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A new Arctic facility in Ny-Alesund for comparative studies with the Antarctic region

submitted
by
The REPUBLIC OF KOREA

Korea Ocean Research and Development Institute (KORDI), the operating agency of the national polar program, opened a new Arctic research laboratory, ***Dasan Station*** (named after a renowned Korean scientist in the late 18th century), at Ny-Alesund, Svalbard on April 29, 2002. Korea also became a new member (18th country) of IASC (International Arctic Science Committee). As a beginning step, KORDI is going to concentrate research work in the fields of (1) marine biology and (2) upper atmospheric physics based at Ny-Alesund primarily for comparative studies between the Antarctic and the Arctic regions.

Major programmes

1. Arctic Coastal Ecosystem Studies

The programme is designed to study the structure and functioning of Arctic marine ecosystem and to test several hypotheses relating to the interaction of biological

and physical processes with an emphasis on the coastal sea-ice zone. The coastal shelf region of the Arctic has high primary production and is one of the principal breeding, feeding, and spawning grounds of Arctic marine animals. In order to conduct this programme, the Polar Sciences Laboratory of KORDI has set up a laboratory equipped with clean bench, deep-freezer, autoclave, CTD and fluoromenter. A pilot sampling on plankton and benthos was conducted in order to figure out species composition and density in a coastal region near Ny-Alesund (79°N, 12°E) from 5 to 28 August 2002. Assemblages, biomass and production of planktonic and benthic organisms will be studied in the near-shore waters. In the near future, sediment trap will be deployed near the base to estimate organic carbon flux through major trophic levels.

A marine ecosystem monitoring progrm also was initiated near the pier area. As a preliminary step, existing data were examined to identify key environmental parameters to be monitored. Biological parameters such as biomass and composition of phytoplankton, zooplankton, benthic organisms will be routinely measured. Physical and chemical parameters will also be measured to obtain a baseline data inventory for a later assessment on long-term changes in temperature, salinity, nutrients, UVB, and sea-ice dynamics.

Contact point: Dr. Sung-Ho Kang, Błąd! Nie zdefiniowano zakładki.

2. Arctic Oceanographical studies

The joint Korea/China 1999 and Korea/Russia 2000, 2001, and 2002 Arctic Ocean Study were conducted to increase the observational base necessary for understanding the role of the Arctic in global change. The projects were interdisciplinary from its inception including studies of ocean circulation and geochemistry, biology and the carbon cycle, geology and paleoceanography, contaminant chemistry, ice physics and remote sensing, atmospheric chemistry and climate, and the ecology of polar bears and other marine mammals. The overall objective of participating scientists was to make measurements that would best promote the analysis and modeling of the biological, chemical, and physical systems related to the Arctic and global climate change, and to identify controlling processes in this system. The program was carried out on aboard the ice breaker, the RV *Xuelong* from July 1 to September 10, 1999 in Bering and Chukchi

Seas and the *Evan Petrov* on August 2000, 2001, and 2002 in Kara and Barents Seas. The collaborations with other nations in the Artic waters were very successful, and we're planning to continue this type of collaborative studies.

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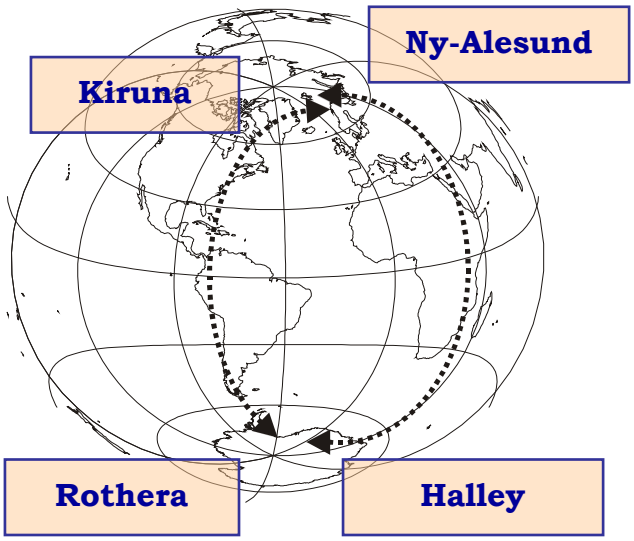
3. Studies on Upper Atmospheric physics Using Ground-based Optical Measurements

A. Introduction

The lower thermosphere and upper mesosphere are important regions of the atmosphere in that processes dominating the lower atmosphere coexist with the upper thermospheric processes. Until recently, this region, between roughly 80-150 km altitude, was the least understood of all atmospheric regions due, in part, to its inherent complexity and also in part, to the difficulty of carrying out in-situ measurements at this altitude.

B. Plan of work

As a part of our upper atmospheric research program, the Polar Sciences Laboratory, KORDI has equipped Fourier Transform Spectrometers (FTS) to characterize the thermodynamics of the Earth's lower thermosphere and upper mesosphere region. We have located one FTS in Kiruna (68° N), Sweden and are planning to install another one at Ny-Alesund (79° N), Svalbard. We are interested in performing measurements from these two arctic places in collaboration with British Antarctic Survey (BAS), who is operating the same instrument in Halley (75° S) and Rothera(68° S) stations in Antarctica, nearly conjugate points of Ny-Alesund and Kiruna, respectively.



Utilizing atmospheric emissions in the infrared (1000 to 1700 nm), we will remotely sense the temperature of the arctic upper atmosphere near 87 km and these measurements will be compared to those from Halley and Rothera in order to assess hemispherical differences in temperature in the middle atmosphere. Long-term measurements of atmospheric emission features are expected to reveal the detailed information on the energy balance and the dynamics behavior (such as gravity waves, tides) of the lower thermospheric and upper mesospheric region of the atmosphere.

C. Instrument

The instrument is an optical spectrometer working in the near infrared, and views the sky in the near zenith. It is a small, laboratory interferometer system which passively senses atmospheric emissions in the infrared (1000 to 1700 nm) and is able to retrieve the temperature of the upper atmosphere near 87 km.

We hope that the coordinated observations will surely help to improve our understanding of physical and chemical processes that take place in the upper atmosphere.

Specifications of our system are as follows.

Table 1. The specifications of the Bomem (MR160) Michelson interferometer

Spectral	5000 cm-1 to 10,000 cm-1 (detector

range	response)
Resolution	1, 2, 4, 8, 16 cm-1 (selectable)
Detector	0.5 mm diameter InGaAs detector module (TE-cooled operation)

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