ped la	1
		40 Bet nan	2			177 Tof pu	1
		56 Pin vul	2			190 Sal m	1
		88 Pyr no	2			7 Vac myr	0
		174 Ran p	2			8 Cer fon	0
		183 Ant di	2			9 Mel syl	0

Continued on sheet (2) ...

Continued on sheet (2) ...

Colour-coded key:

- **Group 14**: Sub-alpine early intermediate lichen heath
- **Group 30**: Sub- to low alpine late-snow heath
- **Group 62**: Sub-alpine mature/late intermediate woodland heath
- **Group 63**: Sub-alpine woodland heath
- **Group 5**: Low and sub-alpine late intermediate snowbed
- **Group 6**: Low and sub-alpine late-snow heath
- **Group 34**: Low alpine late intermediate late-snow heath
- **Group 18**: Low alpine late-snow heath
- **Group 33**: Alpine exposed snowbed
- **Group 32**: Alpine exposed lichen heath
- **Group 19**: Alpine lichen heath
- **Group 35**: Pioneer and snowbed assemblage

Note: Abbreviations for species are given in Appendix 1 and the abbreviations for environmental parameters are given in Appendix 3.

Table 6.4 (sheet 2) Rank of species (and superimposed TWINSPAN "final species groups"), including calculated regression coefficients of environmental parameters, on DCA ordination axes (1) and (2) (combined data set) .

Continued from sheet (1) ...

30 Cla fim	1
74 Cla cri	1
87 Ver alp	1
100 Cla ci	1
129 Cet s	1
143 Bar a	1
177 Tof pu	1
187 Rum	1
45 Cla pol	0
48 Cla ch	0
54 Jun tri	0
58 Car sp	0
184 Ane v	0
26 Cet isl	-1
83 Phi alp	-1
94 Alc glo	-1
107 Ste pa	-1
186 Ran r	-1
186 Leo s	-1
4 Sal gla	-2
27 Cla gra	-2
39 Fes ov	-2
67 Cla ar	-2
111 Gna s	-2
134 Nep a	-2
142 Cam	-2
161 Cla c	-2
167 Ter s	-2
176 Squ c	-2
18 Des al	-3
62 Cla ca	-3
78 Sal lan	-3
113 Hie s	-3
130 Cet d	-3
137 Arc u	-3
147 Sil ac	-3
155 Cla p	-3
179 Lyc s	-3
188 Cet D	-3
191 Sax c	-3
192 Sax c	-3
205 Woo	-3
46 Cla chl	-4
49 Cla un	-4
50 Lyc se	-4
81 Ste bo	-4
119 Epi a	-4
146 Pso h	-4
190 Sal m	-4
193 Vis al	-4
194 Dre a	-4
202 Lec q	-4
63 Cla pe	-5
69 Cla pl	-5
110 Cer c	-5
115 Sag s	-5
195 Sal re	-5
197 Lyc s	-5
198 Dry e	-5
199 Pyr s	-5
203 Och f	-5
34 Sal he	-6
44 Ste alp	-6
96 Sta ve	-6
116 Luz s	-6
125 Ant a	-6
135 Arc o	-6
140 Ale p	-6
157 Pan p	-6
163 Car b	-6
164 Sph n	-6
180 Gre c	-6
201 Ran e	-6
204 Sie v	-6
69 Cet ni	-7
122 Cas h	-7
152 Cla t	-7
90 Sto cr	-8
64 Cla ve	-8
59 Sol cr	-8
121 Cer a	-8
159 Car p	-8
165 Phe a	-8
181 Dry e	-8
189 Car a	-8
206 Sax c	-8
209 Usn c	-8
82 Oxy di	-9
108 Cet c	-9
128 Cet n	-9
193 Sal e	-9
154 Tri sp	-9
160 Des c	-9
207 Rzn p	-9
124 Tha v	-10
144 Poa a	-10
166 Jun b	-10
178 Ste a	-10
196 Ara a	-10
210 Wer v	-10
153 Ale o	-11
158 Ale m	-11
132 Cor s	-12
182 Cor o	-12
208 Phy a	-13
206 Ner a	-14

Continued from sheet (1) ...

22 Bar au	0
28 Ste glo	0
56 Pin vul	0
76 Des ce	0
78 Sal lan	0
99 Str cup	0
164 Sph n	0
166 Jun s	0
168 Ped s	0
193 Vis al	0
23 Cla bo	-1
47 Cla co	-1
85 Sol cre	-1
98 Cer sp	-1
122 Cas h	-1
138 Eup fi	-1
162 Cla st	-1
176 Squ c	-1
180 Gre c	-1
152 Cla t	-1
2 Phy cae	-2
25 Cet isl	-2
53 Lyc an	-2
90 Jun co	-2
126 Des c	-2
127 Lyc a	-2
149 Tof pu	-2
181 Dry e	-2
188 Cet D	-2
203 Och f	-2
1 Emp nig	-3
5 Bet pub	-3
6 Vac uli	-3
50 Lyc se	-3
51 Eup he	-3
61 Lou pr	-3
63 Cla pe	-3
102 Cla si	-3
104 Cla fu	-3
124 Hie a	-3
130 Cet d	-3
146 Pso h	-3
161 Cla c	-3
183 Ant di	-3
207 Rzn p	-3
26 Cet isl	-4
30 Cla fim	-4
40 Bet nan	-4
45 Cla pol	-4
48 Cla chl	-4
64 Cla ver	-4
77 Cla art	-4
151 Coe v	-4
195 Sal re	-4
3 Cal vul	-5
27 Cla gra	-5
48 Cla ch	-5
49 Cla un	-5
54 Jun tri	-5
62 Cla ca	-5
66 Cla ran	-5
67 Cla ar	-5
69 Cla pl	-5
71 Cla be	-5
74 Cla cri	-5
100 Cla ci	-5
156 Bot v	-5
174 Ang s	-5
60 Sta ce	-6
70 Cla am	-6
73 Cla pl	-6
101 Cla ra	-6
105 Cla s	-6
109 Bla c	-6
134 Nep a	-6
170 War p	-6
171 Far re	-6
55 Vac vi	-7
57 ARc al	-7
58 Car sp	-7
68 Cla de	-7
72 Cla su	-7
107 Ste pa	-7
129 Cet s	-7
142 Cam	-7
155 Cla p	-7
103 Cla c	-8
135 Arc o	-8
175 Ste a	-8
128 Cet n	-9
209 Usn c	-9
137 Arc u	-10
210 Wer v	-10
106 Bro c	-11
108 Cet c	-11
208 Nep a	-11
131 Tha v	-13
133 Sph q	-13
145 Ale o	-13
163 Car b	-14
182 Cor o	-14
158 Ale m	-14
186 Phe a	-14
153 Ale o	-15
132 Cor s	-15
203 Phy a	-17

Note: Abbreviations for species are given in Appendix 1 and the abbreviations for environmental parameters are given in Appendix 3.

Table 6.5 Correlation matrix of Pearson's product moment correlation coefficients between the environmental parameters within the combined foreland data set (coefficients significant at p <0.001 are in bold). *Options chosen in CANOCO are: DCA, detrending by 4th order polynomials, log transformation, species are weighted sample scores, down-weighting of rare species.*

****** Weighted correlation matrix (weight = sample total) ******

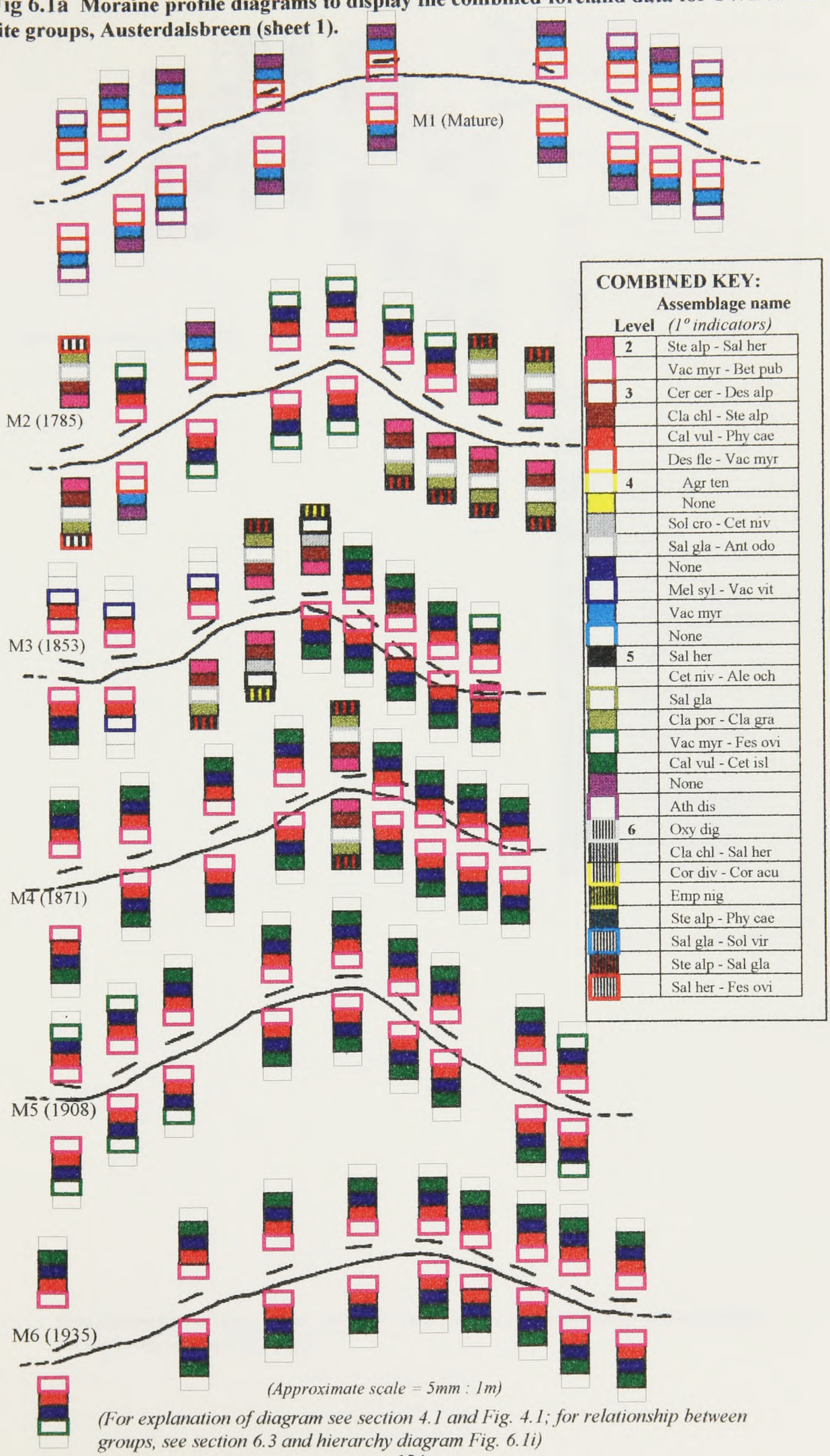
	SPEC	SPEC	SPEC	SPEC	ENVI A	ENVI A	ENVI A	ENVI A	Sno lie	Pos en	Fro hv	Dow e	Moi tre	Flu via	Slo pe	Sol flu	Asp ec	Tra mp	Ani inf	Soi tex	pH* ***	Hum d	Sta de	Roo de	Bar bo	Bar gr	Bar fin	Veg co	Bry co	Asp ea	Alt tud	Age	mor
SPEC	1																																
SPEC	0	1																															
SPEC	0	0	1																														
SPEC	0	0	0	1																													
ENVI A	**0.897**	0.004	0.076	0	1																												
ENVI A	0.005	**0.687**	-0.14	0.133	0.006	1																											
ENVI A	0.1	-0.14	**0.682**	-0.16	0.112	-0.21	1																										
ENVI A	0	0.152	-0.18	**0.598**	0	**0.222**	**-0.27**	1																									
Sno lie	**-0.41**	**-0.34**	-0.19	-0.1	**-0.45**	**-0.49**	**-0.28**	-0.18	1																								
Pos en	-0.12	-0.15	-0.09	0.037	-0.13	**-0.22**	-0.13	0.062	**0.424**	1																							
Fro hv	**-0.53**	-0.14	0.085	0.163	**-0.6**	-0.2	0.124	**0.272**	**0.504**	**0.321**	1																						
Dow e	-0.19	-0.06	-0.14	-0.02	-0.21	-0.09	-0.21	-0.03	**0.437**	0.189	**0.235**	1																					
Moi tre	-0.09	-0.15	-0.12	0.199	-0.1	**-0.22**	-0.18	**0.333**	**0.24**	**0.223**	**0.285**	0.134	1																				
Flu via	-0.01	**0.44**	-0.05	-0.07	-0.02	**0.64**	-0.08	-0.12	-0.2	**-0.22**	-0.16	-0.08	-0.15	1																			
Slo pe	0.067	-0.08	-0.04	0.123	0.074	-0.11	-0.06	0.205	0.029	0.154	0.073	0.004	0.171	**-0.23**	1																		
Sol flu	-0.02	-0.04	**0.232**	0.124	-0.02	-0.06	**0.341**	0.208	0.116	0.168	**0.312**	0.069	0.15	-0.18	**0.451**	1																	
Asp ec	0.082	-0.03	-0.13	0.09	0.092	-0.04	-0.2	0.15	0.024	0.02	0.007	0.01	0.02	0.018	-0.01	-0.05	1																
Tra mp	-0.11	-0.03	-0.2	-0.08	-0.13	-0.05	**-0.3**	-0.13	0.113	0.079	-0.03	0.018	0.048	-0.05	0.004	-0.19	0.002	1															
Ani inf	0.145	0.017	0.021	-0.02	0.161	0.025	0.031	-0.03	-0.01	-0.06	-0.05	-0.01	-0.01	0.003	-0.06	-0.04	-0.02	-0.02	1														
Soi tex	0.13	-0.06	0.09	-0.06	0.145	-0.09	0.131	-0.1	-0.02	0.016	-0.04	-0.03	-0.07	-0.03	0.031	0.056	-0.04	-0.03	0.006	1													
pH* ***	-0.2	0.072	0.017	0.061	**-0.22**	0.104	0.026	0.102	0.127	0.03	0.151	0.133	0	-0.08	0.027	0.033	0.06	-0.08	-0.05	0.008	1												
Hum d	**0.37**	-0.05	**0.359**	**-0.4**	**0.412**	-0.07	**0.527**	**-0.66**	**-0.22**	-0.15	**-0.38**	-0.14	**-0.32**	-0.03	-0.15	-0.01	-0.08	-0.08	0.023	0.122	-0.11	1											
Sta de	**0.335**	-0.19	**0.447**	**-0.33**	**0.373**	**-0.28**	**0.655**	**-0.56**	**-0.24**	-0.17	**-0.38**	-0.18	**-0.28**	-0.05	-0.13	-0.04	-0.05	-0.11	0.039	0.146	-0.03	**0.67**	1										
Roo de	**0.437**	-0.07	**0.263**	**-0.36**	**0.487**	-0.11	**0.386**	**-0.6**	**-0.24**	-0.15	**-0.41**	-0.13	-0.2	-0.05	-0.08	0	-0.05	-0.16	0.074	0.125	-0.07	**0.6**	**0.624**	1									
Bar bo	**-0.22**	0.055	**-0.22**	-0.16	**-0.25**	0.08	**-0.32**	**-0.27**	0.045	-0.06	-0.1	-0.02	-0.11	0.116	0.032	**-0.24**	0.029	0.093	-0.05	-0.03	0.059	-0.08	-0.02	-0.09	1								
Bar gr	**-0.57**	0.007	**-0.25**	**0.251**	**-0.64**	0.011	**-0.37**	**0.42**	0.202	0.064	**0.479**	0.083	0.219	-0.01	0.025	-0.02	0.033	0.109	-0.07	-0.14	0.051	**-0.59**	**-0.52**	**-0.51**	0.023	1							
Bar fin	-0.19	0.032	0.068	-0.05	-0.21	0.047	0.099	-0.08	0.011	-0.01	0.055	0.135	-0.03	0.041	0.145	0.088	0.036	0.055	-0.03	0	0.103	-0.14	0	-0.02	-0.08	-0.08	1						
Veg co	**0.467**	-0.14	**0.226**	-0.16	**0.521**	-0.2	**0.332**	**-0.26**	**-0.26**	-0.14	**-0.45**	-0.16	**-0.23**	-0.08	-0.08	-0.1	-0.05	-0.06	0.041	0.025	-0.03	**0.46**	**0.555**	**0.505**	**-0.25**	**-0.5**	0.099	1					
Bry co	**0.279**	-0.05	0.15	**0.22**	**0.311**	-0.07	**0.22**	**0.368**	**-0.28**	-0.13	0.016	-0.11	-0.01	0.043	-0.04	-0.02	-0.01	-0.17	0.101	-0.03	-0.14	-0.06	0.001	######	-0.21	0.03	0	0.132	1				
Asp ea	0.003	0.045	0.02	0.037	0.003	0.065	0.029	0.062	-0.06	-0.08	-0.02	-0.01	-0.01	-0.01	-0.09	-0.02	0.041	-0.06	0.014	-0.03	0.041	0.004	0	-0.01	-0.03	0.027	-0.02	-0.12	0.066	1			
Alt tud	**-0.79**	-0.03	0.112	-0.13	**-0.88**	-0.05	0.165	**-0.22**	**0.351**	0.053	**0.444**	0.174	-0.06	-0.01	-0.05	0.076	-0.1	0.045	-0.05	-0.01	**0.222**	-0.18	-0.12	-0.18	0.199	**0.359**	0.174	**-0.36**	**-0.29**	0.004	1		
Age m	0.164	**-0.4**	**0.445**	**-0.4**	0.183	-0.59	**0.652**	**-0.67**	0.052	-0.01	-0.11	-0.02	-0.14	-0.17	0.005	0.145	-0.09	-0.04	0.066	0.185	-0.1	**0.52**	**0.627**	**0.521**	-0.07	**-0.46**	-0.02	**0.351**	-0.1	-0.04	0.115	1	0

Note : see Appendix 3 for environmental parameter abbreviations.

Table 6.6 Summary of the environmental factor complexes suggested by results taken from the combined data set.

Meso-environmental variables (forming factor complexes)	**Associated micro-environmental parameters** (forming a factor complex with each mesoenvironmental variable).	
	Positively correlated parameters ($p<0.001$)	**Negatively correlated parameters ($p<0.001$)**
Altitude	Frost heave *($r = 0.444$)* Bare-ground gravels *($r = 0.359$)* Lack of snow *($r = 0.351$)* pH ($r = 0.222$)	Vegetation cover *($r = -0.356$)* Bryophyte cover *($r = -0.29$)*
Age	Stain (soil) depth *($r = 0.627$)* Root depth *($r = 0.521$)* Humus depth *($r = 0.52$)* Vegetation cover *($r = 0.351$)*	Bare ground gravels *($r = -0.46$)*
Microtopography	Lack of snow *($r = 0.424$)* Frost *($r = 0.321$)* Dryness *($r = 0.223$)*	Fluvial activity *($r = -0.22$)*
Fluvial disturbance (not forming factor complex)	None	Slope ($r = -0.23$) Position ($r = -0.22$)

Fig 6.1a Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Austerdalsbreen (sheet 1).

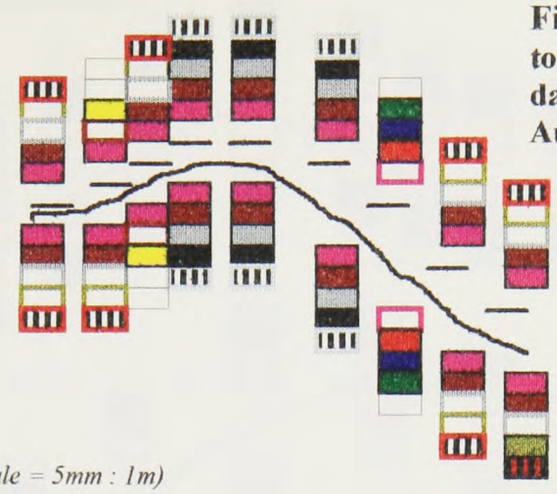


(Approximate scale = 5mm : 1m)

(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

Fig. 6.1a Moraine profile diagrams to display the combined foreland data for TWINSPAN site groupings, Austerdalsbreen (sheet 2).

M7 (1960)



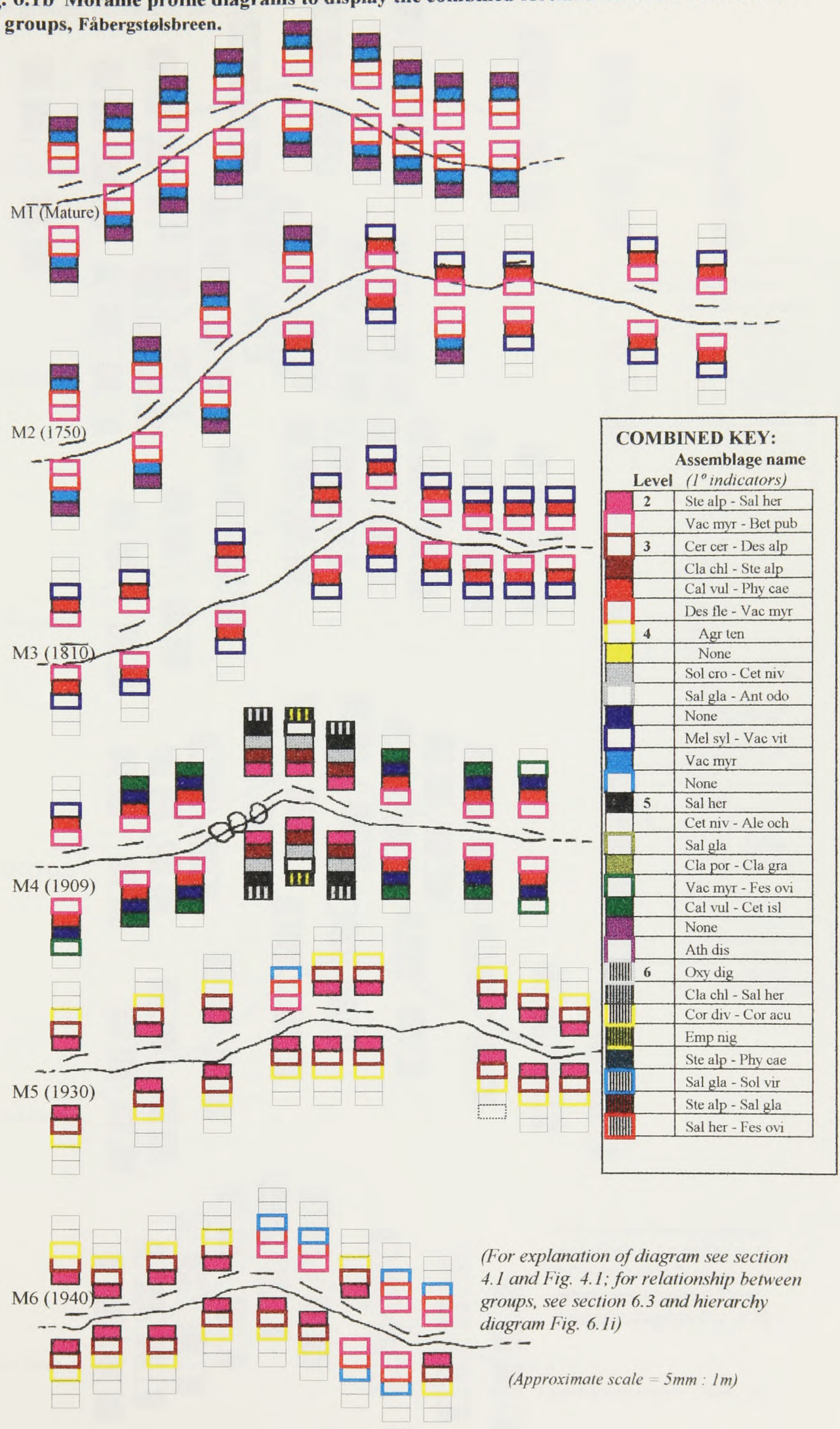
(Approximate scale = 5mm : 1m)

COMBINED KEY:

Level	Assemblage name (1° indicators)
2	Ste alp - Sal her
	Vac myr - Bet pub
3	Cer cer - Des alp
	Cla chl - Ste alp
	Cal vul - Phy cae
	Des fle - Vac myr
4	Agr ten
	None
	Sol cro - Cet niv
	Sal gla - Ant odo
	None
	Mel syl - Vac vit
	Vac myr
	None
5	Sal her
	Cet niv - Ale och
	Sal gla
	Cla por - Cla gra
	Vac myr - Fes ovi
	Cal vul - Cet isl
	None
	Ath dis
6	Oxy dig
	Cla chl - Sal her
	Cor div - Cor acu
	Emp nig
	Ste alp - Phy cae
	Sal gla - Sol vir
	Ste alp - Sal gla
	Sal her - Fes ovi

(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see hierarchy diagram Fig. 6.1i)

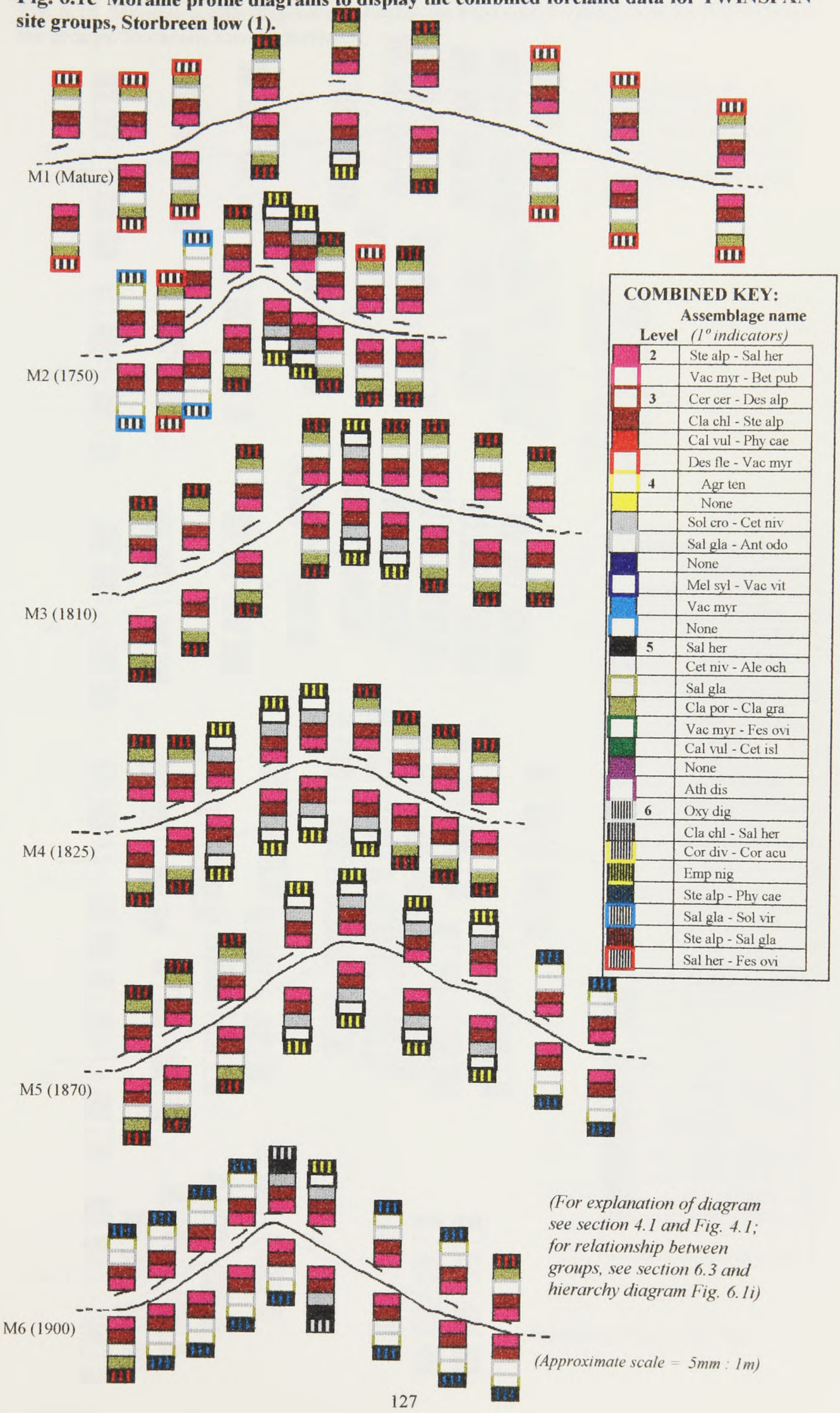
Fig. 6.1b Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Fåbergstølsbreen.



(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

(Approximate scale = 5mm : 1m)

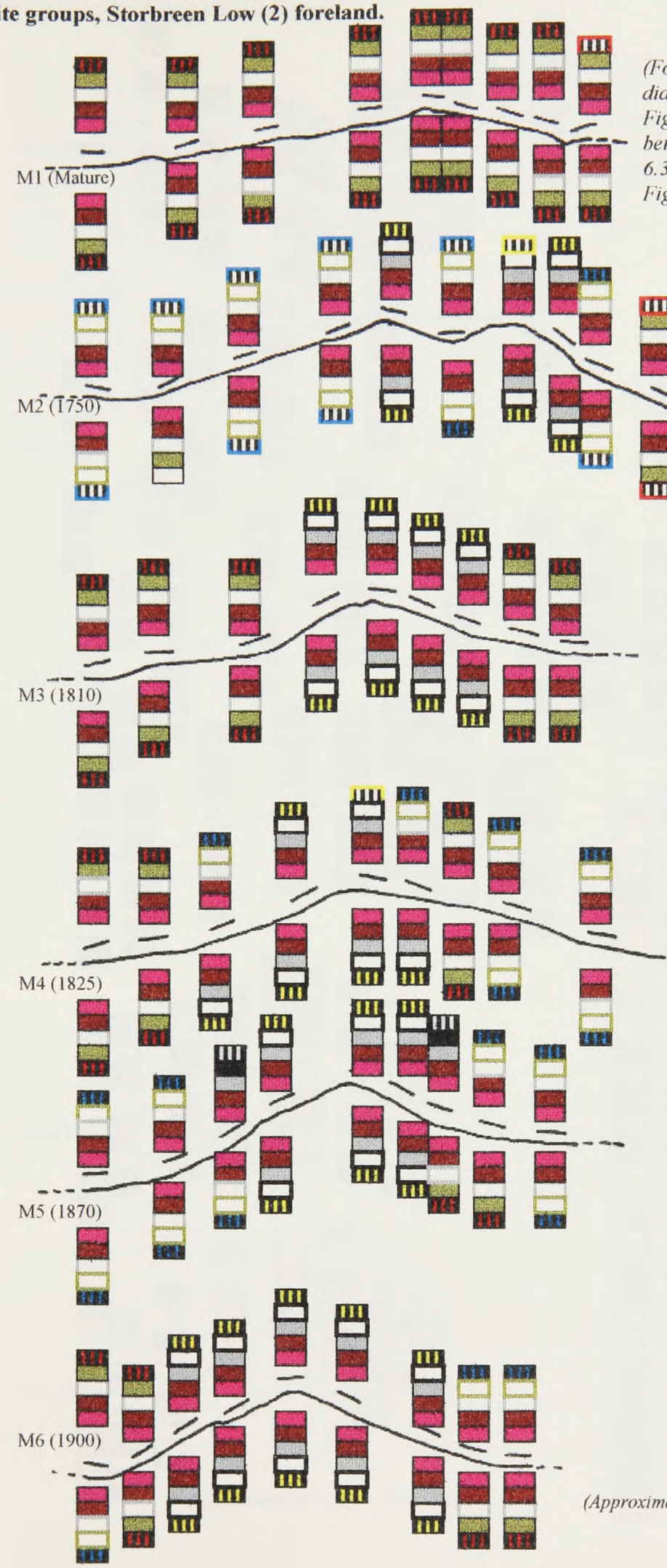
Fig. 6.1c Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Storbreen low (1).



(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

(Approximate scale = 5mm : 1m)

Fig. 6.1d Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Storbreen Low (2) foreland.



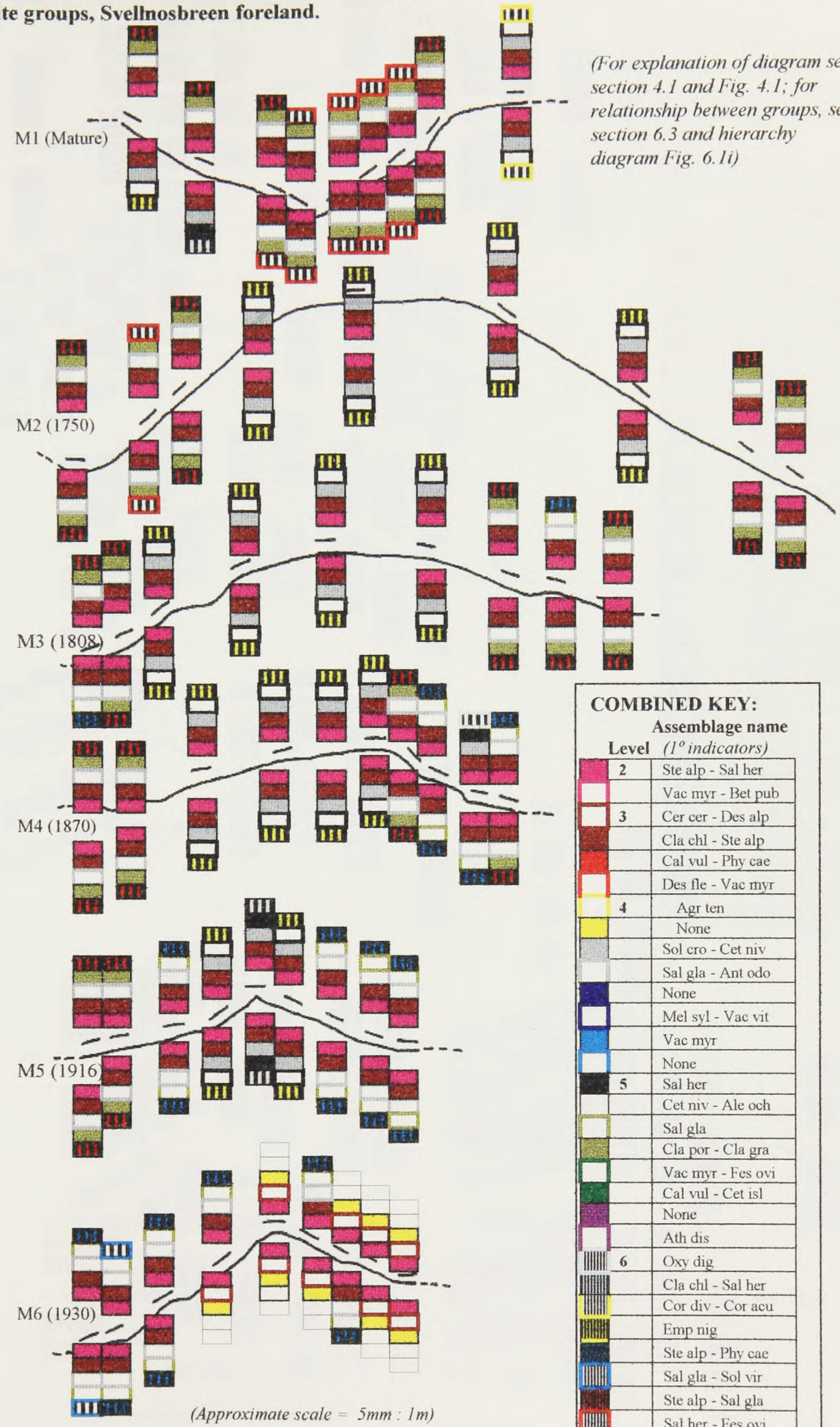
(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

COMBINED KEY:

Level	Assemblage name (1° indicators)
2	Ste alp - Sal her
	Vac myr - Bet pub
3	Cer cer - Des alp
	Cla chl - Ste alp
	Cal vul - Phy cae
	Des fle - Vac myr
4	Agr ten
	None
	Sol cro - Cet niv
	Sal gla - Ant odo
	None
	Mel syl - Vac vit
	Vac myr
	None
5	Sal her
	Cet niv - Ale och
	Sal gla
	Cla por - Cla gra
	Vac myr - Fes ovi
	Cal vul - Cet isl
	None
	Ath dis
6	Oxy dig
	Cla chl - Sal her
	Cor div - Cor acu
	Emp nig
	Ste alp - Phy cae
	Sal gla - Sol vir
	Ste alp - Sal gla
	Sal her - Fes ovi

(Approximate scale = 5mm : 1m)

Fig. 6.1e Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Svellnosbreen foreland.

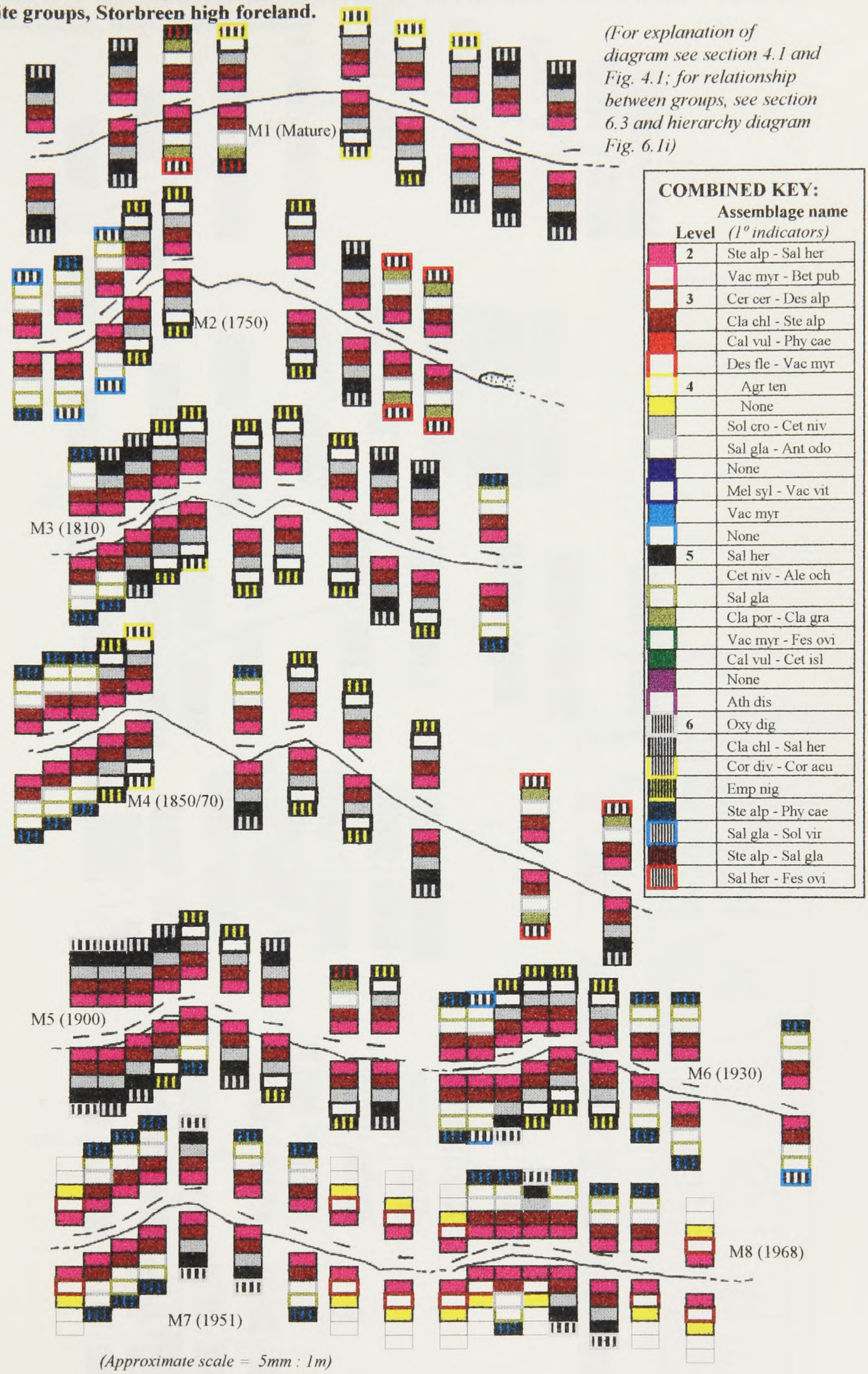


(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

COMBINED KEY:

Level	Assemblage name (1° indicators)
2	Ste alp - Sal her
	Vac myr - Bet pub
3	Cer cer - Des alp
	Cla chl - Ste alp
	Cal vul - Phy cae
	Des fle - Vac myr
4	Agr ten
	None
	Sol cro - Cet niv
	Sal gla - Ant odo
	None
	Mel syl - Vac vit
	Vac myr
	None
5	Sal her
	Cet niv - Ale och
	Sal gla
	Cla por - Cla gra
	Vac myr - Fes ovi
	Cal vul - Cet isl
	None
	Ath dis
6	Oxy dig
	Cla chl - Sal her
	Cor div - Cor acu
	Emp nig
	Ste alp - Phy cae
	Sal gla - Sol vir
	Ste alp - Sal gla
	Sal her - Fes ovi

Fig. 6.1f Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Storbreen high foreland.

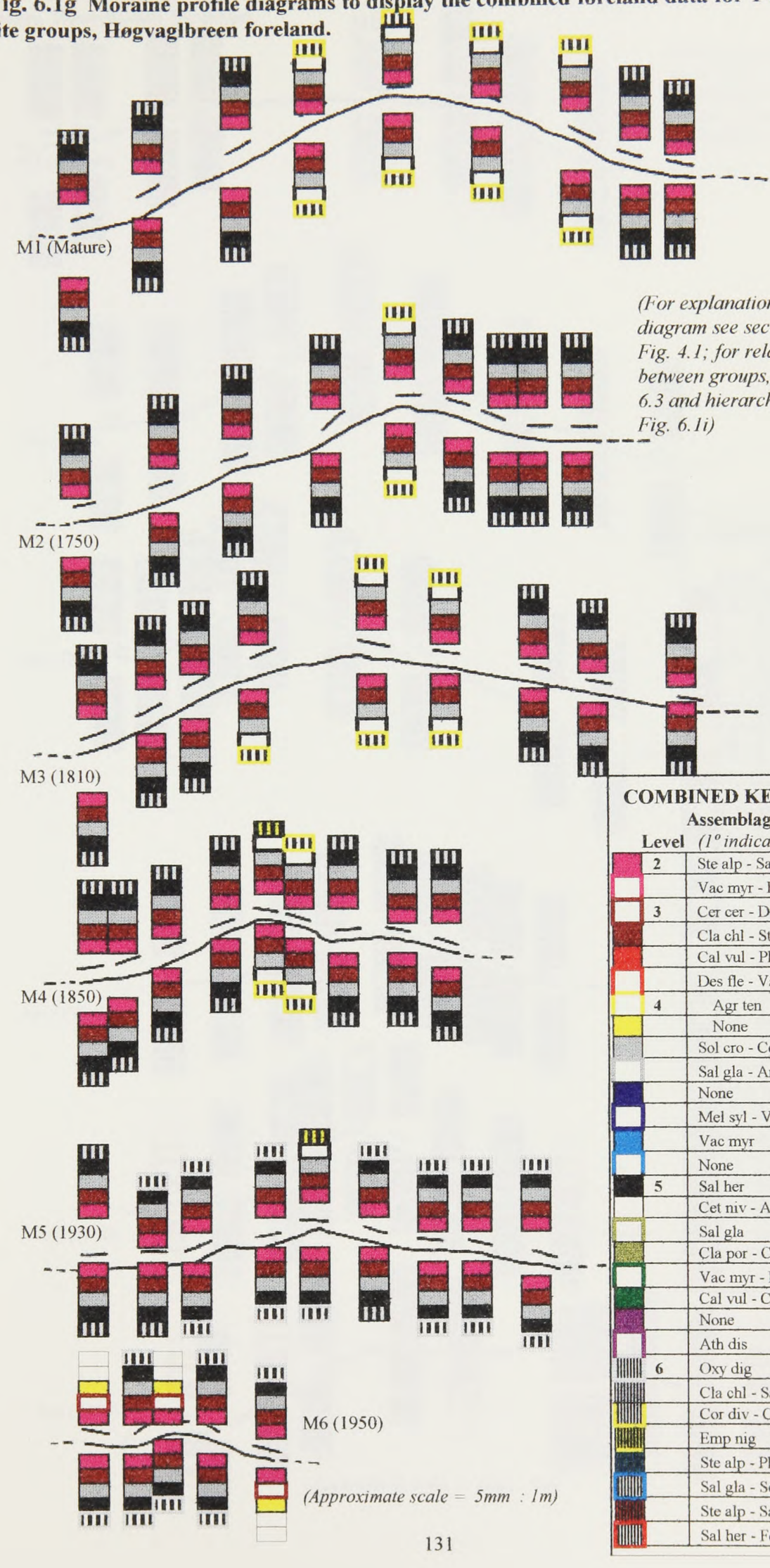


(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

COMBINED KEY:

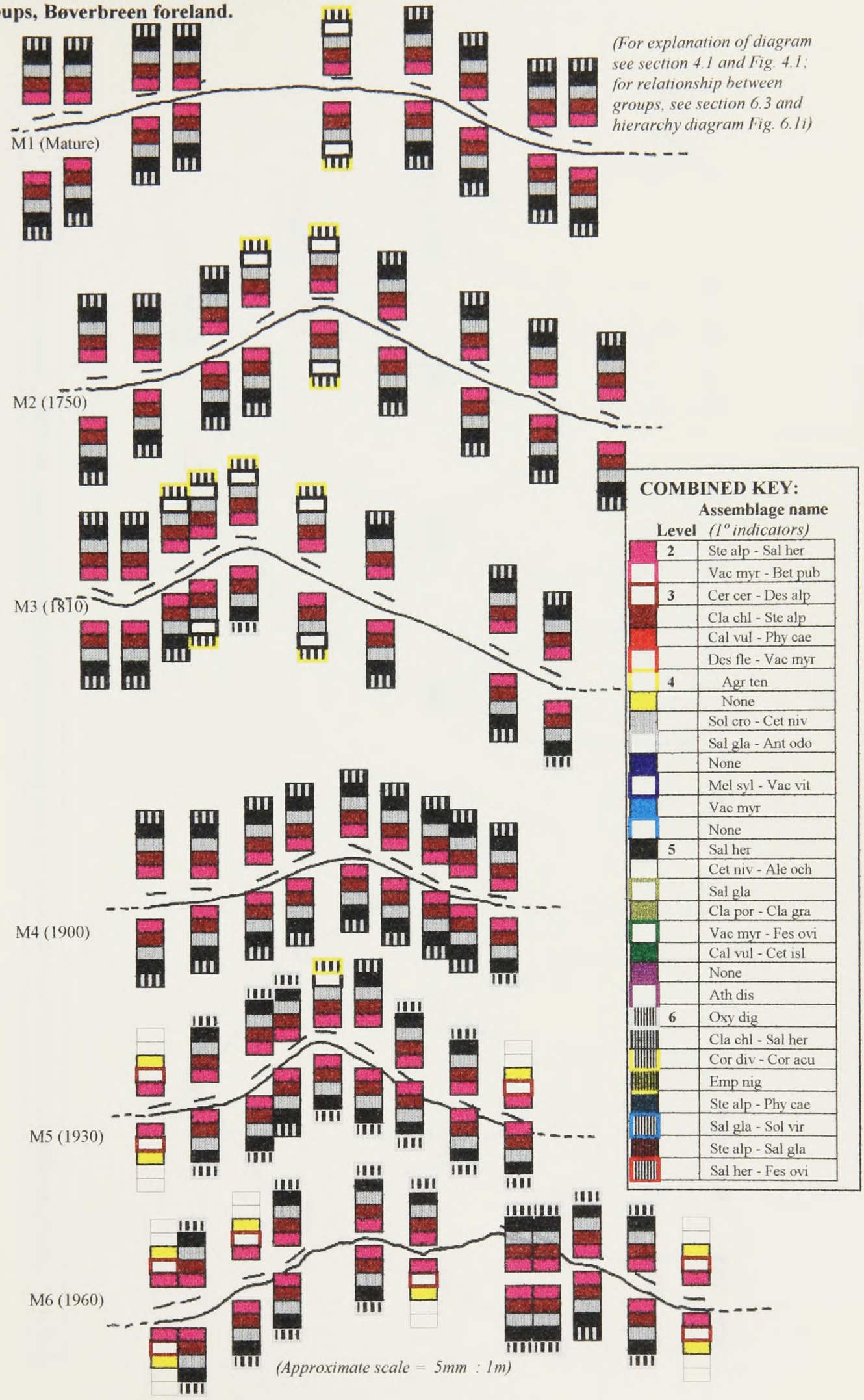
Level	Assemblage name (1° indicators)
2	Ste alp - Sal her
	Vac myr - Bet pub
3	Cer cer - Des alp
	Cla chl - Ste alp
	Cal vul - Phy cae
	Des fle - Vac myr
4	Agr ten
	None
	Sol cro - Cet niv
	Sal gla - Ant odo
	None
	Mel syl - Vac vit
	Vac myr
	None
5	Sal her
	Cet niv - Ale och
	Sal gla
	Cla por - Cla gra
	Vac myr - Fes ovi
	Cal vul - Cet isl
	None
	Ath dis
6	Oxy dig
	Cla chl - Sal her
	Cor div - Cor acu
	Emp nig
	Ste alp - Phy cae
	Sal gla - Sol vir
	Ste alp - Sal gla
	Sal her - Fes ovi

Fig. 6.1g Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Høgvaglbreen foreland.



(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

Fig. 6.1h Moraine profile diagrams to display the combined foreland data for TWINSPAN site groups, Bøverbreen foreland.



(For explanation of diagram see section 4.1 and Fig. 4.1; for relationship between groups, see section 6.3 and hierarchy diagram Fig. 6.1i)

COMBINED KEY:

Level	Assemblage name (1° indicators)
2	Ste alp - Sal her
	Vac myr - Bet pub
3	Cer cer - Des alp
	Cla chl - Ste alp
	Cal vul - Phy cae
	Des fle - Vac myr
4	Agr ten
	None
	Sol cro - Cet niv
	Sal gla - Ant odo
	None
	Mel syl - Vac vit
	Vac myr
	None
5	Sal her
	Cet niv - Ale och
	Sal gla
	Cla por - Cla gra
	Vac myr - Fes ovi
	Cal vul - Cet isl
	None
	Ath dis
6	Oxy dig
	Cla chl - Sal her
	Cor div - Cor acu
	Emp nig
	Ste alp - Phy cae
	Sal gla - Sol vir
	Ste alp - Sal gla
	Sal her - Fes ovi

Fig. 6.1i. Hierarchy diagram to show the colour code used at each level for the combined foreland TWINSPAN "site group" profile diagrams.

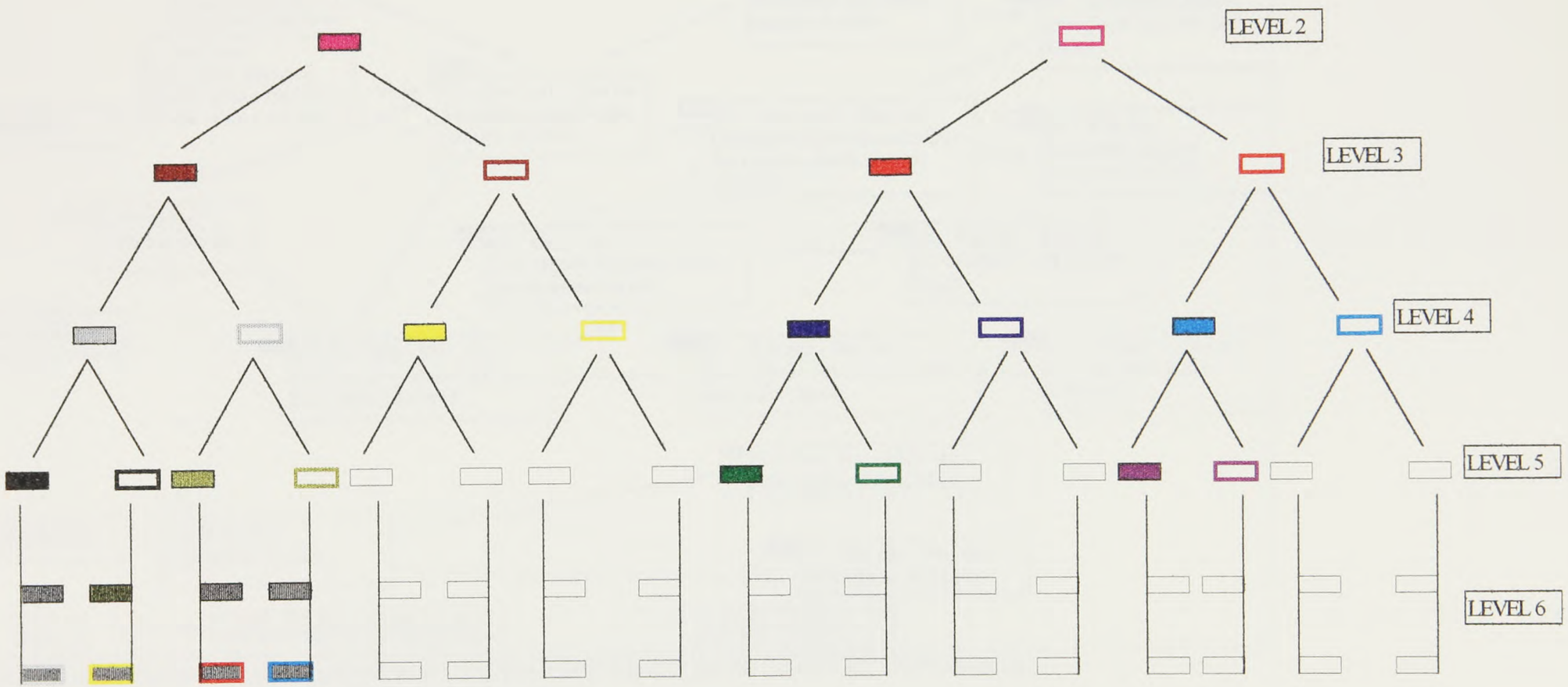
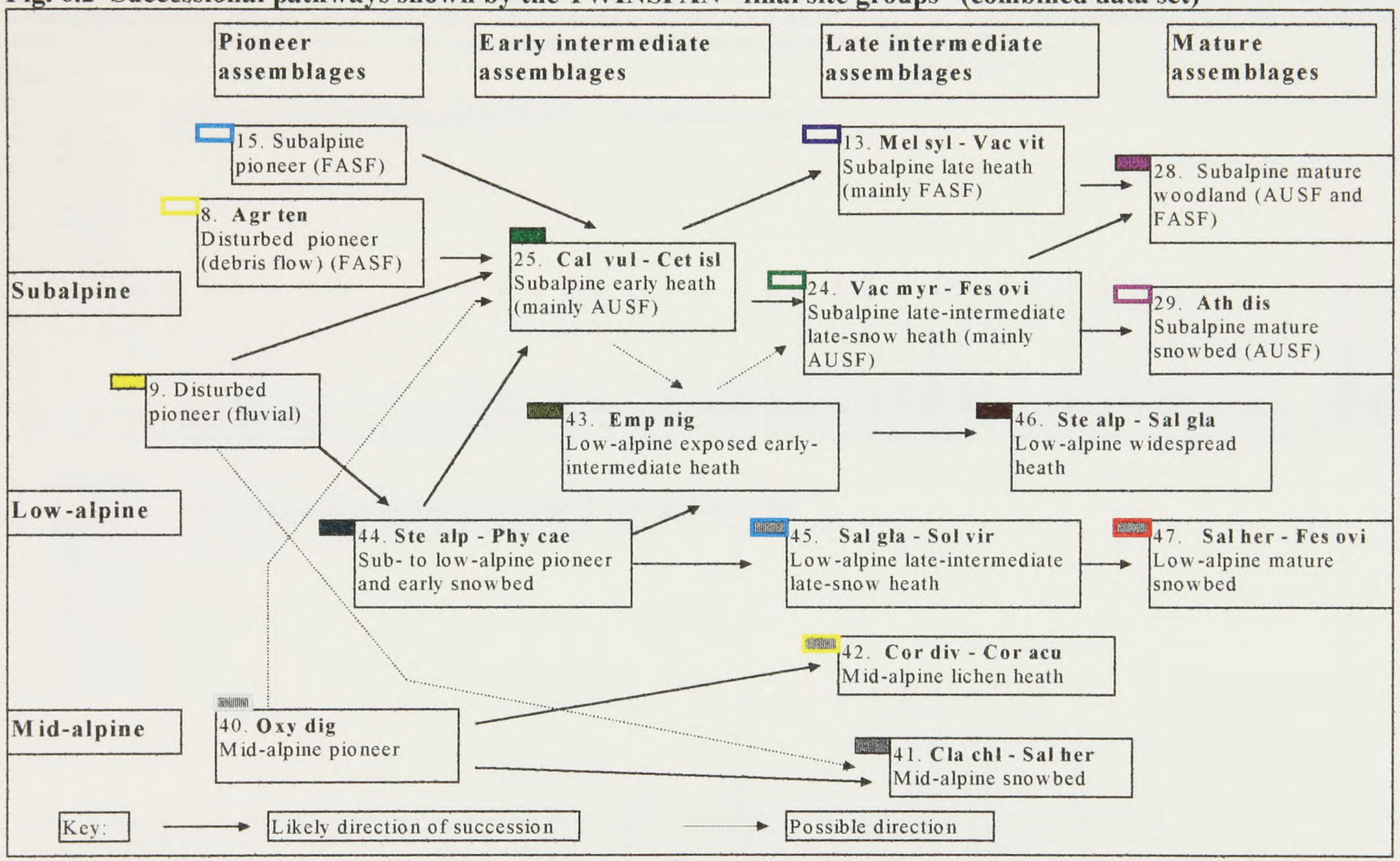
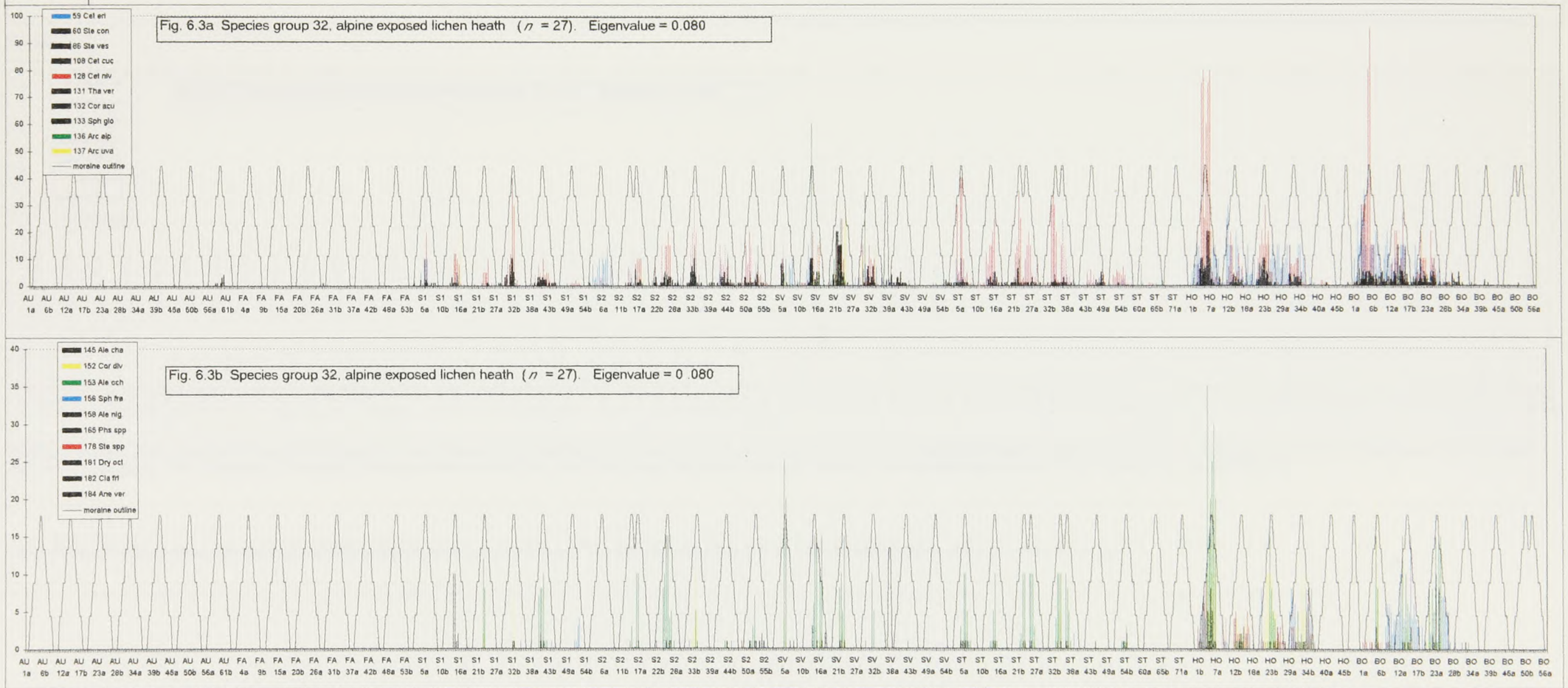


Fig. 6.2 Successional pathways shown by the TWINSPAN "final site groups" (combined data set)



Notes: The colour boxes represent the colours used in Fig 6.1a-h and Table 6.1 for the TWINSPAN "final site groups".
This succession diagram is described and discussed in section 6.4.

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs.. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*



Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*

% Cover

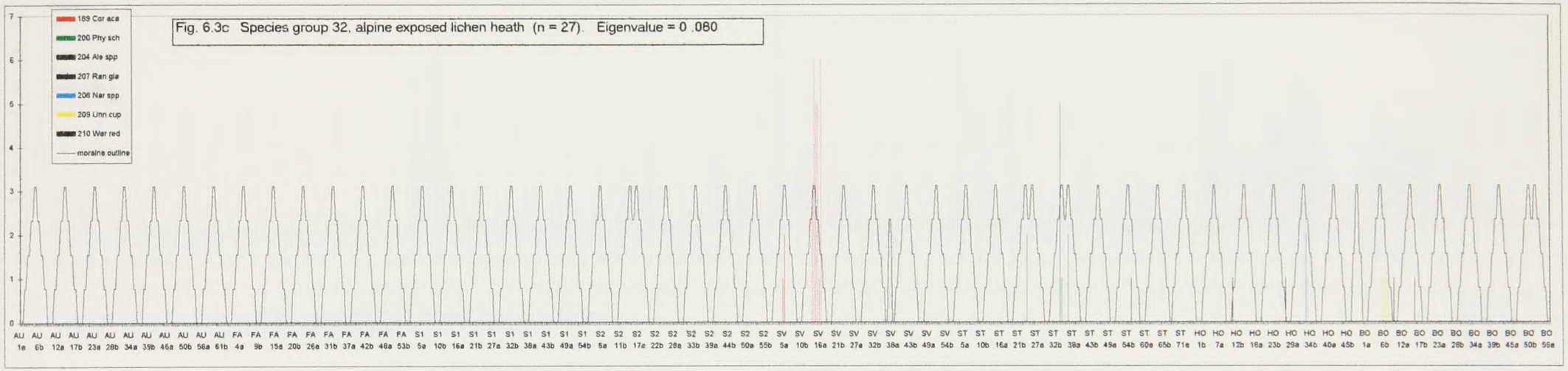


Fig. 6.3c Species group 32, alpine exposed lichen heath (n = 27). Eigenvalue = 0 .080

Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*

% Cover

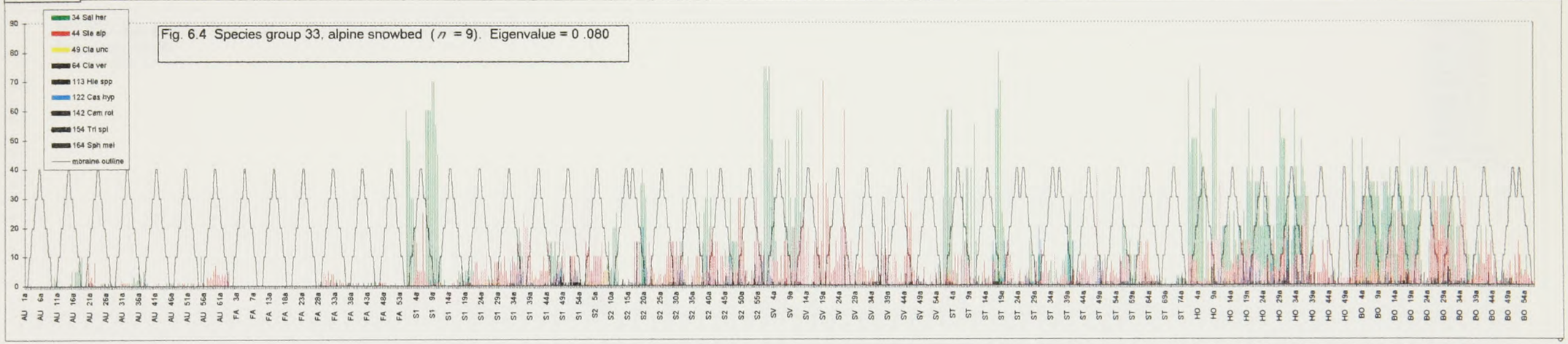


Fig. 6.4 Species group 33, alpine snowbed (n = 9). Eigenvalue = 0 .080

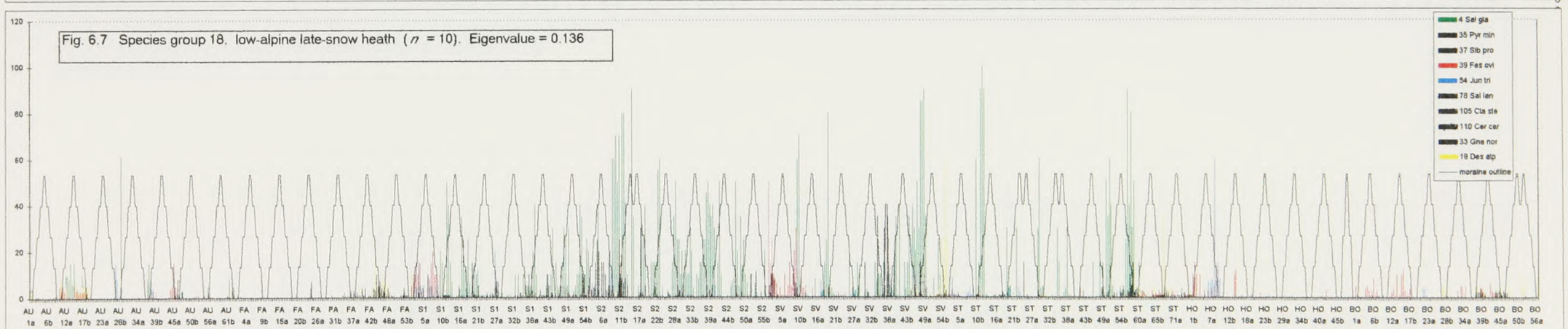
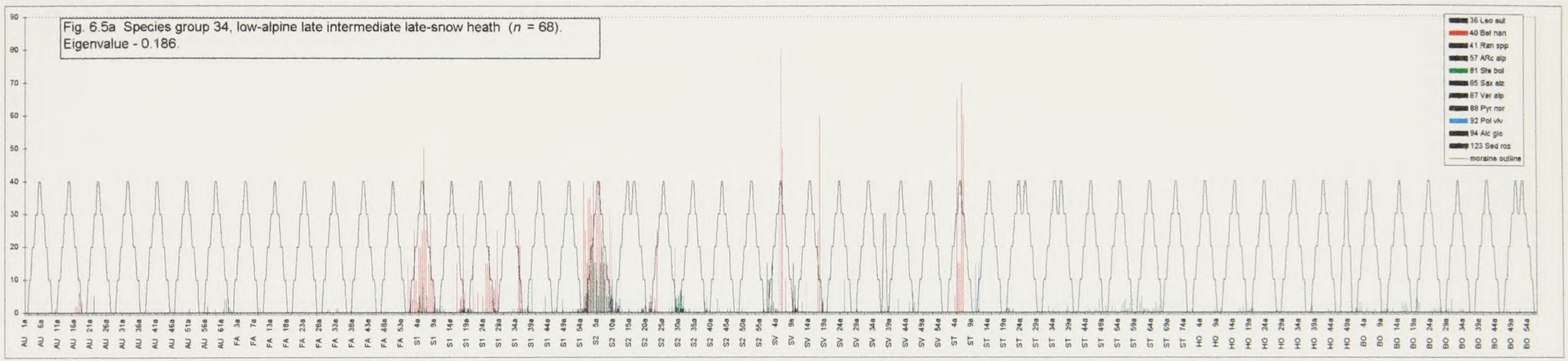


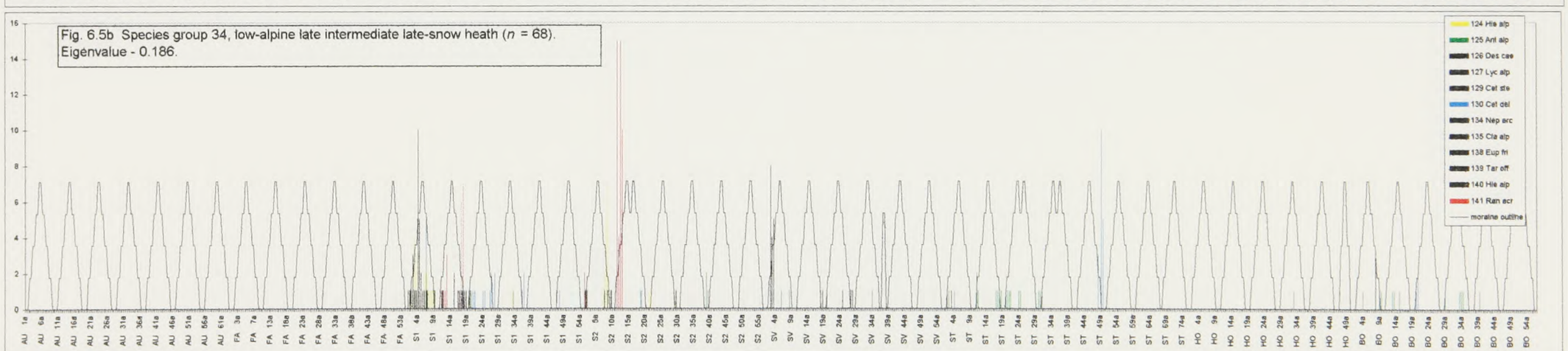
Fig. 6.7 Species group 18, low-alpine late-snow heath (n = 10). Eigenvalue = 0.136

Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in chapter 2)* .

% Cover

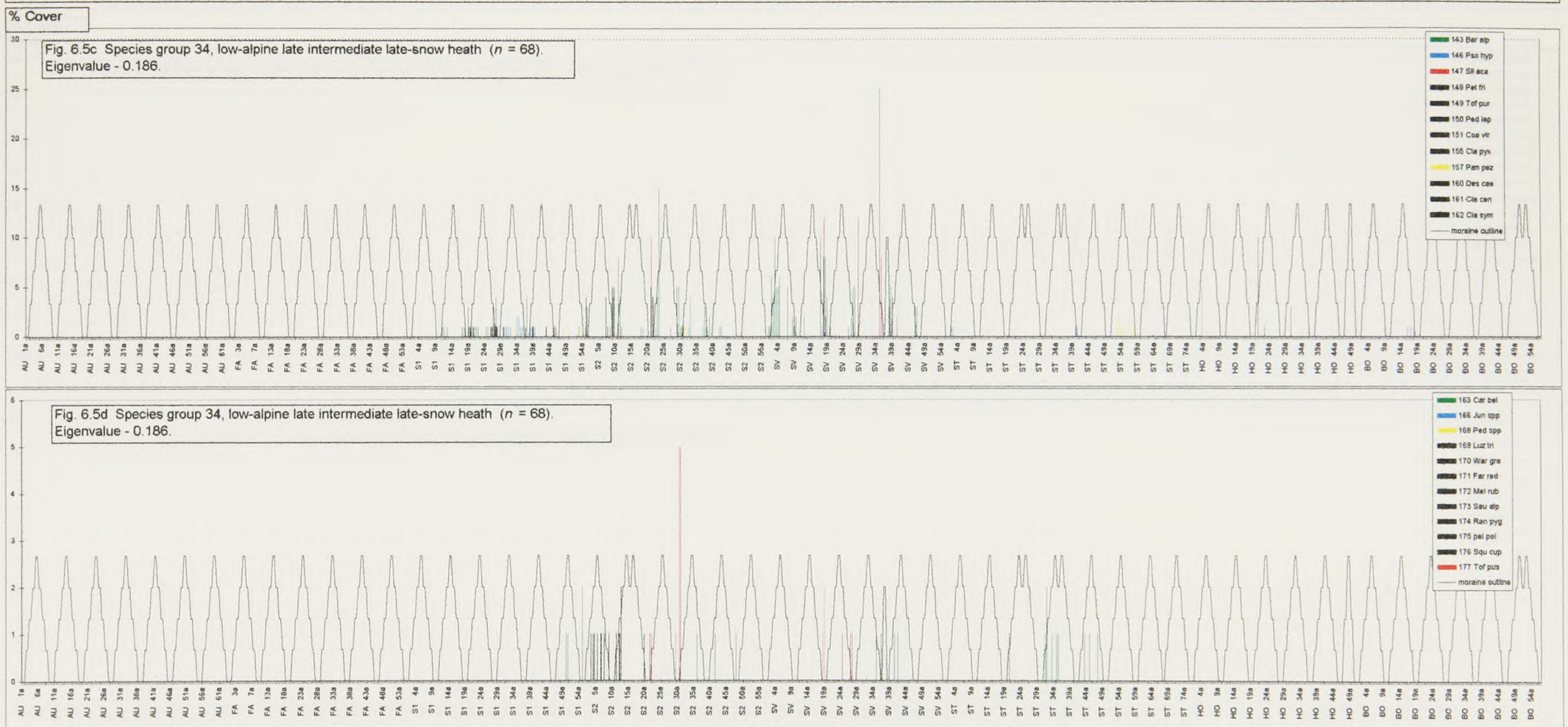




Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a","b" etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in chapter 2) .*



Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b" etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*

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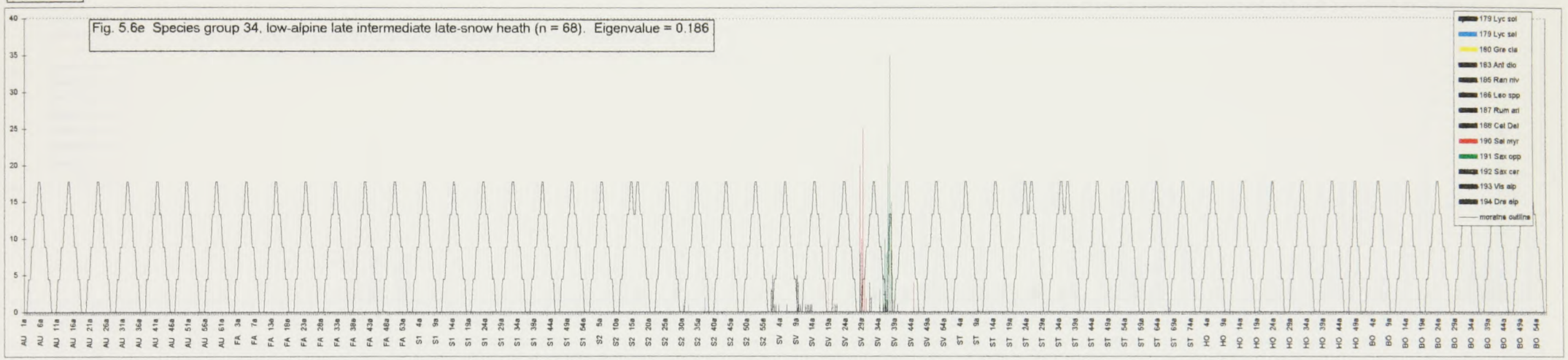
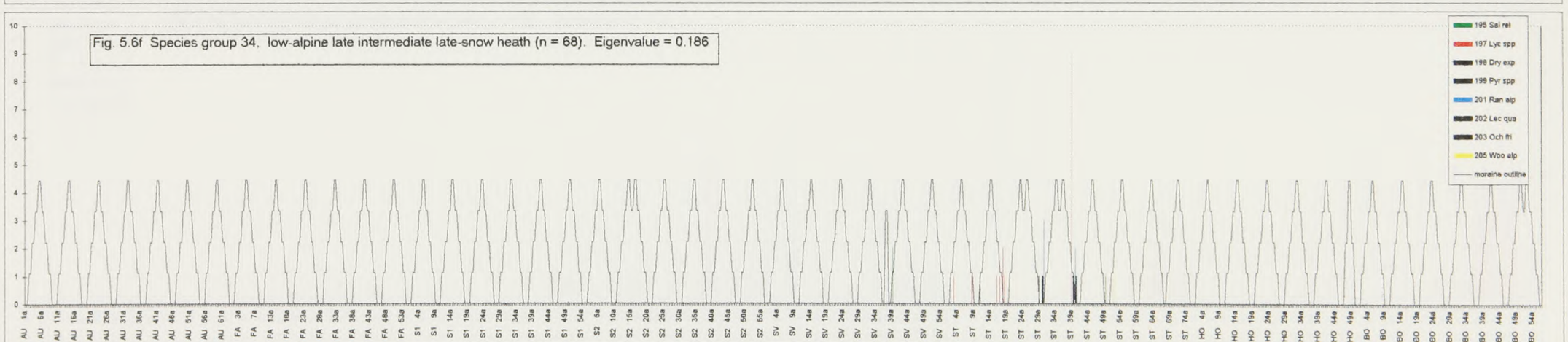




Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*

% Cover

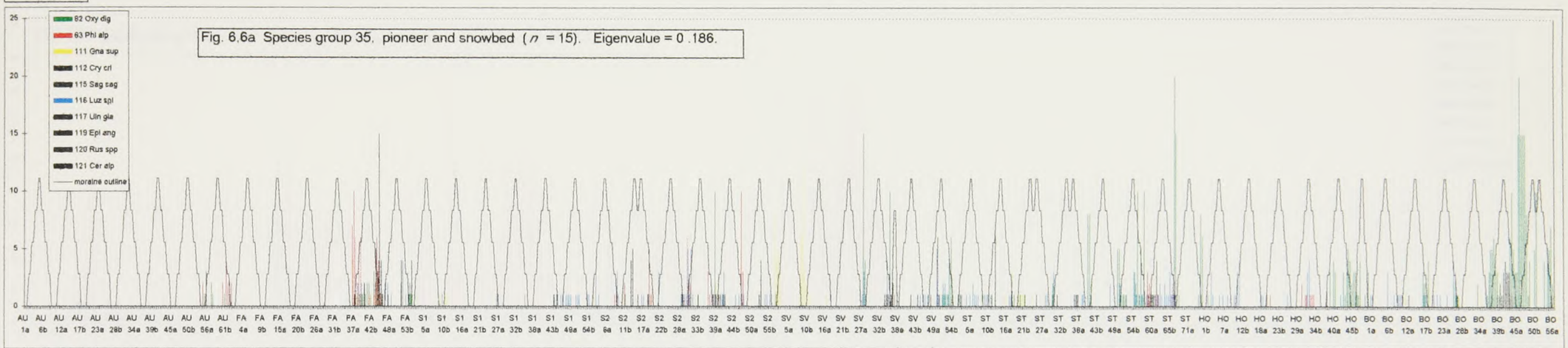


Fig. 6.6a Species group 35, pioneer and snowbed (n = 15). Eigenvalue = 0 .186.

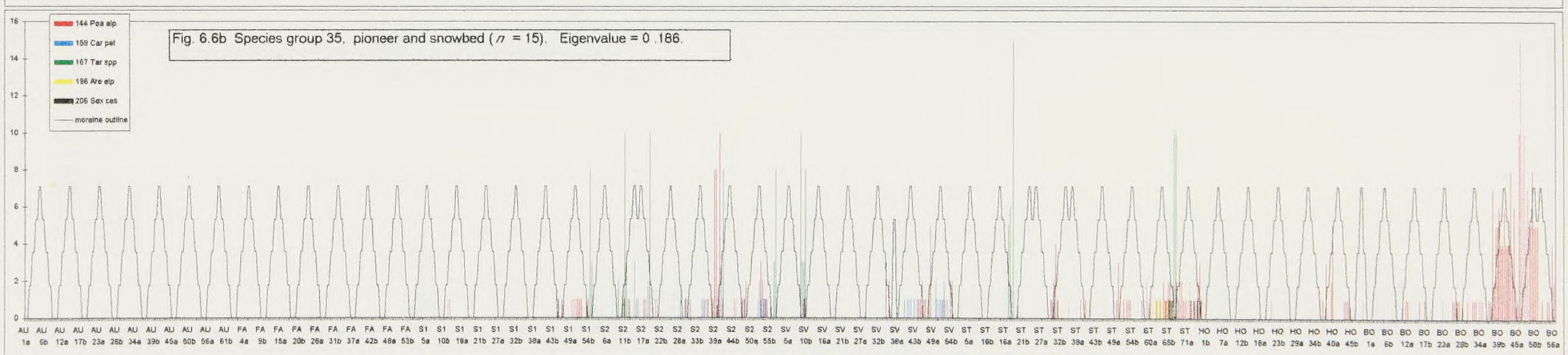
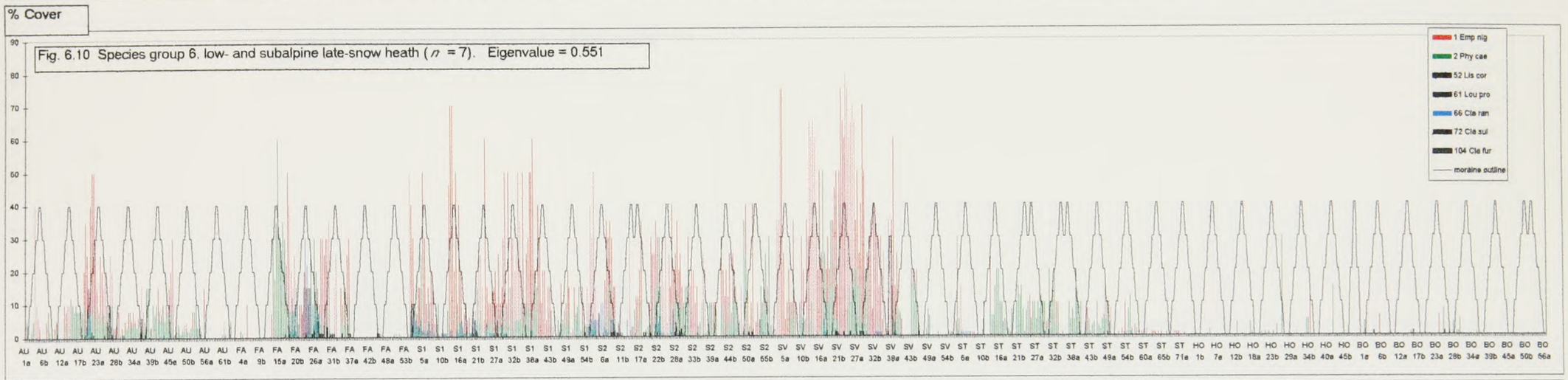


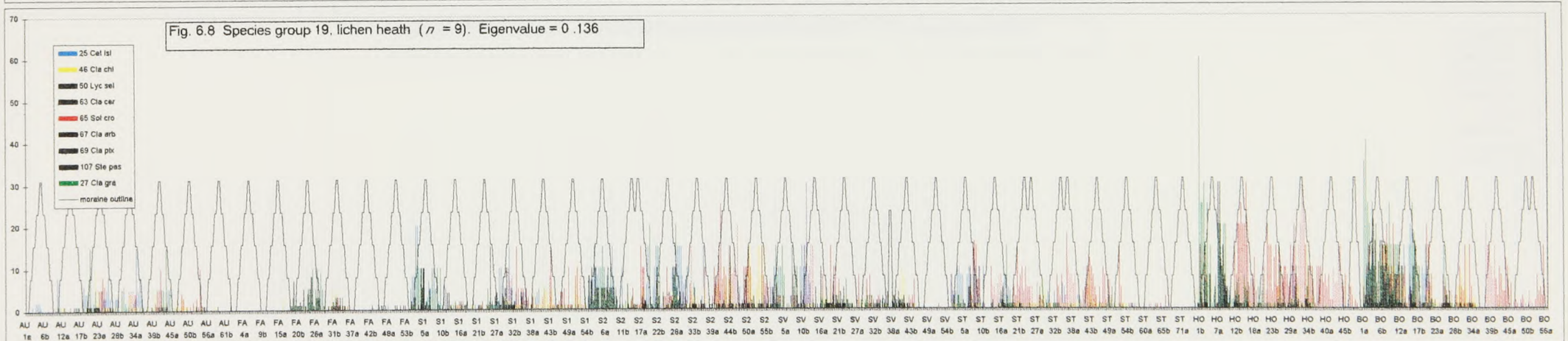
Fig. 6.6b Species group 35, pioneer and snowbed (n = 15). Eigenvalue = 0 .186.

Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

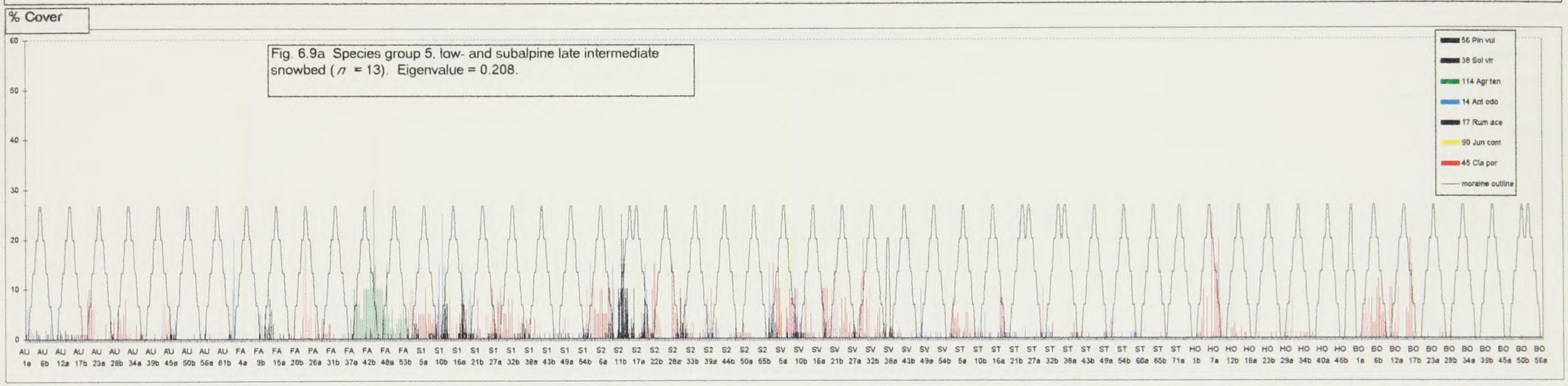
(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*

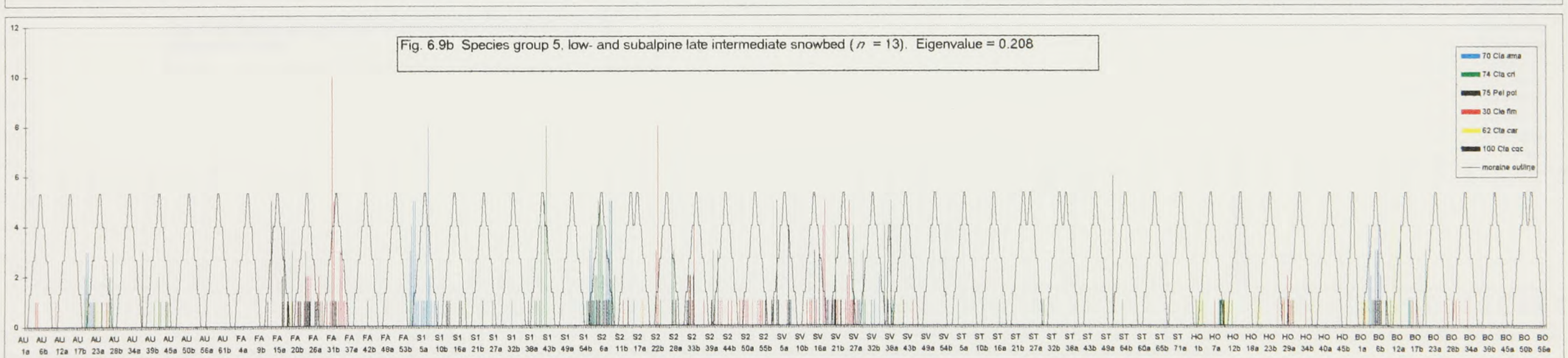




Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*





Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1).*

% cover

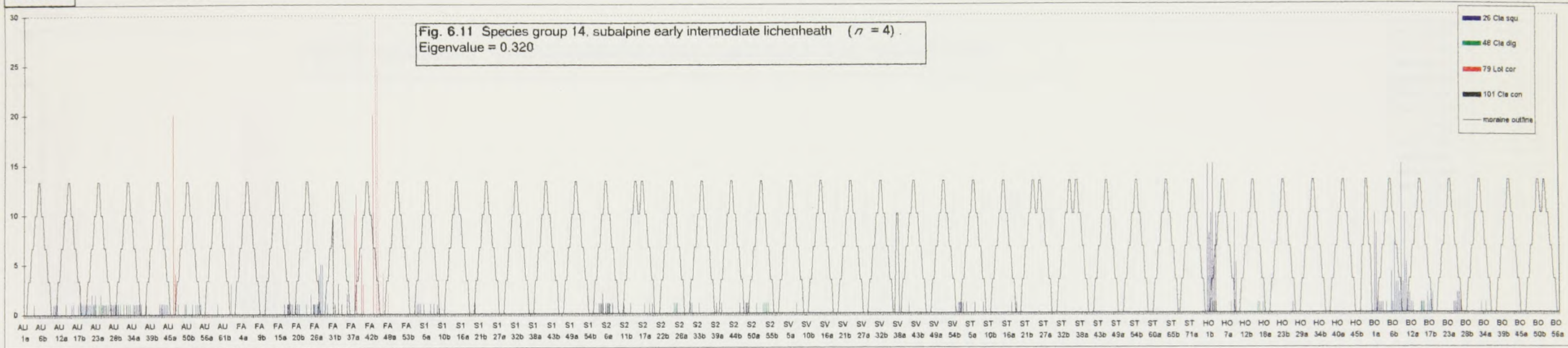


Fig. 6.11 Species group 14, subalpine early intermediate lichenheath (n = 4). Eigenvalue = 0.320

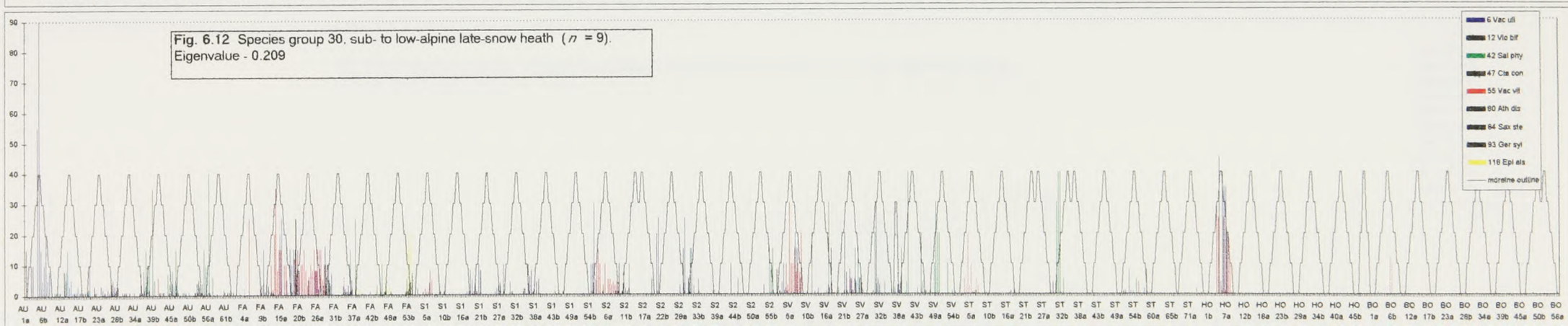
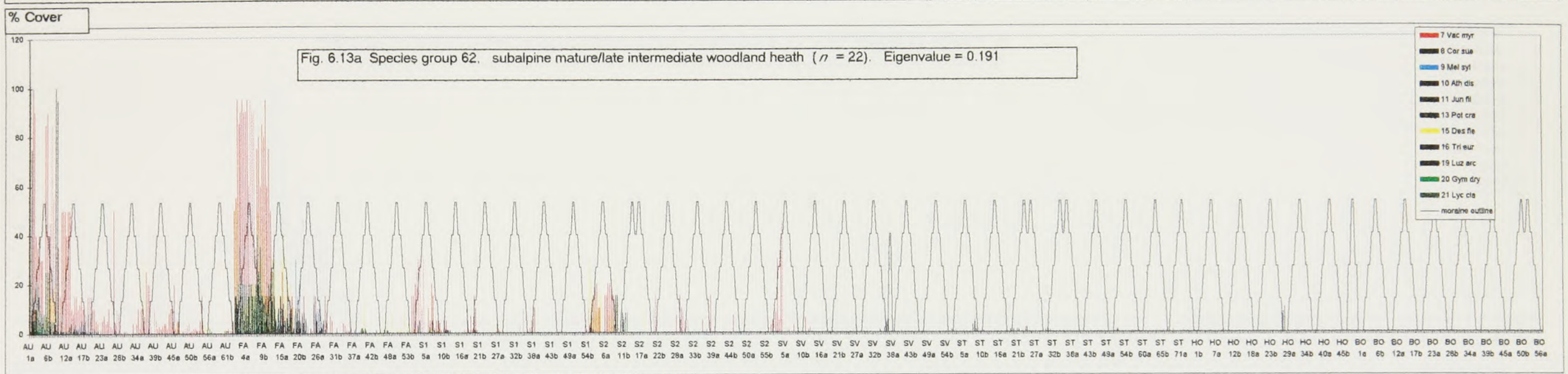
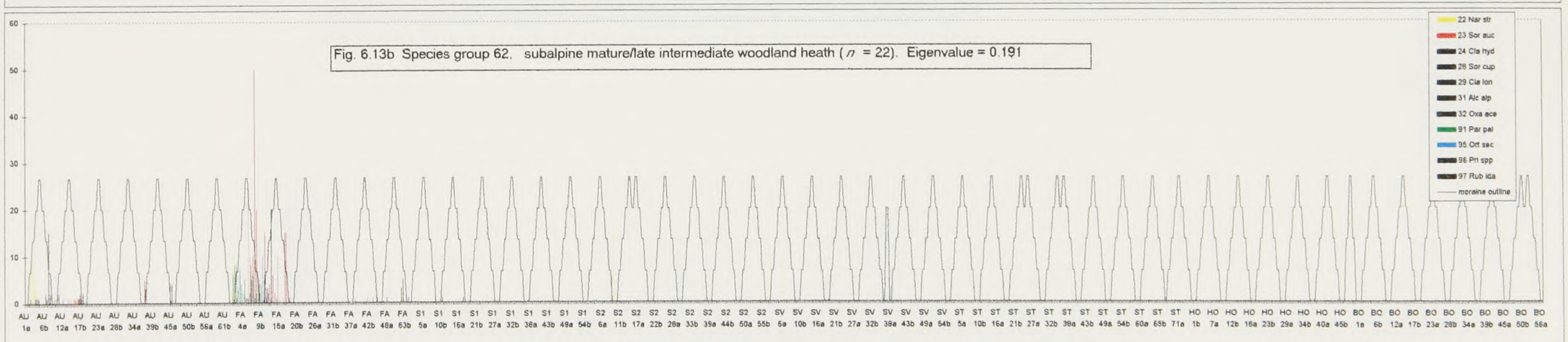


Fig. 6.12 Species group 30, sub- to low-alpine late-snow heath (n = 9). Eigenvalue - 0.209

Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position on selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*





Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

(Figs. 6.3 to 6.14) Distribution of TWINSPAN "final species groups" (combined foreland data set) in relation to microtopographical position selected forelands of different altitude, Jotunheimen and Jostedalsbreen, Norway. *(Species with a higher cover are represented by different colours and all lower cover species are represented by black - it is not possible to distinguish more than five colours on the graphs. A key of the species colour code is provided on each diagram and a list of full species names is given in Appendix 1) .*

% Cover

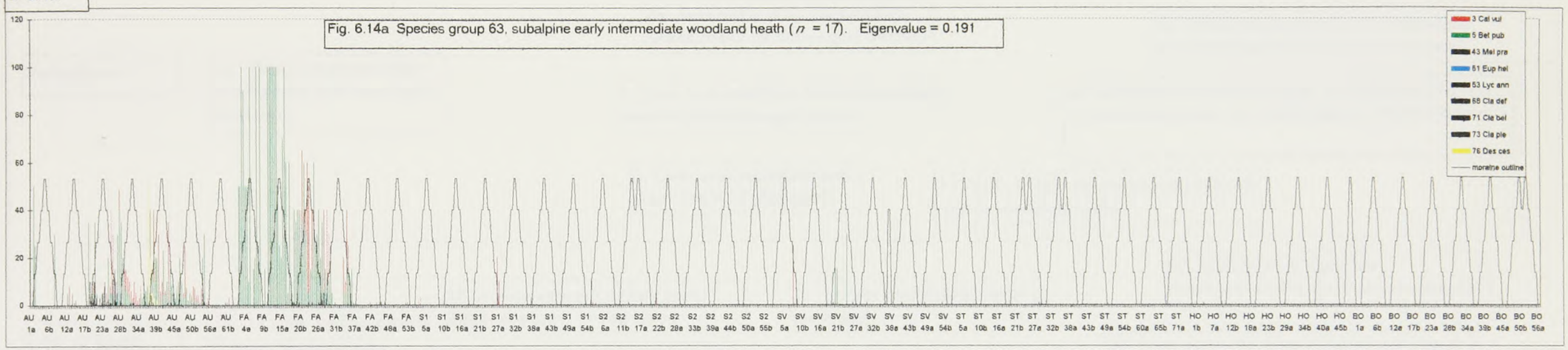


Fig. 6.14a Species group 63, subalpine early intermediate woodland heath (*n* = 17). Eigenvalue = 0.191

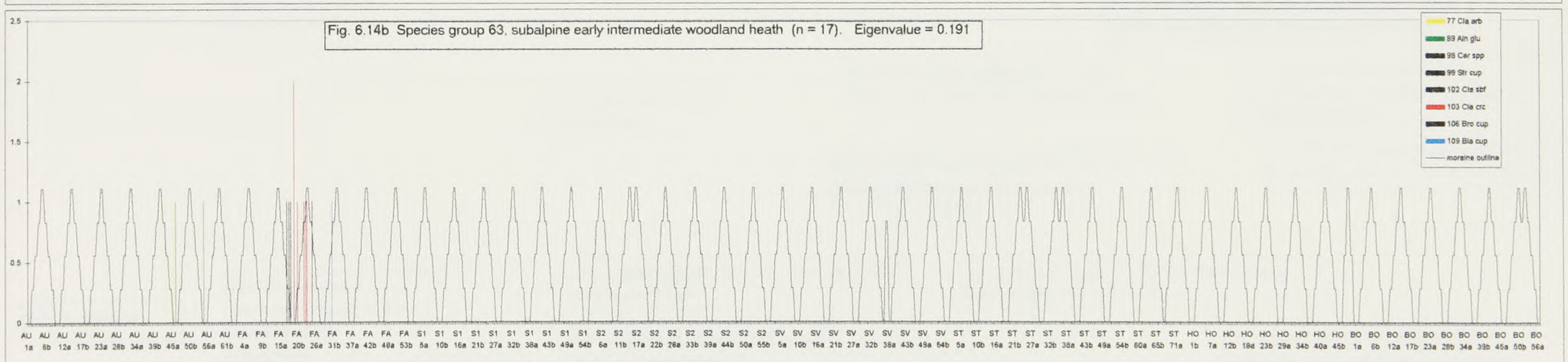
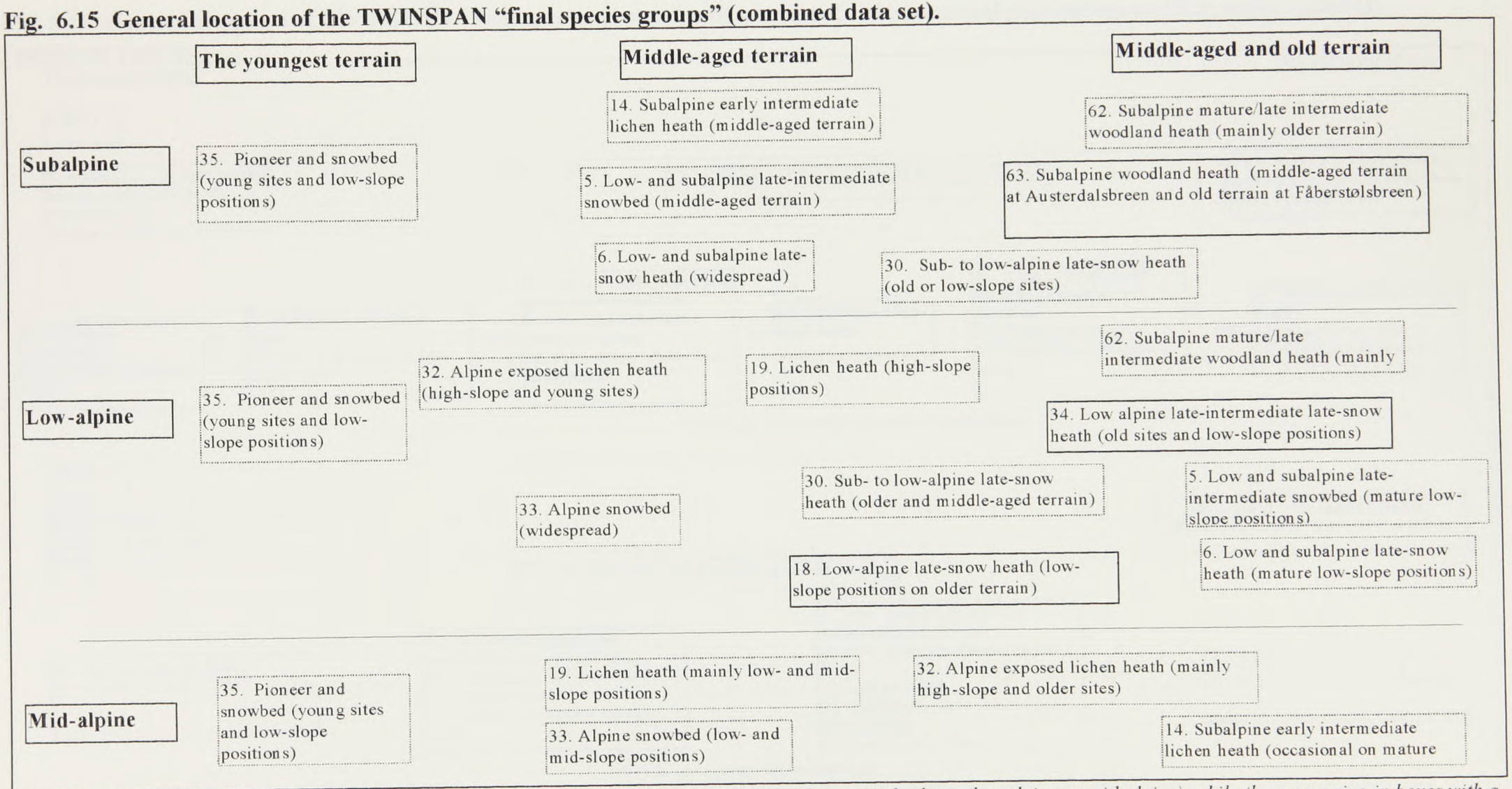


Fig. 6.14b Species group 63, subalpine early intermediate woodland heath (n = 17). Eigenvalue = 0.191

Sites across each of the moraines on each of the forelands. Each foreland is represented by the following symbols: **AU** - Austerdalsbreen; **FA** - Fåbergstølsbreen; **S1** - Storbreen low (1); **S2** - Storbreen low (2); **SV** - Svellnosbreen; **ST** - Storbreen high; **HO** - Høgvaglbreen; **BO** - Bøverbreen. The order of moraines follows, left to right, from oldest to youngest (on each foreland). The order of forelands follows, left to right, from lower altitude to higher altitude.

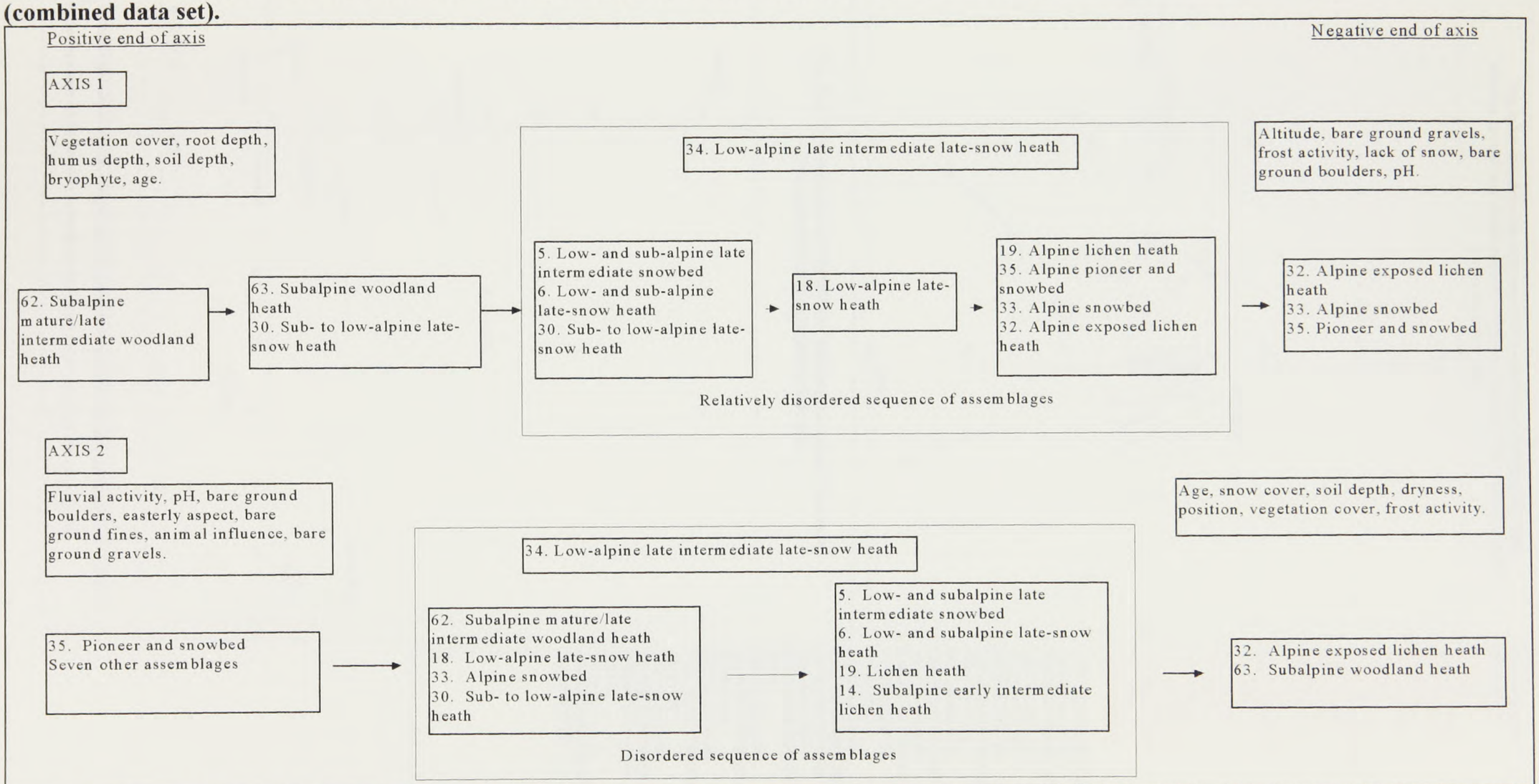
Note: Some TWINSPAN species groups have too many species to be put onto one diagram. In such cases the groups are split between several diagrams and are labled "a", "b", etc

Fig. 6.15 General location of the TWINSPAN "final species groups" (combined data set).



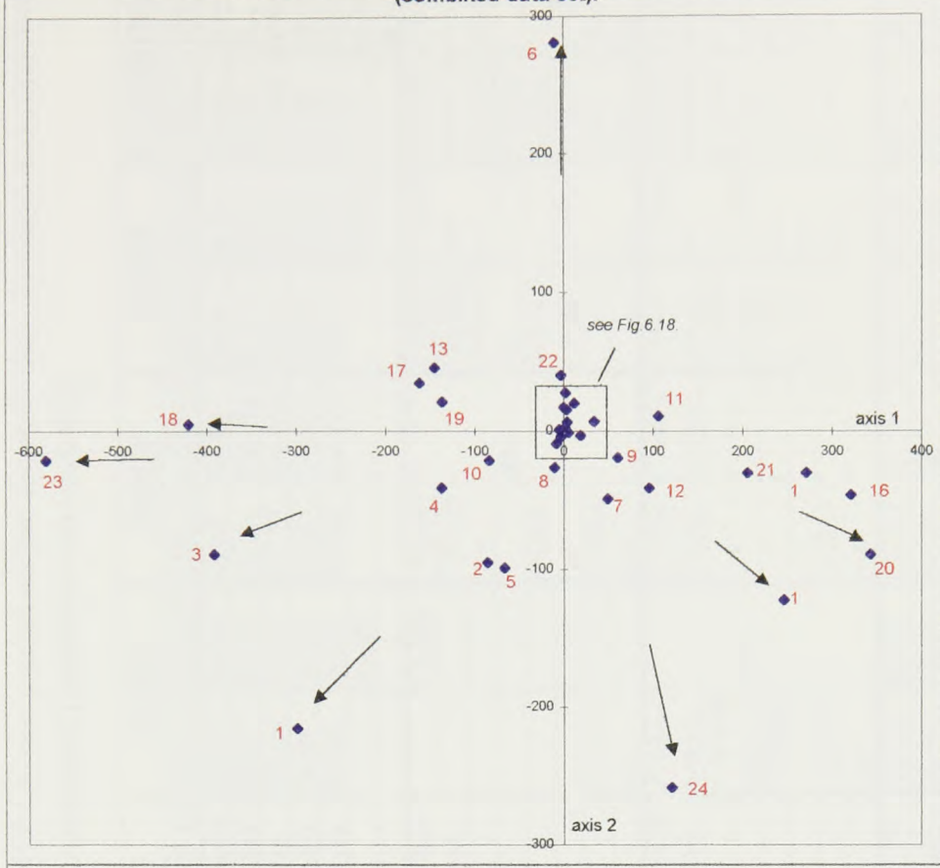
Note: Assemblages in the boxes with a dashed line occur on ground from at least two altitudinal zones (sub-alpine, low alpine or mid-alpine), while those occuring in boxes with a complete line occur in one altitudinal zone. The assemblages in this diagram are described in detail in section 6.5.

Fig. 6.16 General sequence of TWINSPAN "final species groups" and associated environmental parameters on DCA axes (1) and (2) (combined data set).



Note: The rank of "final species groups" on DCA axes (1) and (2) are described in detail in section 6.7.

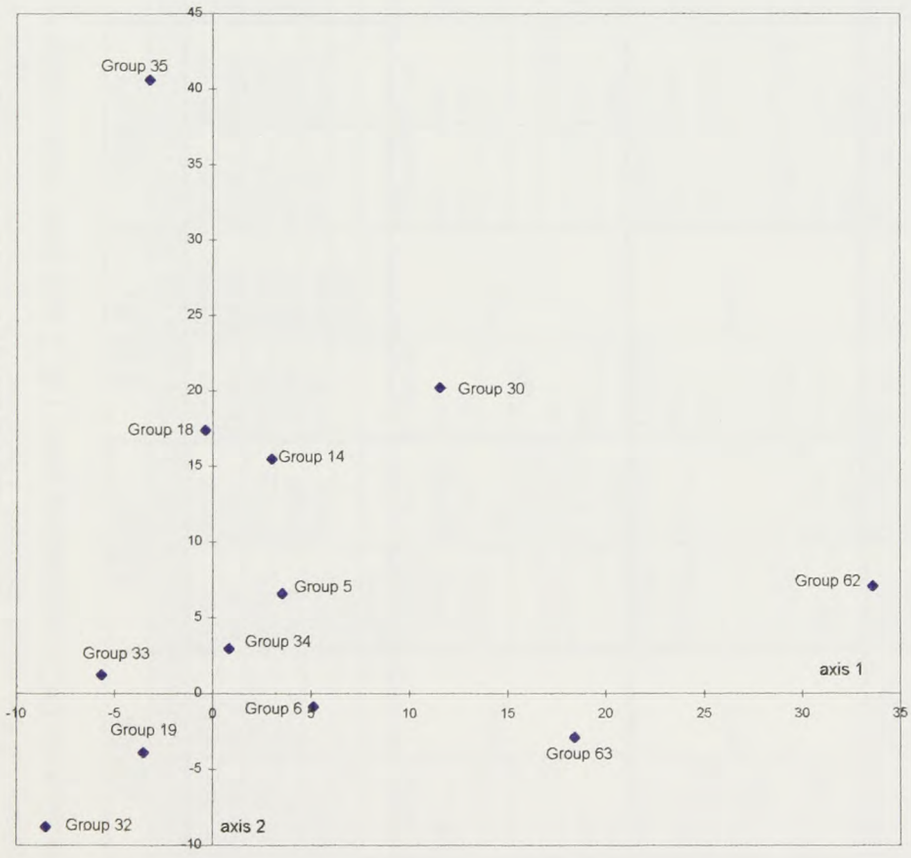
Fig. 6.17 Relationship between DCA centroids of TWINSPAN "final species group" and environmental biplot scores on DCA axes (1) and (2) (combined data set).



KEY:
Environmental parameters:
1 - snow lie
2 - position
3 - frost evidence
4 - dowel heave
5 - moisture
6 - fluvial activity
7 - slope
8 - solifluction
9 - aspect (northerly)
10 - trampling
11 - grazing
12 - soil texture
13 - pH
14 - humus depth
15 - soil depth
16 - root depth
17 - boulders
18 - gravels
19 - fines
20 - vegetation %
21 - bryophyte %
22 - aspect (east')
23 - altitude
24 - moraine age

"Final species groups":
species group 32 - (alpine exposed lichen heath)
species group 33 - (alpine snowbed)
species group 34 - (low-alpine late intermediate late-snow heath)
species group 35 - (pioneer and snowbed)
species group 18 - (low-alpine late-snow heath)
species group 19 - (lichen heath)
species group 5 - (low- and subalpine late-intermediate snowbed)
species group 6 - (low- and subalpine late-snow heath)
species group 14 - (subalpine early intermediate lichen heath)
species group 30 - (sub- and low-alpine late-snow heath)
species group 62 - (subalpine mature/late intermediate woodland heath))
species group 63 - (subalpine early intermediate woodland heath)

Fig. 6.18 DCA centroids of TWINSPAN "final species group" scores on DCA axes (1) and (2) (combined data set).



Note 1: The arrows emphasise the most influential environmental parameters on each axis and their point of origin is at 0.
Note 2: See Appendix 6.2 for the plot coordinates and section 6.7.3 for discussion of these diagrams.

Table 7.1 Summary of the most distinct TWINSPAN species assemblages and TWINSPAN site groups within the individual foreland and combined data sets: their distribution on DCA ordination axes 1 & 2 and their relationship to the environmental parameters on each axis.

Data set title	AUSF		FÅSF		STLF1		STLF2		SVLF		STHF		HØHF		BØHF		COMBINED	
Ordination axis	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)	AXIS (1)	AXIS (2)
Environmental	Roo dep	Alt tud	Flu via	Moi tre	Moi tre	Roo dep	Bar gra	Bar bou	Flu via	Hum dep	Flu via	Bar bou	Alt tud	Sta dep	Bar gra	Sno lie	Veg cov	Flu via
parameters at	Hum dep	Bar gra	Bar gra	Sno lie	Pos env	Bar bou	Fro hve	Bar gra	Hum dep	Age mor	pH* ***	Bar gra	Flu via	Hum dep	Flu via	Bar gra	Roo dep	pH
the positive end of	Age mor	pH* ***	Bar bou	Bar bou	Bar gra	Bar gra	Alt tud	Flu via	Sta dep	Sta dep	Tra mpl	Slo pe*	pH* ***	Roo dep	Bar fin	Bar fin	Hum dep	Bar bou
the DCA ordination	Sta dep	Flu via	Bar fin	Bar gra	Tra mpl	Bar fin	Moi tre	Alt tud	Bry cov	Roo dep	Bar fin	Fro hve	Bar gra	Veg cov	Dow els	Dow els	Sta dep	Asp eas
axes	Soi tex'		Dow els	Flu via	Sno lie	Asp ect	Sno lie	Bry cov	Tra mpl	Veg cov	Asp eas	Moi tre	Bar bou	Age mor	Sol flu	Slo pe*	Bry cov	Bar fin
			Fro hve			Slo pe*						Bry cov				Pos env	Age	Ani inf
			pH* ***															Bar gra
+ve end of axis	31. Mature heath		27. Pioneer 7. Pioneer snowbed	37. Early lichen hth 36. Early heath	31 Exposed lichen heath		16.Exposed lichen heath	30. Late lichen heath	7. Exposed pioneer 4. Pioneer snowbed	25. Mature snowbed		7. Pioneer	3. Pioneer 5. Widespr' heath		7. Pioneer 6. Snowbed 5. Widespr' heath	16. Exposed lichen heath	62. Mature /interm' *S-a* woodland	35. *M-L-S-a* pioneer /snowbed
Distinct TWINSPAN species groups on DCA ordination axes	68. Early interm' heath	NONE	11. Heath	27. Pioneer 11. Heath 21. Mature woodland	11. Early interm' heath	NONE		14. Mature lichen heath	43. Lichen heath		17. Lichen heath		8. Lichen heath 36. Mature heath	NONE	36. Early snowbed	17. mature late heath	63. Interm' *S-a* heath 32. *M-L-a* lichen heath	32. *M-L-a* lichen heath
-ve end of axis																		
+ve end of axis	7. Mature meadow		7. Exposed snowbed	21. Lichen heath	15. Exposed lichen heath		7. Exposed lichen heath	4. Late interm' snowbed	3. Pioneer snowbed	9. Atypical snowbed	15. Pioneer snowbed		6. Pioneer snowbed	11. Mature snowbed	7. Pioneer snowbed	4. Exposed lichen heath	Combined site groups not placed on DCA ordination axes - due to size of list	Combined site groups not placed on DCA ordination axes - due to size of list
Distinct TWINSPAN site groups on DCA ordination axes	10. Pioneer snowbed 47. Lichen heath 8. Exposed pioneer	NONE	11. Lichen heath	17. Birch woodland	10. Mature late-snow heath	NONE	11. Mature lichen heath	11. Mature lichen heath	8. Snowbed 22. Heath		14. Exposed pioneer 6. Snowbed 9. Lichen heath	NONE	4. Lichen heath		6. Exposed snowbed 10. Mature/ interm' lichen heath 11. Interm' snowbed			
-ve end of axis																		
Environmental	Bry cov	Age mor	Sta dep	Hum dep	Sta dep	Sol flu	Roo dep	Veg cov	Sno lie	pH* ***	Age mor	Sta dep	Age nor	pH* ***	Age mor	Sta dep	Alt tud	Age
parameters at the	Fro hve	Sta dep	Roo dep	Roo dep	Hum dep	Soi tex	Veg cov	Sol flu	Pos env	Bar gra	Pos env	Veg cov	Sno lie	Alt tud	Roo dep	Bry cov	Bar gra	Sno lie
negative end of the	Bar bou	Veg cov	Age mor	Age mor	Age mor	Fro hve	Hum dep	Pos env	Fro hve	Bar bou	Sno lie	Hum dep	Veg cov	Bar gra	Sta dep	Veg cov	Fro hve	Sta dep
DCA ordination	Bar gra	Pos env	Hum dep	Asp eas	Sol flu	Age	Soi tex	Sta dep	Moi tre	Asp ect	Soi tex	Roo dep	Pos env	Pos env	Hum dep	Hum dep	Sno lie	Moi tre
axes	Bar fin		Veg cov	Ani inf	Veg cov	Veg cov	Sta dep		Age mor	Fro hve	Moi tre	Age mor	Soi tex	Sno lie	Sno lie	Roo dep	Bar bou	Pos env
	Sno lie						Age mor							Dow els	Veg cov	Age mor	pH	Veg cov

Notes: 1. Abbreviations used for the glacier forelands and environmental parameters are listed, and described, in Appendix 2 and 3. Other abbreviations used in this table are: interm' - intermediate-aged terrain; widespr' - widespread distribution; hth - heath; S-a, L-a, M-a - subalpine, low alpine and mid-alpine (combined data set only)

2. The most distinct species groups (combined and individual foreland data sets) were found by referring to the eigenvalues and the rank diagrams. The site groups of the individual foreland data sets were found by referring to both the eigenvalues and the rank diagrams, but the combined data set was not used as the list was too long and cumbersome.

Fig. 7.1 Summary of altitudinal controls on microenvironmental parameters.

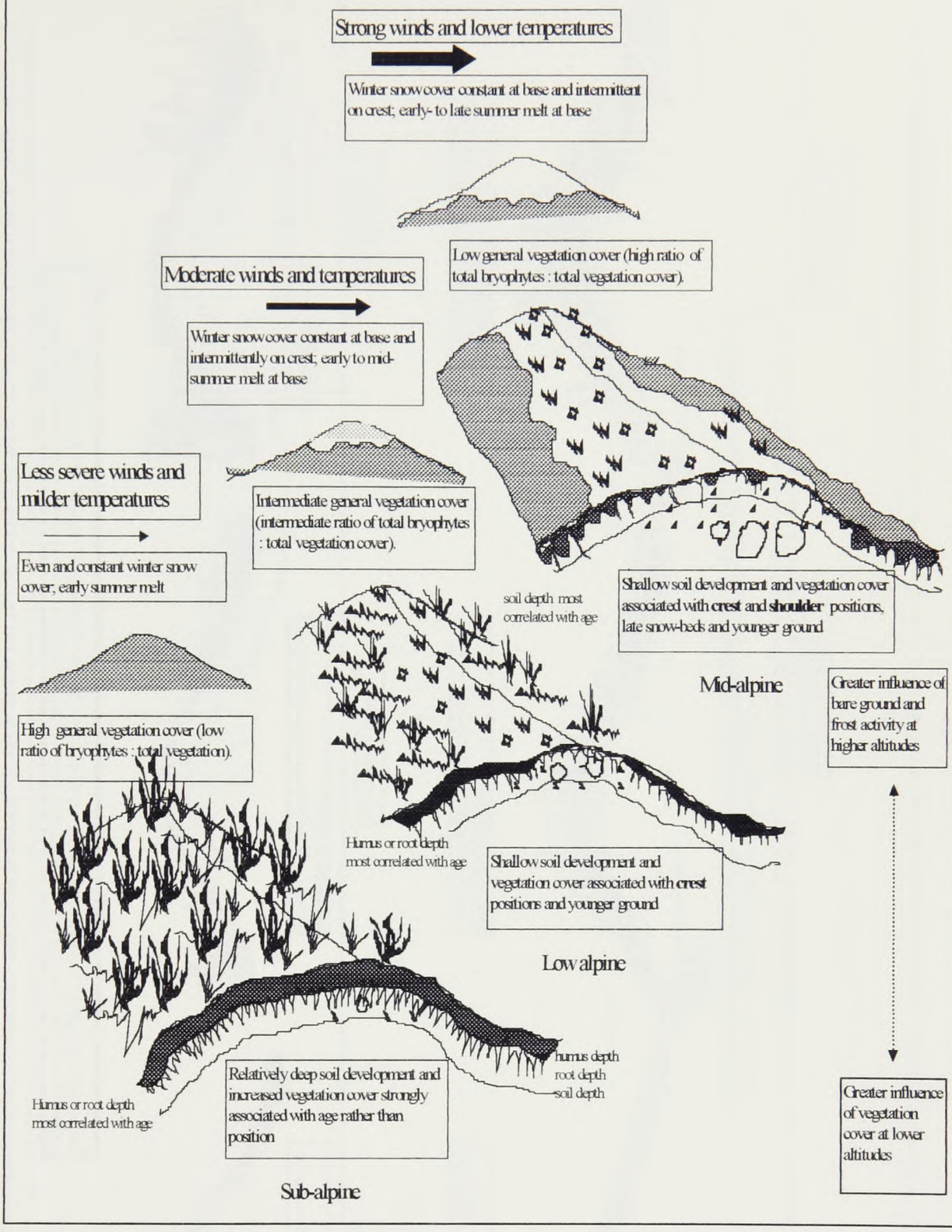


Fig. 7.2 Summary of the relationship between microtopography and time on DCA axes (1) and (2) for the combined data set.

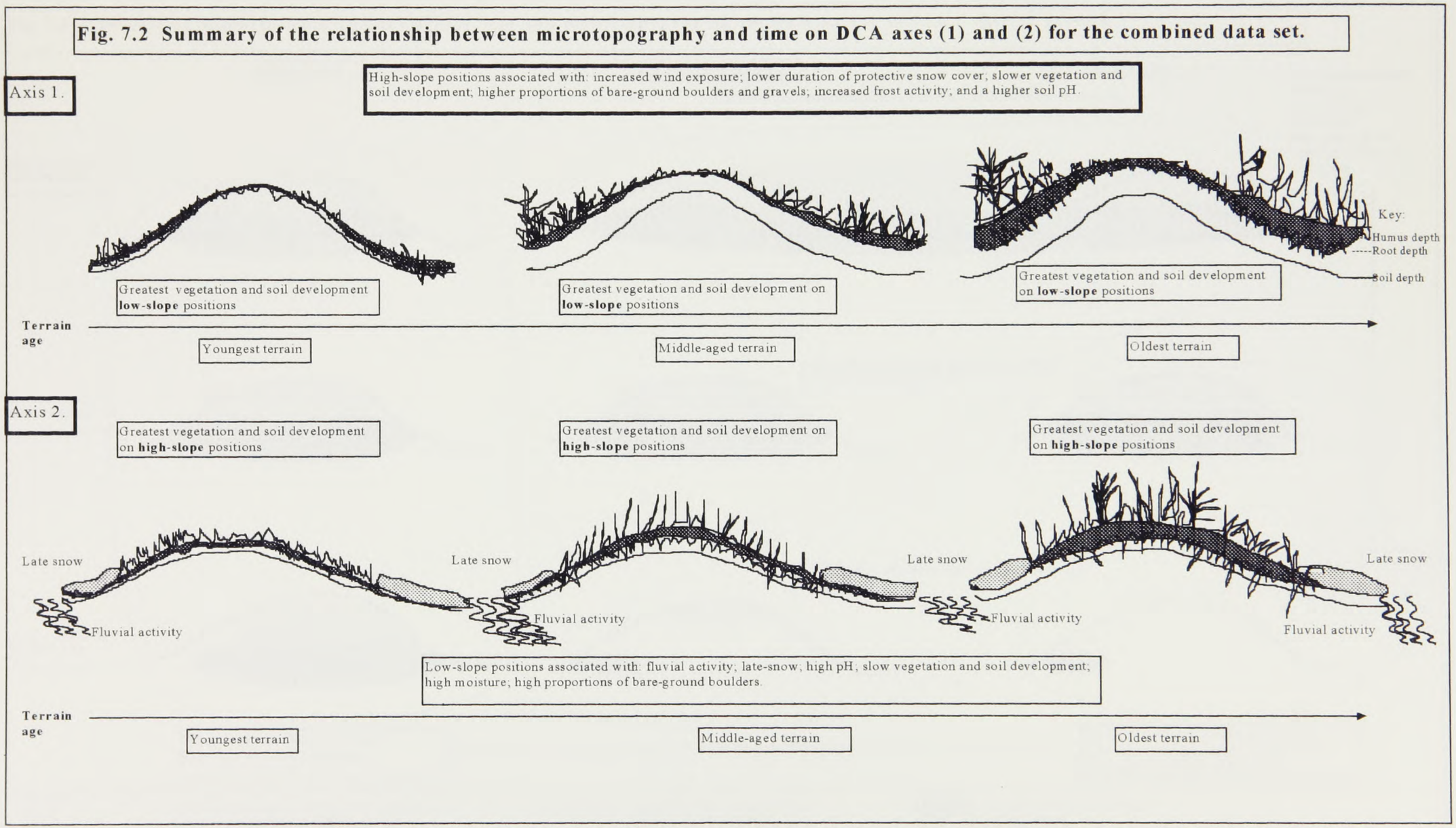


Fig 7.3 Generalised relationship between altitude, age and microtopographic controls on TWINSPAN species groups.