

AERC NEWSLETTER

*Arctic Environment Research Center***DIGEST****MARCH, 1996****VOL. 1****DIRECTOR'S INTRODUCTION***by Prof. Okitsugu Watanabe**Director, Arctic Environment Research Center,
National Institute of Polar Research*

The Arctic Environment Research Center (AERC) was founded in 1990 within Japan's National Institute of Polar Research (NIPR), which had concentrated on Antarctic research since its founding in the 1970s. In 1991 AERC established its Arctic Environment Research Station at Ny-Ålesund, Svalbard, Norway, where much though not all of AERC's field work has been based. One of the station's projects is coordinated observations of greenhouse gases and substances related to the ozone hole with NIPR's Syowa Station in Antarctica; this research has already started to give results. Glaciological, biological, geological and sea ice observations are under way not only in Svalbard but at other Arctic locations.

Fortuitously, Japan's Arctic program is being launched at a time of increasing international cooperation in Arctic research. Major areas of current international cooperation in the Arctic include atmospheric science, cryospheric science, terrestrial environmental science and oceanic science.

The complex distribution of land and sea in the Arctic creates strong variability of climate from one location to another, which in turn strongly affects other elements. To support the observations at the Ny-Ålesund base, additional observations along the Russian coast and in the central Arctic Ocean are indispensable. Plans include long-range research drones and drifting ice stations but these still face problems in implementation.

Several international cooperative field programs started this past summer. In meteorology, the emphasis is

on broadening the coverage of observations from one point at Ny-Ålesund to a wider area. In glaciology, core drilling is being carried out on the Svalbard Nordaustlandet Icecap, and preliminary glaciological investigations on Baffin Island. In August, scientists from Russia, Canada, Germany and Japan conducted a preliminary investigation for future drilling to the Wisconsin Ice Age layer of the Akademia Nauk Icecap on Severnaya Zemlya. In terrestrial ecology, the growth of new tundra vegetation in the wake of glacial retreat is being observed, along with related environmental conditions, on the Brøgger Glacier near Ny-Ålesund. In oceanography, including sea ice and marine biology studies, plans are being considered for cruises to study the formation of polynyas, which play an important role in world climate, and air-sea interaction and biological processes in them, together with related observational programs on the ice.

**STUDIES AT NY-ÅLESUND BASE
JUNE-OCTOBER 1995**

Melt water hydrology (leader: Yuji Kodama, Institute of Low Temperature Science, Hokkaido University)

Field processing of core samples (leader: Kokichi Kamiyama, National Institute of Polar Research)

Oceanographic observations and maintenance of meteorological instruments (leader: Hajime Ito, National Institute of Polar Research)

Preliminary work on aeronomy (leader: Osamu Watanabe, Kyushu University)

Ecological changes (leader: Takehiro Masuzawa, Shizuoka University)

Preparation for winter observations (leader: Takashi Shibata, Solar-Terrestrial Environment Laboratory, Nagoya University)

RESEARCH PROGRAM REPORTS

Concentrated Winter Observations of Aerosols in the Arctic December 1994 - March 1995

Leader: Makoto Wada,

National Institute of Polar Research

This is a cooperative project involving the National Institute of Polar Research, the Solar-Terrestrial Environment Laboratory of Nagoya University, Fukuoka University, the Alfred Wegener Institute (Germany), the Norwegian Polar Research Institute and the Norwegian Meteorological Institute.

These observations form part of a long-range monitoring effort, with emphasis on trace constituents of the atmosphere (troposphere and stratosphere) including ozone, carbon dioxide and methane; and substances in precipitation and fallen snow. But the observations were more concentrated than usual during the above period in order to learn more about the behavior of aerosols, from December when the polar vortex intensifies until March when the sun rises and the polar vortex weakens. Specifically, this project is studying the distribution, seasonal variation and chemical composition of precipitation; and the type and amount of precipitation (snow). Observations include radar, lidar, amount of precipitation, types of snow crystals, ozone concentration at ground level, aerosol sonde, and general meteorological observations.

To inquire about this program please call Makoto Wada at 81-3-3962-5580.

Arctic Ecology Research

Leader: Takehiro Masuzawa

Faculty of Science, Shizuoka University;

Visiting Professor, National Institute of Polar Research

A common feature of glacial moraines worldwide is that the first plants to establish themselves on the terminal moraine left behind as a glacier retreats are the saxifrages (saxifrage in Japanese is "yukinoshita", meaning "under the snow"). There are also other plants that change their distribution as climate fluctuates such as the mountain avens (*Dryas octopetala* L.) and are often found in isolated communities near glacier termini in the Arctic and Antarctic, and in alpine regions. The present research is aimed at learning how these plant

communities establish themselves on new terrain and how groups of isolated individuals are able to survive.



*Photos: Mountain avens community
flowering on a seaside cliff, NyÅlesund*

Ice Core Drilling to 210m on Vestfonna Glacier, Nordaustlandet, Svalbard

Leader: Kokichi Kamiyama

National Institute of Polar Research

Since 1987 the Japanese Arctic Glacier Expedition (JAGE) has been drilling ice cores in the Svalbard archipelago, mainland Norway and Greenland in order to study the climate of the last several hundred years. The present project is a joint Japan - Russia - Norway drilling effort on the Vestfonna Glacier, Nordaustlandet, Svalbard as a component of the ICAP circum-Arctic ice drilling program being coordinated by the International Arctic Science Committee (IASC) Glaciology Working Group. The Soviets/Russians have been drilling on Nordaustlandet for some years and results have been published but many problems remain unresolved.

Specific work includes both mechanical and thermal drilling to 210m depth; on-site core analysis including layer observations and photographs, bulk density, melt water pH, electrical conductivity, ultraviolet absorption spectrum (nitric acid), bottling of samples to send to Japan and general meteorological observations.

*Oceanographic Observations in the Barents Sea and
Along the Spitsbergen Coast*

Leader: Hajime Ito

National Institute of Polar Research

The oceanography and sea ice group has been studying physical oceanography and marine ecology in the Barents Sea and the Spitsbergen coastal region in cooperation with Bergen University, Svalbard University and the Norsk Polarinstitutt. Work includes physical oceanography observations from ice in Van Mijen Fjord on the west coast of Spitsbergen, setting and retrieving of continuous temperature - salinity measurement moorings in Kongs Fjord north of Ny-Ålesund, and observations in the marginal ice zone of the Barents Sea using the RV Lance.

Special Reports:

*Travel to the Taymyr Peninsula and Severnaya
Zemlya*

by Shuhei Takahashi

Kitami Institute of Technology.

In August 1995 I had the opportunity to visit the Taymyr Peninsula and Severnaya Zemlya as part of a preliminary survey for cooperative glaciological research there (leader: Okitsugu Watanabe).

Taymyr Peninsula

The broad Taymyr Peninsula, 800km east-west and 500km north-south, is the northernmost point of Eurasia, bounded by the Kara Sea to the west and the Laptev Sea to the east. In its middle is Taymyr Lake, extending 200km east-west, surrounded by numerous swamps. The land looks broad and grassy but when you try to walk it turns out to be mostly marshland that your feet sink into, a thin seasonal melted layer on top of the permafrost. At Taymyr Lake a German party, mainly from AWI, was sampling swamp sediments in cooperation with the Arctic and Antarctic Scientific Research Institute of St. Petersburg.

I heard that there were remains of an ancient glacier near the research base at the lake. As the peninsula does not have high mountains or summer snowfields I was doubtful, but a 10km walk brought me to 600m high mountains with 7 - to - 8m ice slabs beneath the

sediments in a canyon, apparently the remains of the ancient glacier that deposited the moraine.

The Severnaya Zemlya Archipelago

The southernmost of the 3 main islands, Bolshevik Island, has mountains reaching just short of 1,000m with several fjords on its northern coast. The higher ridges are all connected and ice-covered, and the valley glaciers plunge into the ocean. Prima Station at the northern end of the island, consisting of 20 buildings, is manned, and meteorological observations are carried out, year-round. It is a comfortable station and is suitable for fixed point observations, but does not have the capability to resupply field expeditions.

The middle island, Oktyabrskoy Revolyutsii Island, has 6 icecaps around a central depression; glaciers plunge into the ocean along the eastern coast. Srednii Station is on one of the long narrow sandbar islands off the western coast. In addition to conducting full-scale meteorological observations, this station has a long runway and many fuel tanks, and would be suitable for supplying field expeditions.

The northern island, Komsomolets Island, has the Akademii Nauk Icecap, 70km in circumference. It is 780m high at its highest point and the bedrock is said to be below sea level, which makes it a thick icecap and perhaps the most suitable place for ice drilling.

The Arctic and Antarctic Scientific Research Institute

The Russian Arctic and Antarctic Scientific Research Institute (AARI) is located in St. Petersburg. It started in 1920 as the Northern Research and Trade Expedition; eventually it came to do Antarctic work as well and took its present name in 1958. It includes 17 research departments, the Arctic and Antarctic Museum, World Data Center B for sea ice, the Russian Antarctic Research Expedition and the research vessel Akademik Fedorov.

AARI has not escaped the effects of the Russian economic slowdown, and is increasing its emphasis on international cooperative research. In the present difficult situation, some researchers have left the institute to form consulting companies. One such company, ECOSHELF, handled the planning and logistics for our tour; the tour manager was a former ice forecasting researcher. Another is VICAAR, led by Victor Boyarsky of Will

Steger's 1989-1990 Antarctic dog sled traverse expedition, which has logistic know-how for establishing and maintaining Arctic research stations.

Ny-Ålesund in the Midnight Sun

by Hiroshi Koizumi

National Institute of Agro-Environmental Sciences

It took 4 days from Narita Airport to arrive at Ny-Ålesund, via Stockholm, Oslo, Tromsø, and finally Longyearbyen from where I took a charter flight for the final leg. The sun merely circled around the sky, remaining more than 30° above the horizon; it was directly north at midnight. The brightness was comparable to Japan in summer. To conduct my study of how much CO₂ is released from a glacier surface, I loaded my heavy instruments onto a pack frame and hiked about an hour over a moraine with unstable footing underneath and across a river. I set my tent up at the observation site and, since it remained light, before I knew it I had been working for 36 hours without a break. When observations at one point were finished I moved on to the next.

Some days it was too windy and rainy for observations. Then we relaxed at the base with wine and took walks around Ny-Ålesund, quite a change from the hectic pace of life in Japan. We also had an unexpected audience with the King and Queen of Norway. After thus completing a wonderful 50 days of field work in Ny-Ålesund, I returned to the late August heat of Tokyo and the predictable flood of paper work waiting for me.

Arctic Glaciological Observations

by Hideaki Motoyama

Atmosphere - Hydrosphere Research Group,

National Institute of Polar Research

The outstanding characteristic of Arctic glaciers, except in the interior of Greenland, is the strong maritime influence. In Antarctica, the process is straightforward: snow falls, accumulates, is compacted into ice and then flows out laterally. In the Arctic, on the other hand, because of the strong maritime influence even at high latitude some of the snow that falls in winter melts the following summer, and some of that in turn refreezes, making analysis of ice cores much more complicated than in the Antarctic.

The figures (see No.3, P.11) show pH distributions with depth in ice cores from different locations in the Svalbard archipelago. There is remarkable symmetry in the overall variations.

One advantage to working in the Arctic as opposed to Antarctica is that we can be on the glacier within a few days after leaving Japan. A disadvantage is the need to be prepared for polar bears. Near the coast a rifle is mandatory whenever one goes outdoors. This summer we strung trip wires around our camp; a bear trying to enter the camp would have set off an explosion intended to scare him/her away. None came, but there were many tension-filled foggy days.

EDITOR'S NOTE

In 1995 the Arctic Environment Research Center of the National Institute of Polar Research, started distributing a newsletter (domestic edition in Japanese except for contributions by foreign scientist which are in English) to give Japanese Scientists news of Japanese projects under way, news of important research abroad and news of domestic and international conferences. The international edition includes only news of Japanese Arctic research and other news of potential interest and/or novelty to international readers. This edition incorporates numbers 1 to 3 of the domestic bulletin; in the future it is intended to put the two out together. The bulletin appears irregularly, 2 or 3 times per year. Contributions are welcome and should be addressed to:

Director
Arctic Environment Research Center
National Institute of Polar Research
Kaga 1-9-10, Itabashi Ku
Tokyo 173, Japan

TEL 81-3-3962-4742
FAX 81-3-3962-5701
E-mail arctic@nipr.ac.jp

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