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Snow depth measurements

Motivation

The thickness of the snow cover (snow depth) is an important determinant of how well the ground is insulated from ambient air temperatures and snow season length (phenology). The snow depth measurements are connected to monitoring of snow beds (plant communities and lemming winter habitat occupancy/grazing impact) and hummock tundra (lemming summer habitat occupancy), and are a part of COAT Varanger's small rodent module.
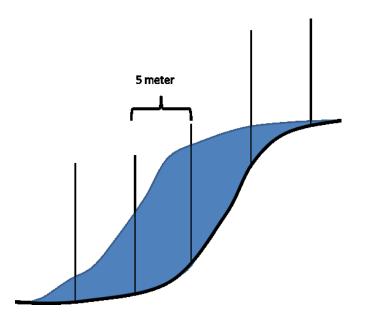
State variables:
- CT2 snow depth

Spatial study design

The snow depth measurements are conducted within COAT Varanger's intensive monitoring locations; Komagdalen and Vestre Jakobselv. At both locations, snow depth is measured according to two designs:

1. Altitudinal snow bed transects: One of the two transects per locations where plant communities and lemming winter activity (pellets counts) are monitored each summer is included. See description for "mountain slope" sections in the study design protocol for COAT. The selected sections/transects are "Bearaveaijohka» at Vestre Jakobselv and «Kjøltindan» at Komagdalen.

At each snow bed site within the transect snow depths are measured next to a recco (i.e. middle point of the snowbed) and then, 5m and 10m distance uphill and downhill from the middle point (see figure).

2. Camera trap monitoring design of lemmings: Snow depth measurements are made at a subset of sites where the camera traps are placed both in lemming summer habitat (hummock tundra) and in winter habitat (snow beds). See description for "lemming block" sections in the study design protocol for COAT. Measurements are taken at 5 points, as for the altitudinal snow bed transects. The midpoint should be the a recco-brick that is placed 15m away from the camera trap to avoid disturbance of the snow pack close to the trap.

A list of sites where snow depth measurements are done is given in the Appendix. GPS files that include all relevant sites are stored at COAT Box/Fieldwork/Varanger GPS files for fieldwork and are called "snowbeds lemming transect 2019.gpx" and "small_mammal_cameras_2019.gpx".

Temporal study design

The snow depth measurements are done once per year, during late march.

Procedure

Snow depth per measurement point: Use snow probe that is maximum 4 meters long, so max depth you can measure is 3.7m. Enter the probe straight down (see figure). Compass directions for uphill and downhill from recco are given in Appendix.

Equipment needed

- Snow depth probe
- Notebook, pencil, GPS
- Compass
- Recco detector

Information recorded in the field

For each snowbed, record site ID, date, observers. For each sampling point, record position (**0**=middle point, **+5**=5 m uphill, **+10**=10 m uphill , **-5**=5 m downhill, **-10**=10 m dowhnhill) and snow depth. Note a comment if you are uncertain or do not reach the bottom.

Data processing

All field observers are in charge of typing their data into digital format (unless otherwise agreed with the data set responsible, Nigel Yoccoz).

Template datasheet is called "template_snowdepth_COAT.xlsx" and stored in the COAT Box folder Protocol/Data typing templates. The template file is accompanied with instructions (an additional sheet of the template excel file). This included additional information on how to record specific types of observations in the template. Follow the datasheet exactly; use exactly the same column names, large/small letters, for factorial values do not add new categories etc.

After completing a data file in excel (one datafile per year and locality), it should be saved as txt-file. Thereafter (unless otherwise agreed), data files are sent to dataset responsible who will quality-check them and store them in COAT data portal.

Training requirements and specialized skills

No special skills are needed.

Appendix

Sites where snow depth should be measured every year at Vestre Jakobselv. At Reinhaugen, Gåsevannan, Skoarrajohka and Tranemyra two sites should be selected for snowpit and excluded from snow depth measurements.

section	site	Compass direction "uphill" from recco
Bearalveaijohka	vj_be_sn_1	220
	vj_be_sn_2	230
	vj_be_sn_3	250
	vj_be_sn_4	220
	vj_be_sn_5	240
	vj_be_sn_6	220
	vj_be_sn_7 – 2 recco here!!	190
	vj_be_sn_8	200
	vj_be_sn_11	270
	vj_be_sn_12	10
	vj_be_sn_13	210
	vj_be_sn_14	240
	vj_be_sn_15	240
	vj_be_sn_17	0
	vj_be_sn_19	na
	vj_be_sn_20	320
	vj_be_sn_21	290
	vj_be_sn_22	160
	vj_be_sn_24	220
	vj_be_sn_25	270
Reinhaugen	vj_re_sn_1	200
	vj_re_sn_2	140
	vj_re_sn_3	108
	vj_re_sn_4	140
	vj_re_sn_5	76
	vj_re_sn_6	34
	vj_re_hu_1	50
	vj_re_hu_2	250
	vj_re_hu_3	120
	vj_re_hu_4	0
	vj_re_hu_5	110
	vj_re_hu_6	0
Gåsevannan	vj_ga_sn_2 (only site with recco here)	190
	All other sites except the ones where snow pits are dug	NA
Skoarrajohka	All sites except the ones where snow pits are dug. None of the sites have recco.	NA
Tranemyra	All sites except the ones where snow pits are dug. None of the sites have recco.	NA

Sites where snow depth should be measured every year in Komagdalen. At the sites that are excluded from snow depth measurements, a snow pits should be dug.

section	site_id	Compass direction "uphill" from recco
Kjøltindan	ko_kj_sn_1… ko_kj_sn_25	NA
	ko_kj_hu_1…ko_kj_hu_6, except ko_kj_hu_4b	NA
Hubejohka	ko_hu_hu_6	0
	ko_hu_sn_1	0
	ko_hu_hu_2b – excluded, snow pit site	0
	ko_hu_sn_2	198
	ko_hu_hu_3b	0
	ko_hu_sn_3	200
	ko_hu_sn_4	210
	ko_hu_hu_4	230
	ko_hu_sn_5	240
	ko_hu_hu_5 – excluded, snow pit site	0
	ko_hu_hu_1	190
Ryggfjellet	All sites except ko_ry_hu_1b and ko_ry_sn_1	NA
Gargas	All sites except ko_ga_hu_2 and ko_ga_sn_2b	NA