

Japanese scientific activities in the Arctic in retrospect and prospect

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One of the earliest scientific engagements in the Arctic by a Japanese scientist was an IGY project carried out by M. Miyake at Point Barrow, which tried to measure evaporation from a lead between ice floes. Since then almost 60 years have passed. Some individual efforts followed in the 1960s and 70s, projects at the High Latitude Research Laboratory of McGill University on Axel Heiberg Island, the North Water Project in northern Baffin Bay, and AIJDEX in the Beaufort Sea. From 1980s to 2000s, Japanese activities acquired a more organized character in such international projects such as the Greenland Ice Sheet Project, various projects at the International Environment Monitoring Facilities at Ny Ålesund and at Summit Environment Monitoring Laboratory on Greenland ice sheet, and IARC at UAF.

Japan became one of the original members of the IASC in 1990. These efforts however relied heavily on the sense of problem awareness and the individual enthusiasm of the participating scientists. There however has not yet been a truly highly organized Pan-Arctic project carried out by Japan. In this sense GRENE-Arctic Climate Research Project (ACRP) is an important step forward, and the project is a chance for Japanese Arctic research to make a truly international contribution.

Besides the on-going GRENE ACRP, some important aspects are summarized in the following eight points:

- 1) Polar amplification and rapid warming should be viewed carefully without prejudice. The temperature increase in the Arctic is a seasonal phenomenon. When summer conditions are considered, the Arctic is the slowest warming region of the Northern Hemisphere. To support this statement, one can look at the seasonal glacier mass balance of glaciers near the Arctic Ocean, which shows the smallest increase in the summer melt in the High Arctic.
- 2) The sea-ice recession in the Atlantic sector is most clearly observed at the end of the melt season in September. The recession at its maximum extension in March is not so conspicuous. This difference is probably responsible for the stability of the Atlantic thermohaline circulation, which has been claimed to change drastically by some scientists.
- 3) The paleo-climatology in the Arctic has still to be studied. For this purpose soft rock geology of the Arctic basin and lakes will play an important role.
- 4) The terrestrial ecosystem should be studied together with the change in physical conditions of the same site.
- 5) Greenland glaciology should focus more on to the mountain glaciers and ice caps that have lower altitudes, hence reacting faster to the warming.
- 6) Summit Observatory should be moved to the true geodesic Summit for long-term monitoring.
- 7) All these activities become important only when the work is carried out for a long time. Many IGY projects are still carried out long after the IGY was completed.
- 8) For fulfilling this mission, the operation from the own icebreaker in the Arctic is the most fundamental prerequisite. Without the icebreaker, no original science in the Arctic will be achieved by the Japanese.