

NySMAC REPORT (September, 2010)

Korea Polar Research Institute (KOPRI) Research activities of the Dasan Station at Ny-Alesund

Status Report on September 7, 2010

1. Amount of man/days used at the Dasan Station during March 2010- September, 2010

Project Organizations	Numbers	Project date
KOPRI (Korea Polar Research Institute)	24	
POSTECH (Pohang University of Science and Technology)	1	
Seoul National University	1	
Korea University	1	
Sangmyung University	1	
Inha University	2	
Sweden University of Gothenberg	1	
Others	17	
Total	48 people	166 days

* Actual station open date : March 04 2010

* Actual station close date : September 09, 2010
(Currently station is working for this season.)

2. Science Activities in 2010

1) Biology

① Optimum utilization of satellite data for polar research

◇ Purpose: Satellite polar research

◇ Period: 5. 10 – 5. 18

◇ Participants: 5 Scientist

Dr. Kim Youngnam / Park, Byoungkwon (KOPRI)

Lee, Yun Sun / Kim, Kyung Mi, Han, Jung Min (KOPRI),

◇ Summary

Satellite data including Moderate Resolution Imaging Spectroradiometer (MODIS) and Sea-viewing Wide Field-of-view Sensor (SeaWiFS), is useful to study an influence on marine

ecosystem of Polar region by climate change. However, high latitude region have poor validation data for Satellite ocean-color. Hence, to improve the accuracy of satellite ocean color data, in-situ measuring should be done. In this project, we measure both of inherent and apparent bio-optical properties to improve the accuracy for Polar region through ship survey around Ny-Alesund. And we monitor Arctic marine ecosystem variation using satellite ocean color data and these in-situ data.

② Diversity and DNA barcoding of macro-algae from the Arctic and the Antarctic

◇ Purpose: To Collect & Study Algae

◇ Period: 4. 12 – 4. 26 / 7. 26 - 7. 29

◇ Participants: 2 People

Dr. Hyun, Jin Oh (Northeast Asia Plant Institute Co., Ltd.),

Prof. Hwang Chung Yeon(Seoul National Univ.)

◇ Summary

The environmental changes of polar areas are clearly observed at a large scale and accelerated, and have a serious effect on the earth. The serious environmental changes influence the existence and distribution of algae, primary producers so directly and greatly that the research of these phenomena is required urgently.

In our research, we study algae from the Arctic and the Antarctic. We try to grasp the diversity of species with the investigations of the Bangiales, Corallinales and Ceramiales in the Rhodophyta, which have a comparatively long history of evolution, and the Desmarestiales, Laminariales and Sphacelariales in the Phaeophyceae, known as recently evolved. We are also carrying out DNA barcoding of the mitochondrial COI, analyze their morphological data, reveal their phylogenetic relationships based on multi-gene sequence data including nuclear SSU and ITS rDNA, plastid rbcL-S (including RuBisCo spacer) and 16S, and ultimately clarify distributions and evolutionary mechanisms of endemic and widely distributed algae.

③ Arctic Marine Microbial Diversity Project

◇ Purpose: Arctic Marine Microbial Diversity Project

◇ Period: 7. 12 – 7. 19

◇ Participants: 2 person

Prof.Cho, Jang Cheon, Jung, Jae Ho (Inha Univ.)

◇ Summary

A planned research project is about to define micro-scale microbial diversity in the coastal region of Ny-Ålesund that is affected by melting glacier input. The DNA or mRNA from the samples will be extracted from seawater samples and next genome sequencing

approaches will be applied to nucleic acids extracted.

④ Biodiversity and Cold-adaptation of the Arctic Organism

◇ Purpose: To study the biodiversity of various organisms around *Ny-Ålesund* -

◇ Period: 7. 12 – 7. 22

◇ Participants: 4 People

Dr. Lee, Sung Gu (KOPRI)

Koh, Hey Yeon / Kim, Eun Hye / Park, Ha Ju (KOPRI)

◇ Summary

To study the biodiversity of various organisms around the Korean Arctic Research Station, we will investigate and sample plants, mosses, lichens, small animals and microorganisms from land soils, sea and fresh water. The organisms are grouped by conventional observation for their morphology and identified by phylogenetic analyses. Their physiological characteristics will be assessed to understand adaptation in polar environments and roles in nutrient cycling. We will analyze ITS and 28S rDNA sequences for lichen samples to understand phylogenetic and evolutionary relationships of Arctic lichen with lichens of Antarctic and other areas of the earth. For study on the cold-adaptation of organism, we are going to screen bioactive metabolites and cold-active enzymes from plants, small animals and microorganisms, which have evolved specifically for low temperature. Organisms living in polar regions are known to have adapted to and survived in such low-temperature environments due to their particular metabolites and high specific enzyme activities. Thus, the bioactive metabolites and cold-active enzymes have a great potential in biological research field. For this reason, we are trying to obtain any useful bioactive metabolites from plants and mosses using various extraction methods, and identify their structure. The studies for relationship between biological function and structure are in progress. Also, we are trying to obtain psychrophilic microorganisms from Arctic samples using a traditional culture method and a high-throughput screening method.

2) Atmosphere

⑤ Integrated research on the COMposition of Polar Atmosphere and Climate Change (COMPAC)

◇ Purpose: To study the role of Polar region in the climate change for the mid latitudes

◇ Period: 3. 4 - 3. 31 / 6. 17 – 6. 24 / 7. 15-7. 22 / 9. 2 – 9. 9

◇ Participants: 8 People

Dr. Yoon Youngjun/ Dr. Choi, Tae Jin/ Dr. Kim Sung Joong (KOPRI),

Dr. Kim, Baek Min/ Woo, Sung Ho, Dr. Lee Bang Yong (KOPRI)

Park, Ki Tae (POSTECH)/ Jeong, Jee Hoon (Sweden University of Gothengerg)

◇ Summary

The project "Integrated research on COMposition of Polar Atmosphere and Climate Change (COMPAC)" operated by Korea Polar Research Institute from 2006 to 1020 has three main topics: Polar atmospheric environment observation, understanding atmospheric composition, climate prediction modelling. The purpose of this project is to understand the role of Polar regions in the climate change for the mid latitudes. The Arctic climate change influences the mid latitude through a teleconnection by the Arctic Oscillation, which impacts the climate change especially in Winter Season.

3. Non-Scientific Activities

1) Operation and Logistics Team

Officers who are in charge of operating Dasan Station in Logistics and operation team are planning on visiting the station for routine maintenance and operation and management state for improvement in October 2010. KOPRI has been preparing for improving the residential environment for scientists and to make space arrangements more efficiently.

It will relieve our scientists from chores and make them focus on their activities. In next season, we are planning on sending the personnel again to finalize the deal and relevant works.

2) Delegation

During the season, the delegation of 3 Congressmen visited the station to observe the status and activities. We expect it will help expanding Korean activities in the Arctic science and emphasizing the importance of the Arctic.

3) Korea Outreach Program – Pole to Pole Korea

Korea Polar Research Institute has operated the “Polar Research Experience Team” programs for the purpose of raising public awareness about polar research, disseminating the science oriented culture and promoting the pioneering spirit. In 2010, 8 middle and high school students have experienced Arctic and Antarctic through this program