

Form 0 Target region

Comments on vegetation boundary lines³⁾

Country code ¹⁾		Date	Researcher(s)
Target region code ¹⁾			

Altitude of major vegetation boundary lines (in metres)

Potential natural forestline ²⁾		Potential natural treeline ²⁾		Alpine-nival ecotone ²⁾	
Current forestline ²⁾		Current treeline ²⁾			

Predominant bedrock material and approximate soil pH at the summit sites of the target region ⁴⁾	Short description of the target region, particularly regarding land use history and the current land use situation ⁵⁾
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SUMMITS	Summit code ¹⁾	Summit name	Altitude (m a.s.l.)	Vegetation zone or ecotone ⁶⁾	Comments on the summit situation ⁷⁾
LOW					
↑ Altitude					
↓ HIGH					

Notes

1) See Box 6.1 for coding. **2)** Enter the approximative metres above sea level (m a.s.l.) for each vegetation boundary line which indicates its average altitude in the *target region*; the forestline (or timberline) is defined as the line where closed forests end; the treeline is defined as the line where groups of trees taller than 3m end; the alpine-nival ecotone is the transition zone between the upper alpine belt and the nival belt - make an estimation of the altitude of the upper boundary line of the alpine zone, where closed vegetation ends (this line may coincide with the permafrost limit in many mountain regions). **3)** Where required make comments on the indicated altitudinal positions of boundary lines; e.g. deviations from the average altitude; mention if a boundary line does not exist in the *target region* and comment on the reasons for its absence. **4)** Bedrock material of the summit sites of the target region, which should be consistent throughout the four summits (consistent regarding the influence of the bedrock on the species composition); in addition, make a rough estimate on the average soil pH (e.g. acid: <4.5, intermediate: 4.5-6.5, neutral/alkaline: >6.5). **5)** If the situation is not pristine or natural, indicate what kind of land use have or had an impact on the present vegetation. **6)** Only the following entries are possible: treeline ecotone, lower alpine, lower/upper alpine ecotone, upper alpine, alpine-nival ecotone, nival. **7)** Make comments on the situation of the particular summit if vegetation zone or ecotone is not properly applicable and describe the deviations. Further comment on any other pronounced deviation from an 'ideal' standard summit situation (compare chapter 2.2 in the field manual).

Use extra blank sheets, if necessary - indicate the number of extra sheets in this box (e.g. 1 of 2, 2 of 2 etc...)

Form 1 Measurement protocol

Country code ¹⁾		Date		Highest summit point (HSP)³⁾	Altitude (m)	Geographic co-ordinates (deg/min/sec)
Target region code ¹⁾		Researcher(s)		Photo check ⁸⁾ <input type="checkbox"/>		long.
Summit code ¹⁾						lat.
Summit name ²⁾				Magnetic declination (°) for compass measurements ⁴⁾		

QUADRAT CLUSTERS & 10-m POINTS

	Point number ⁵⁾	Distance (m) ⁶⁾	Compass direction (°) ⁷⁾	Photo check ⁸⁾	
NORTH	p5m-N11	<input type="checkbox"/>		<input type="checkbox"/> quadrat N11	<input type="checkbox"/> 3m×3m grid cluster overview
	p5m-N31	<input type="checkbox"/>		<input type="checkbox"/> quadrat N31	
	p-N33			<input type="checkbox"/> quadrat N33	
	p-N13			<input type="checkbox"/> quadrat N13	
	p10m-N			<input type="checkbox"/> 10-m-point	
EAST	p5m-E11	<input type="checkbox"/>		<input type="checkbox"/> quadrat E11	<input type="checkbox"/> 3m×3m grid cluster overview
	p5m-E31	<input type="checkbox"/>		<input type="checkbox"/> quadrat E31	
	p-E33			<input type="checkbox"/> quadrat E33	
	p-E13			<input type="checkbox"/> quadrat E13	
	p10m-E			<input type="checkbox"/> 10-m-point	
SOUTH	p5m-S11	<input type="checkbox"/>		<input type="checkbox"/> quadrat S11	<input type="checkbox"/> 3m×3m grid cluster overview
	p5m-S31	<input type="checkbox"/>		<input type="checkbox"/> quadrat S31	
	p-S33			<input type="checkbox"/> quadrat S33	
	p-S13			<input type="checkbox"/> quadrat S13	
	p10m-S			<input type="checkbox"/> 10-m-point	
WEST	p5m-W11	<input type="checkbox"/>		<input type="checkbox"/> quadrat W11	<input type="checkbox"/> 3m×3m grid cluster overview
	p5m-W31	<input type="checkbox"/>		<input type="checkbox"/> quadrat W31	
	p-W33			<input type="checkbox"/> quadrat W33	
	p-W13			<input type="checkbox"/> quadrat W13	
	p10m-W			<input type="checkbox"/> 10-m-point	

INTERSECTION LINES

Point num.	Dist. (m) ⁶⁾	Comp. dir. (°) ⁷⁾	Photo check ⁸⁾	Point num.	Dist. (m) ⁶⁾	Comp. dir. (°) ⁷⁾	Photo check ⁸⁾
pNE-5			<input type="checkbox"/>	pSW-5			<input type="checkbox"/>
pNE-10			<input type="checkbox"/>	pSW-10			<input type="checkbox"/>
pSE-5			<input type="checkbox"/>	pNW-5			<input type="checkbox"/>
pSE-10			<input type="checkbox"/>	pNW-10			<input type="checkbox"/>

COMMENTS

Use extra blank sheets for further remarks, if necessary.

Indicate the number of extra sheets in this box

Entire summit
Photo check⁸⁾

Notes

- See Box 6.1 for coding.
- Full name of the summit (from topographic maps or a working name where no official name is available).
- The highest summit point is the culmination point +/- in the middle of the summit area (rocky outcrops which may be higher but are not centred in the summit area should be ignored).
- The angle (with its correct sign) between the direction of the geographic North Pole and of the magnetic North Pole (e.g. -6 for a magnetic declination of 6° W; +10 for 10° E; see Box 3.1).
- Mark those checkbox where the respective point lies on the principal measurement line (e.g., p5m-N11 or p5m-N31, both are not possible; compare Fig. 3.2).
- The length of a straight surface line between the HSP and the measurement point (in metres, with two decimal places); keep the measurement tape tightened for all distance measurements (see Box 3.3).
- The compass direction from the HSP to the measurement point in degrees (360° scale; see Box 3.1). Please note: always write the magnetic compass directions (i.e. degrees as indicated on the compass).
- Photo check: check the box after photos are taken to make sure that the photo documentation is complete (see under 4.4 for details).

Form 2 1-m² quadrat

AMENDED 20180705

Country code ¹⁾		Date	Aspect ²⁾
Target region code ¹⁾		Recording time from to	
Summit code ¹⁾		Researcher(s)	Slope (°) ³⁾
Quadrat code ¹⁾			

Top cover of surface types (%)⁴⁾

		Pointing hits ⁹⁾	Total hits ¹⁰⁾
Vascular plants			
Solid rock			
Scree			
Lichens on soil not covered by vascular plants			
Bryophytes on soil not covered by vascular plants			
Bare ground			
Litter			
	100%		

Subtypes in % of the top cover type⁵⁾

Lichens below vasc. pl.		Bryoph. below vasc. pl.	
Lichens on solid rock		Bryophytes on solid rock	
Lichens on scree		Bryophytes on scree	

General comments on the quadrat

Plant species cover (%)⁶⁾

Species	cf. ⁷⁾	%-cover ⁶⁾	Pointing hits ⁹⁾	Total hits ¹⁰⁾	add. ¹¹⁾
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

	Cover sum ⁸⁾
Total number of vascular plant species	

If you have used extra sheets, indicate their number (e.g. 1 of 2, 2 of 2 etc...)

See back page for footnotes

NOTES: FORM 2 1-m² QUADRAT

- 1 See [Box 6.1](#) for coding.
- 2 Average aspect of the quadrat surface (N, NE, E, SE, S, SW, W, or NW).
- 3 Average slope angle of the quadrat surface (in degrees, 360° scale).
- 4 The vertical projection of cover (perpendicular to the slope angle), all types together add up to 100% (for definitions of surface types see under 4.1.1). Top cover of surface types is surveyed by visual estimation as well as through pointing.
- 5 The top cover of subtypes is estimated as percentage of the respective top cover surface type (see under 4.1.1).
- 6 Percentage cover of each species, surveyed by visual estimation (see chapter 4.1.1); avoid indications such as less than (<) or more than (>); all vascular plants must be recorded; lichens and bryophyte species are optional (see [Box 4.2](#)); indicate species either by using species names or by (provisional) codes.
- 7 Use the cf. column if the identification of the taxon is doubtful (use g if this is the case for the genus level, s for the species level, t for a lower taxonomic level); make a specifying comment in such cases.
- 8 Check the cover sum (the cover of all species together) against the top cover surface type "vascular plants": the cover sum of all vascular plant species can be higher but not lower than the top cover of vascular plants surface type - the cover sum can be more than 100 % in dense vegetation due to overlapping layers (see under 4.1.1).
- 9 Use a grid frame of 1 m × 1 m inner width with 100 crosshair points (see [Fig. 4.2](#)) and a pin/knitting needle of 2 mm diameter for point recording at 100 points. Always conduct pointing after you have completed visual cover estimation. Where you hit with your pin a surface without vascular plants, make a stroke at the respective surface type. Where you hit vascular plants, make a stroke at the respective species - record all vascular plant species that you hit at a point, i.e. also species at the lower vegetation layers are considered (but do not make a stroke for a surface type that lies below a vascular plant).
- 10 Enter the sum of all strokes of the tally.
- 11 This concerns only species which were previously not found during the visual species cover sampling: Enter "P" if species was detected only through pointing and "F" if species was only found through the optional method of subplot-frequency counts.

Form 3 Summit area section (SAS)

Codes of¹⁾

Country	
Target region	
Summit	
SAS	
Date	
Time from	to

Researcher(s)
Comments on grazing impacts ³⁾

Top cover of surface types (%)²⁾

Vascular plants	
Solid rock	
Scree	
Lichens (excl. epilithic)	
Bryophytes	
Bare ground	
Litter	
SUM	100%

Species ⁴⁾	cf. ⁵⁾	Abundance ⁶⁾	add. ⁷⁾	%-Cover ⁸⁾ (optional)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Species ⁴⁾	cf. ⁵⁾	Abundance ⁶⁾	add. ⁷⁾	%-Cover ⁸⁾ (optional)
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Comments on species recording

Total number of vascular plant species in this *summit area section*

See back page for footnotes

If you have used extrasheets, indicate their number (e.g. 1 of 3, 2 of 3, etc.)

NOTES: FORM 3 SUMMIT AREA SECTION (SAS)

1 See [Box 6.1](#) for coding; for summit area sections (SAS), e.g. N05, N10, E05.

2 Visual cover estimation of the surface types (top cover) within the summit area section, indicated as percentage value; see chapter 4.2.

3 Comment on impacts of grazing such as faeces, browsing damage, trampling; see [Box 4.6](#).

4 Entering all vascular plant species is **obligatory**; lichens and bryophyte species are **optional** (see [Box 4.2](#)); indicate species either by using species names or by (provisional) codes.

5 Use the cf. column if the identification of the taxon is doubtful (use **g** if this is the case for the genus level, **s** for the species level, **t** for a lower taxonomic level); make a specifying comment in such cases.

6 Indicate the abundance of species in five qualitative abundance categories (obligatory):

r! (very rare): one or a few small individuals.

r (rare): some individuals at several locations, can hardly be overlooked in a careful observation.

s (scattered): widespread within the section; the species cannot be overlooked but its presence is not obvious at first glance (not necessarily an evenly dispersed distribution over the entire summit area section).

c (common): occurring frequently and widespread within the section – presence is obvious at first glance (cover is less than 50%).

d (dominant): very abundant, making up a high portion of the phytomass, often forming more or less patchy or dense vegetation layers; species covers more than 50% of the area of the SAS (this is the only abundance class which is entirely related to cover).

7 Only for 5m-SAS: Indicate with X if species was not found during the survey of the SAS, but added after cross-check with species-list from 1m²-quadrats located in the same section

8 Only optional (as an additional record): Percentage cover estimation for each species; avoid indications such as: less than (<) or more than (>). Percentage cover may either be surveyed by direct visual cover estimation or by point-line intercepts (for the more common species) and recording of area cover (i.e. the exact area size, such as m², dm², etc.; for the rarer species) which can be converted into percentage cover later on (PAF method; see chapter 5.5.2).

Form 4 Temperature loggers

Country code ¹⁾		Summit code ¹⁾	
Target region code ¹⁾		Full summit name	

First installation

Quadrat code ¹⁾	Logger serial ²⁾	Logger type ³⁾	Start date	Start time ⁴⁾ (local time)	UTC diff. ⁵⁾	Dist-11 ⁶⁾	Dist-31 ⁷⁾	Photo check open ⁸⁾	Photo check closed ⁸⁾	Researcher(s)	Comments
								<input type="checkbox"/>	<input type="checkbox"/>		
								<input type="checkbox"/>	<input type="checkbox"/>		
								<input type="checkbox"/>	<input type="checkbox"/>		
								<input type="checkbox"/>	<input type="checkbox"/>		

Data read-out

Quadrat code ¹⁾	Logger serial ²⁾	Logger type ³⁾	Stop date	Stop time ⁹⁾ (local time)	Researcher(s)	Comments ¹⁰⁾	De-installation needed ¹¹⁾					
							New logger serial ¹²⁾	Logger type ³⁾	Start date	Start time ⁴⁾ (local time)	Photo check open ⁸⁾	Photo check closed ⁸⁾
											<input type="checkbox"/>	<input type="checkbox"/>
											<input type="checkbox"/>	<input type="checkbox"/>
											<input type="checkbox"/>	<input type="checkbox"/>
											<input type="checkbox"/>	<input type="checkbox"/>

1) See Box 6.1 for coding. **2)** The logger serial number is usually indicated somewhere on the logger and is the reference number for identifying a logger when launching and reading out the data. **3)** Indicate the logger type, e.g. GeoPrecision, TidBit or TinyTag. **4)** Indicate the time after finishing the installation of each logger in the field (use your local time). **5)** Indicate the time difference, i.e. the number of hours to be added or subtracted from your local time to the UTC/GCT (Coordinated Universal Time/Greenwich Mean Time); for example, if the local time is 14:00 and UTC 12:00, the value to be entered is -2. **6)** Distance (in m with two decimal places) from the logger to the left lower cluster corner (e.g. p5m-S11; see Fig. 4.5). **7)** Distance (in m with two decimal places) from the logger to the right lower cluster corner (e.g. p5m-S31; see Fig. 4.5). **8)** Photo check: Check the box after photos are taken to be sure that the photo documentation is complete (documentation of the logger position with the hole open and documentation after the hole is closed with substrate material; see Fig. 4.5). **9)** Indicate the time of data read-out (use your local time). In cases where de-installation is necessary indicate the time before digging out the logger. **10)** Comment on logger failure and de-installations; in any case when you de-install the logger, indicate **DR** for data read-out (e.g. in the case of TidBit loggers), **BC** for battery change, or **LC** for logger change. **11)** Only to be filled out when you de-install the logger. **12)** Indicate the new logger serial number. In cases of installing the same logger (battery change or TidBit data read-out), indicate "ident" for identical logger.

Form 5-S Subplot-frequency counts in the 1-m² quadrat

Codes of ¹⁾	Country	Target Region	Summit	Date	Time from to	General comments
Rows no. 1 to 0 (numbered from top to bottom); column no. 1 to 0 (numbered from left to right when looking towards the summit) ²⁾			Quadrat code ¹⁾	Researcher(s)		

Grazing impact ³⁾		row 1										row 2										row 3										row 4										row 5										row 6										row 7										row 8										row 9										row 0									
H.i. 1: faeces/droppings		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0																																								
H.i. 2: browsing damage																																																																																																					
H.i. 3: trampling																																																																																																					
Species ⁴⁾	cf. ⁵⁾	row 1										row 2										row 3										row 4										row 5										row 6										row 7										row 8										row 9										row 0									
		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0

If you have used extra sheets, indicate its number (e.g. 1 of 2, 2 of 2 etc...)

1) See box 6.1 for coding. 2) Each cell in this form represents a 0.1m x 0.1m cell of the grid frame (see Fig. 5.1) = 100 possible cells for each species where the presence of the species will be indicated with an X. 3) Grazing impact: frequency of impacts caused by livestock grazing (impacts caused by wild-living mammals are also included, because the latter may hardly be distinguishable from livestock impacts). 4) Species (all vascular plants; bryophytes and lichens are optional); indicate species either by using species names or by (provisional) codes. A species is considered as present when showing plant parts within the boundary strings of a 0.1m x 0.1m grid cell (always in view perpendicular to the grid frame plane), regardless of where it is rooted. 5) Use the "cf." column if the identification of the taxon is doubtful (use **g** if this is the case for the genus level, **s** for the species level, **t** for a lower taxonomic level).

Form 6-S	10m x 10m square	Country ¹⁾	Summit ¹⁾	Date		Indicate line direction and position of start line ³⁾																	
Researchers		TR ¹⁾	Aspect ²⁾		Time from to		Mark one of the four options																
Surface Types⁴⁾	Recording Lines⁵⁾																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total hits ⁶⁾		
Solid rock																							
Scree																							
Lichens on soil																							
Bryophytes on soil																							
Bare ground																							
Litter																							
Species⁷⁾	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total hits ⁶⁾		
General Comments																							

If you have used extrasheets, indicate their number (e.g. 1 of 3, 2 of 3, etc.)

NOTES: FORM 6-S GLORIA 10m × 10m SQUARE

- 1 See Box 6.1 for coding.
- 2 Enter the cardinal direction (N, E, S, or W).
- 3 Indicate starting line position with a check mark at one of the four options.
- 4 The same *surface types* as used in the *summit area sections*, but without the *surface type* "vascular plants" (compare chapter 5.3.1). Surface types are only tallied where no vascular plants were hit.
- 5 Twenty parallel lines for *line-pointing* (column 1-20); twenty points along each line (compare chapter 5.3.1).
- 6 Enter the sum of all strokes of the tally.
- 7 Enter all vascular plant species which you hit with the sampling pin. When you hit more than one vascular plant species on one point, tally all of them. After you have completed line pointing, add (below or on a continuation sheet) all additional vascular plant species that occur within the *10m × 10m square*.