Research and Monitoring Activities on Arctic Environment by Japan

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2nd SAON Board Meeting, Potsdam, Oct. 1-2, 2012
(1) **Scientific interest** in the unique natural system in the Arctic.  
(Getting stronger due to drastic changes)

(2) Consider that it is one of the **key region for Global Change**  
(Focused on water, energy, material cycle  
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(3) Need to improve the **expression of Arctic Region in GCM** and Earth System Model for better prediction of future climate/earth.

**Methodology**

(1) In-situ measurements on land and ocean.  
   Land obs. network, cruises of various R/V, (Mirai etc.)

(2) Development of satellite product and data analysis.

(3) Application of GCM and regional models.
Main Institutes doing environmental research on Arctic Regions in Japan

(1) Japan Agency for Marine-Earth Science and Technology (JAMSTEC)  ~  30 scientist

(2) National Institute for Polar Research (NIPR)  ~  20

(3) Japan Aerospace Exploration Agency (JAXA)  ~  5

(4) National Institute for Environmental Studies (NIES)  ~ 10

(5) Universities  ~ 100
          Hokkaido University and others

(6) Other Agencies, Met Agency.

Number of people registered to newly established Consortium: 270
Japanese Institute/Researchers: Present condition of observation sites

Terrestrial/Cryosphere Observation Sites maintained by in cooperation with corresponding Countries. (Mostly, semi-permanent observation sites) up to 2011.
NIPR: Ny-Ålesund, a Gateway to the Arctic – NIPR Atmospheric Science Activities –

Since 1992

Japanese Rabben Station

Syowa Station

Bi-Polar

Ny-Ålesund Station
Methane and isotope concentration

From measurements of CH$_4$ and $\delta^{13}$C, sources of CH$_4$ are assumed. Contribution of wetland is affecting year to year variation of increase rate (Morimoto et al., 2006)

CH$_4$ concentrations and $\delta^{13}$C and trends at Ny-Ålesund, Svalbard
JAMSTEC: measurement network at circum-polar land in collaboration with Russian, Mongolian and US Institutes. Obs. Period 1997~ (depend on site)

Long-term Obs. Site.
Super-sites, experiment-sites
Traverse Obs. Line

Long-term observation results

ACOS(Automatic Climate Observation System)
The site is revisited twice a year. This is the first detail data set taken for such long period automatically (1997~2007) for use for land surface processes studies

Snow cover and thawed depth at Yakutsk (Yijima et al., 2010)

④ Tower flux measurement site at Yakutsk in Russia maintained between Japanese Institutes and Russian Academy of Sciences.
NIES (National Institute of Environmental Sciences): Observation of Greenhouse Gases using Aircraft and Tower Network in Siberia

By: T. Machida and M. Sasakawa (NIES)

Cooperation with:
- Institute of Atmospheric Optics, Tomsk, Russia
- Permafrost Institute, Yakutsk, Russia
- Central Aerological Observatory, Moscow, Russia
- Institute of Microbiology, Moscow, Russia
CO₂ by Aircraft over Surgut

AN-24

7km

3km

1km
R/V Mirai (JAMSTEC)
Ice-strengthen research vessel


Next cruise: 2012, 2013
New Arctic Research Program:
GRENE (Green Network of Excellence) (2011～2016)
(Funded by MEXT, and NIPR will implement collaborating with whole Japan)

1. Strategic Research Theme
   (1) Clarification of the mechanism of the Arctic amplification.
   (2) The role of Arctic in the global climate change and future projection.
   (3) Evaluation on the influence of the Arctic Environmental Change to the weather in the Japan area and fishery.
   (4) Future projection of the sea ice distribution in relation to the evaluation Arctic route.

2. Basic infrastructure
   (1) Arctic research cruises by Japanese and foreign ships/ice breaker.
   (2) Cloud radar system. (3) Data archive system.

3. Establishment of “Japan Consortium for Arctic Environment Research”

4. Budget size: 650, 000, 000 Japanese Yen per year. (Changes year by year)
   (approx. 8 million USD per year)
New Field observation started in 2012 under GRENE Arctic Program

Ministry of Education, Culture, Sports, Science & Technology—Japan (MEXT) "Green Network of Excellence" (GRENE) Program

Arctic Climate Change Research Project
Rapid Change of the Arctic Climate System and its Global Influences
2011-2016

Research Projects (4)
The role of Arctic cryosphere in global change

Greenland Ice Sheet: Northern near Qaanaaq

The mark shows the in-situ observation started as part of GRENE Arctic Program in 2012
GREENE Arctic Program – Ocean Obs. In 2012

Research Project(6)
Ecosystem studies on the Arctic Ocean declining sea ice

Green Arctic Program – Ocean Obs. In 2012

Projection of sea ice distribution and Arctic sea routes
Sub-Research Project
Changes in the Arctic Ocean and mechanisms of catastrophic reduction of Arctic sea ice

MIRAI Cruise (in the cyclone)

55N, 176E, Sept. 10, 2012

82N, 170E Aug. 13, 2012

81N, 176E Aug. 12, 2012

Cooperation with Korea, on ARAON
Japan Consortium for Arctic Environment Research

Consortium Office:
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(Tentative as of September 2011)

Tentative homepage address:
http://www-arctic.nipr.ac.jp/web_HKKC/HKKC_top/

Credit of Photo:
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This brochure is a tentative version

 Voluntary organization
Main task: Planning and coordination domestically/internationally
270 scientists registered
1. Activity of JCAR

JCAR has several objectives. It will examine and develop the long-term research plan and infra-structure for the Scientific Research on Arctic Environment in Japan, enhance cooperation and coordination internationally and domestically, and will consider about the human resource development. Furthermore, make proposal on these matters to research community and related organizations, will circulate information among the community and will transmit information to the national and international public. Through these activities, JCAR will be a promoting body on Arctic Environment Research for short and long-term.

JCAR will take over the implementation of Arctic session held every year at JpGU (Japan Geophysical Union) Annual Assembly, and the ISAR (International Symposium on Arctic Research) held every two years (2008 and 2010).

JCAR is planning to make stress in transmitting information on Arctic Environment Research done by Japanese scientists, lectures addressed to the public and will transmit information through the HP of the Consortium.

2. Organization and funding of JCAR

The Steering Committee of JCAR will lead the activity through gathering requests and comments from the registered members to JCAR. For detail discussion Working Groups will be formed.

In order to implement the objectives, Consortium Office will be placed at National Institute of Polar Research (NIPR).

The fund need to run the JCAR is prepared by Ministry of Education, Science, Sport and Culture (MEXT) through the new Program “Green Network of Excellence (GRENE)”.

①Radiation measurement at Svalvard

②Aero-photo of the Ny-Ålesund where NIPR has its station.

③Second International Symposium on Arctic Research (December, 2010 in Tokyo)

④Tower flux measurement site at Yakutsk, Russia maintained between Japanese Institutes and Russian Academy of Sciences.

⑤Arctic observation cruise of Research Vessel of JAMSTEC “Mirai”.

⑥Second International Symposium on Arctic Research (December, 2010 in Tokyo)
ISAR-3 early next year.

Third Symposium following the 2008 and 2010.

Has gathered more than 200 participants in the previous one, more than 1/3 join from foreign countries.

Including the discussion on scientific results of various area of environmental research in the Arctic, discussions are made on international cooperation.
Several comments concerning Japanese activity and SAON

Observation and data of Japan

Japan has obtained quite much data at ad-hoc site and observation network, and maintaining them under various kind of program and projects. We hope that networks are sustained and data are well organized, and consider that SAON activity integrating them is important from the following stand point which Japan has strong interest.

(1) Understanding the evidence and process of changes and interaction occurring in the Arctic Environment.
(2) Improving global change study including development and application of climate and earth system model with usage of well-organized data to drive and validate them.

How much Japan or Japanese scientist have contributing to SAON activity or TASKs.

There are scientists involved (with names) in some of the TASK. However, this is very small considering the whole activity of Japan. One reason is that, with some exceptions, they work mainly in small groups without commitment to International Framework.

Secondly, since much Arctic study in Japan takes the form of cooperation with foreign countries, in a document of list of observation works, it is cited under those foreign countries, although they have played significant role. The contribution of Japan is not evident so much in the documents, but reality is different.

How will Japan go on

With development of new GRENE Arctic Program (2011～2016), the work of Japanese scientists are increasing. We would like to organize these activities, along with existing projects from the past, more into the international framework, so that the valuable data is arranged used, not only in a group or in Japan, but worldwide.
Thank you for your attention