Aim and Contents of research

- Understanding changes in atmosphere, pedosphere, and biosphere along a soil chronosequence and microtopography in the foreland of Midtre Lovénbreen
- Paleoenvironmental interpretations, and geological, mineralogical, and geochemical researches on Spitsbergen

Research roadmap

Year	2014	2015	2016
Monitoring of vegetation, microbes, soil organic carbon along a chronosequence and microtopography in the foreland of Midtre Lovénbreen	Sampling design, vegetation survey, soil sampling	Soil organic carbon and chemical analyses	Soil organic carbon mapping
		Vegetation mapping, analysis of decadale vegetation dynamics	Comparison between vegetation and soil organic carbon distribution
		Metagenomics-enabled microbial community analysis	
Atmosphere characteristics in the foreland of Midtre Lovénbreen	Collaboration between Korea-France-Germany on greenhouse gas monitoring in the foreland of Midtre Lovénbreen	Testing the chamber for monitoring greenhouse gas in the foreland of Midtre Lovénbreen	
			Inventorying greenhouse gas data and writing papers
Paleoenvironmental interpretations on Spitsbergen	Facies analysis of the Paleozoic strata around the Dasan Station		Paleo-environmental reconstruction
	Sampling fossils of brachiopods, corals, and microorganisms		
	Forming international networks	Visiting new research areas in Spitsbergen	Preliminary analysis of the basin evolution in Spitsbergen
Geological, mineralogical and geochemical researches on Spitsbergen	Investigation of geochemical features on Cenozoic volcanics and mantle xenoliths		
		Study of petrogenesis of Cenozoic volcanic rocks and mantle evolution in Spitsbergen	
		Petrological and geochemical investigation on carbonatite complexes in Greenland	

Research method

Contents	1st year (2014)	2nd-3rd years (2015-2016)
Atmosphere	Planning for operation of CO_2 flux measurement chambers in the foreland of Midtre Lovénbreen	Understanding of the relationship between soil age and greenhouse gas flux in the foreland of Midtre Lovénbreen
Vegetation	Vegetation survey (129 sites) in the foreland of Midtre Lovénbreen	Vegetation mapping in the foreland of Midtre Lovénbreen
Soil	Soil sampling at 54 sites (650 samples) in the foreland of Midtre Lovénbreen	Soil organic carbon mapping in the foreland of Midtre Lovénbreen
Rock	Sampling of Cenozoic volcanic rocks and mantle xenoliths in Spitsbergen	Geochemical and mineralogical analysis of Cenozoic volcanic rocks and mantle xenoliths in Spitsbergen
Paleoenvironment	Composing detailed columnar sections for the late Paleozoic strata around the Dasan Station. Recovery of new fossils	Stratigraphic reconstruction of the late Paleozoic strata around the Dasan Station, and paleoecological research.
Arctic N	Website development to deliver research information and news in the Arctic	Website maintenance by updating contents

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Environmental Change Studies based on the Arctic Dasan Station

in terms of Geology, Atmospheric Science, and Ecology

Polar Climate Change Research

Polar Earth-System Sciences

Polar Life Sciences

Polar Ocean Environment

Arctic Research

Promotion Program

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Arctic Research Center

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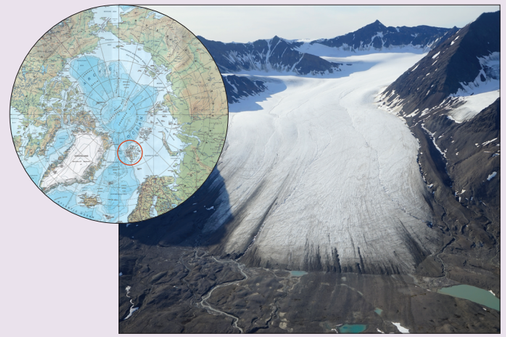
Partner Organizations	Toulouse University (France), University of Tromsø (Norway), Norwegian Polar Institute (Norway), Konkuk University, Incheon University, Korea University, Andong University
Research Duration	January 2014 ~ December 2016 (A period of 3 years)
Research Area	Spitsbergen with special focus on the Dasan Station area



Research Background and Importance

- The Korean government has adopted the Arctic Policy (2013. 12) which requests an expansion of research activities based on the Arctic Dasan Station. In this regard, Korea Polar Research Institute has launched a new research project on the geological, atmospherical and ecological aspects of the environments around the Dasan Station. The main objectives of this project are to interpret the paleoenvironments and paleoecological communities of Spitsbergen, and to investigate the soil development and the succession of microorganisms and vegetation after glacial retreat.

Personnels

Lee, Yoo Kyung

· Geobiology

Lee, Mi Jung

· Petrology

Woo, Jusun

· Sedimentology

Park, Tae-Yoon

· Paleontology

Jung, Ji Young

· Soil Science

Kim, Min cheol

· Ecology

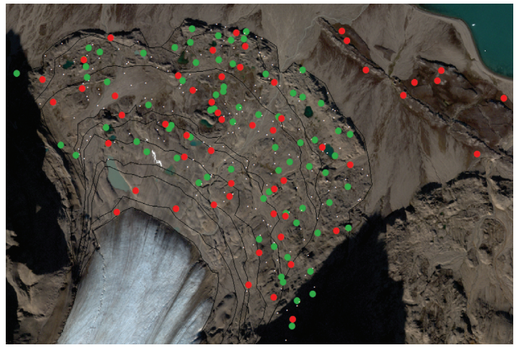
Future Plans and Application

- Participating in the international networks on the scientific activities in Svalbard (NySMAC, SSF etc) to promote cooperative researches with the Arctic countries
- Developing the ability and experience for multidisciplinary Arctic research and exploration, and fostering professional arctic researchers
- Providing environmental, ecological and geological information of Svalbard

Overall Outcomes

Sites of soil sampling and vegetation survey on the foreland of Midtre Lovén Glacier

· Vegetational structure was surveyed and soil samples were collected at 129 sites in the foreland of Midtre Lovénbreen, in order to understand how glacial retreat and microtopography impact on the spacial distributions of vegetation, soil organic carbon and soil microbes.



● Soil+Vegetation(54)
● Vegetation(75)

Rock samples and fossils including corals, brachiopods, and algae were collected to interpret the paleoecology of the area.

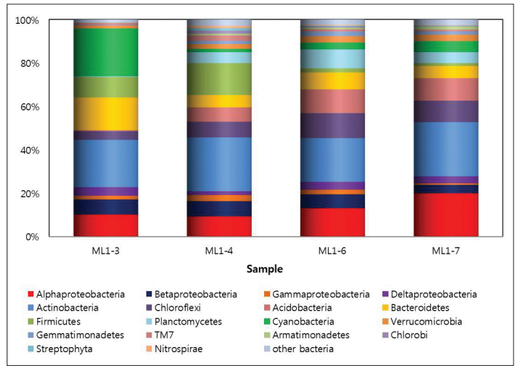
Coral reef at the coast of Kiaerstranda, ca. 20 km west of the Dasan Station

Mantle rocks were collected and have been analyzed to understand the lithospheric mantle evolution beneath Spitsbergen

Aerial view of Halvdanpiggen, ca. 70 km northeast from the Dasan Station, where rock samples of mantle xenolith were obtained

We analyze the community structures of bacteria, fungi and small invertebrates inhabiting in the glacier foreland, which had been underlain by glaciers.

Purple Saxifrage, a pioneer plant, who is the first to grow in glaciers foreland



Relative abundance of the bacterial communities in the foreland of Midtre Loven Glacier. Cyanobacteria was abundant in the early stage, and Alpha-proteobacteria increase along the time

Detailed stratigraphic columns of the late Paleozoic sedimentary strata around the Dasan Station