Supplementary material for: Pedersen Å.Ø. et al. 2022. Five decades of terrestrial and freshwater research at Ny-Ålesund, Svalbard. *Polar Research 41*. Correspondence: Åshild Ønvik Pedersen, Norwegian Polar Institute, Fram Centre, PO Box 6606 Stakkevollan, NO-9296 Tromsø, Norway. E-mail: aashild.pedersen@npolar.no.

Supplementary Table S1. Overview of long-term monitoring time-series (> 10 years), newly established data series that will be run in a long-term monitoring perspective and studies that can be used as a basis to build future long-term time series obtained at the Ny-Ålesund Research Station. Monitoring targets are listed alphabetically under each ecosystem component.

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Climate and weather	Active layer temperature and moisture, permafrost temperature	Kolhaugen [b]	Observational	2016	1 min.	University of Insubria, Italy	Christiansen et al. 2019
	Ground surface temperature	Brøggerhalvøya Sarsøyra	Observational	2012	Annual	Norwegian Polar Institute [c]	Pedersen unpubl. data
	Snow depth and basal ice	Brøggerhalvøya	Observational	2000	Annual	Norwegian Polar Institute [c]	Hansen, Pedersen et al. 2019, Peeters et al. 2019
	Soil temperature, snow cover	Kolhaugen [b]	Observational	2018	1 min., 1 hour	National Research Council, Italy	Salzano et al. 2016

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Climate and weather	Standard meteorological parameters	Ny-Ålesund	Observational	1961, 1963[d]	Daily	Norwegian Meteorological Institute	
	Standard meteorological parameters	Ny-Ålesund	Observational	1993	1 min.	Alfred Wegner Institute, Germany	Maturilli 2020b, Maturilli et al. 2013
	Standard meteorological parameters	Zeppelin Mountain	Observational	1998	1 hour	Norwegian Institute for Air Research	www.nilu.com/facility/nilus-observatories-and-monitoring-stations/zeppelin-observatory/
	Standard meteorological parameters, net radiation components, snow depth, snow temperature, albedo	Kolhaugen [b]	Observational	2009	1 min.	National Research Council, Italy	Mazzola et al. 2016
	Standard meteorological parameters, snow water equivalent, active layer, temperature, moisture, permafrost temperature	Bayelva	Observational	1998	1 hour	Alfred Wegner Institute, Germany	Boike et al. 2018

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Climate and weather	Surface net radiation components	Ny-Ålesund	Observational	1992	1 min.	Alfred Wegner Institute, Germany	Maturilli et al. 2015, Maturilli 2020a
	UV spectral radiation	Ny-Ålesund	Observational	2007	15 min.	National Research Council, Italy	Petkov et al. 2019
	Water temperature, light penetration, pH, presence of ice/water, snow cover	Solvatnet	Observational	2016-18	1 min. 1 hour	Sapienza University, Italy	Pasquali unpubl. data
Soil processes	Bacteria, soil pH, organic carbon	Midtre Lovénbreen	Observational	2014	Irregular	Korea Polar Research Institute	Tripathi et al. 2018
	Bacterial community structure, soil physicochemical properties	Midtre Lovénbreen	Observational	2012	Irregular	Korea Polar Research Institute	Kim et al. 2017
	Functional genes along spatial and temporal gradients	Knudsenheia, Ossian Sarsfjellet	In situ and molecular studies	2017	Seasonal	University of Ghent, Belgium	Verleyen unpubl. data
	Microbial activity, soil temperature and moisture	Stuphallet	Experimental snow fence	2012	Irregular	University Aberystwyth, UK	Foster et al. 2016

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Soil processes	Microbial biodiversity along environmental gradients	Knudsenheia	Experimental snow fences	2017	Perennial	University of Ghent, Belgium	Verleyen unpubl. data
	Microbial C-turnover	Knudsenheia Solvatn	In situ and molecular studies	2009	Annual	UiT The Arctic University of Norway	Tveit et al. 2013, Tveit 2014, Tveit et al. 2015
	Soil organic matter: chemical finger printing	Knudsenheia, Ossian Sarsfjellet	Observational	2017	Annual	University of Rostock, Germany; Swiss Federal Research Institute	Pushkareva et al. 2020
	Soil properties, mineralogy, moisture, soil organic matter, nutrients, pH	Knudsenheia, Ossian Sarsfjellet	Observational	2017	Annual	University of Rostock, Germany	Kern et al. 2019
	Vascular plant and lichen cover, microbial activity, soil fungal and bacterial diversity, soil temperature and moisture	Kongfjordneset	Experimental OTC	2014	Annual	British Antarctic Survey, UK	Lim et al. 2018

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Inverte-brates	Insect diversity	Ny-Ålesund	Pitfall traps	2006	July (2-day interval)	University of Groningen, Netherlands	Loonen unpubl. data
Vegetation	*Cassiope tetragona* growth	Ny-Ålesund	Experimental fertilization and watering	1991, treatment stopped 1994	Irregular	Aberdeen University, UK	Street et al. 2015, Street et al. 2018
	C. tetragona growth and reproduction	Ny-Ålesund	Experimental OTC	2003–2013	Irregular	Vrije University Amsterdam, Netherlands	Weijers et al. 2012
	C. tetragona, Dryas octopetala and *Salix Polaris* growth	Ny-Ålesund	Experimental: fertilization	1991	Irregular	Aberdeen University, UK	Baddeley et al. 1994
	Cryptogamic cover	Ny-Ålesund	Observational	2014	Annual	University of Rostock, Technical University of Kaiserslautem, Germany	Williams et al. 2017
	Cryptogamic cover, plant community structure	Knudsenheia, Ossian Sarsfjellet	Observational	2017	Annual	University of Rostock, Germany	Kern et al. 2019

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Vegetation	*Dryas octopetala* and *Bistorta vivipara*	Ny-Ålesund	Experimental: warming (tents), fertilization	Treatment applied 2000–03	Irregular	University of Manchester, UK	Wookey et al. 1993, Wookey et al. 1994, Robinson et al. 1995
	Grass production	Ny-Ålesund	Experimental exclosures	1991	Annual, weekly	University of Groningen, Netherlands	Bakker & Loonen 1998
	Microbotryum bistortarum on *Bistorta vivipara*	Ny-Ålesund	Observational	2000	Annual 2000–04, irregular 2005–	Osaka Prefecture University, Japan	Tojo & Nishitani 2005
	Plant community composition	Gåsebu-Knudsenheia	Observational	2014	Annual	Norwegian Institute for Nature Research	Bjerke et al. 2017
	Plant community composition	Ny-Ålesund	Observational	1997	5-year interval	National Institute of Polar Research, Japan	Uchida unpubl. data
	Plant community composition, effect of grazing, N and C cycling	Thiisbukta	Experimental: exclosures	1998 2004	Irregular Annual	University of Antwerp, Belgium; University of Groningen, Netherlands	Van der Wal et al. 2001, Sjögersten et al. 2012, Fivez 2014

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Vegetation	Plant community composition, CO_2 fluxes and permafrost	Ny-Ålesund	Observational	2013	Irregular	Insubria University, Italy	Cannone et al. 2016
	Plant community structure and biomass production	Brøggerhalvøya, Sarsøyra [e]	Observational	2018	Annual	Norwegian Polar Institute	Ravolainen unpubl. data
	Plant phenological development	Ny-Ålesund	Observational	2019	Annual	UiT The Arctic University of Norway, Norwegian Research Centre	Cooper & Tømmervik unpubl. data
	Snowmelt, soil physicochemical properties and vegetation patterns	Ny-Ålesund	Observational	2014	Irregular	Seoul National University, South Korea	Park et al. 2018
	Vegetation community composition	Brøggerhalvøya, Sarsøyra Kaffiøyra [e]	Observational /experimental	1978	5–10 years	Norwegian Polar Institute [d]	Cooper 2006, Hansen et al. 2007

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Herbivores	Barnacle goose	Ny-Ålesund, Kongsfjorden islands	Observational	1988	Annual	University of Groningen, Netherlands	Loonen et al. 1998, Layton-Matthews et al. 2019
	Svalbard rock ptarmigan abundance	Brøggerhalvøya	Observational	2019	Annual	Norwegian Polar Institute	Fuglei & Pedersen unpubl. data
	Svalbard reindeer abundance and demography	Brøggerhalvøya, Sarsøyra Kaffiøyra [c]	Observational	1978/ 2000/ 2002 [f]	Annual	Norwegian Polar Institute	Hansen, Pedersen et al. 2019, www.mosj.en
	Svalbard reindeer survival and mortality; habitat use	Brøggerhalvøya, Sarsøyra Kaffiøyra [c]	Capture–mark – recapture	2014	Annual	Norwegian Polar Institute	Pedersen & Hansen unpubl. data
Predator	Arctic fox den occupancy and number of pups	Brøggerhalvøya/ Kongsfjorden	Observational	1993	Annual	Norwegian Polar Institute	Fuglei et al. 2003, www.mosj.en
Seabirds	Black-legged kittiwake abundance	Ossian Sarsfjellet	Observational	1988	Annual	Norwegian Polar Institute	www.mosj.en
	Brünnich's guillemot abundance and demography	Ossian Sarsfjellet	Observational	1988/ 2006 [g]	Annual	Norwegian Polar Institute	Descamps et al. 2021, www.mosj.en
	Common eider abundance	Kongsfjorden	Observational	1981	Annual	Norwegian Polar Institute	www.mosj.en

Ecosystem component	Monitoring target	Spatial extent	Methods	Starting year	Interval	Responsible institution	References [a]
Seabirds	Glaucous gull abundance and demography	Kongsfjorden	Observational	2005/ 2009 [h]	Annual	Norwegian Polar Institute	Descamps and Strøm 2021, www.mosj.en
	Little auk demography	Feiringfjellet	Observational	2006	Annual	Norwegian Polar Institute	Hovinen et al. 2014, www.seapop.no

[a] See the main article for references. [b] Amundsen–Nobile Climate Change Tower. [c] The Sarsøyra and Kaffiøyra peninsulas are located south of Brøggerhalvøya in Forlandsundet and are not included in Fig. 1. [d] There were two starting years, each with different parameters. [e] Norwegian University of Science and Technology and Norwegian University for Life Sciences initiated and were formerly responsible for data collection. [g] Abundance in 1988; demography in 2006. [h] Abundance in 2005; demography in 2009.

References

See main article.