

Arctic Monitoring of KOREA

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Since 2010, Korean scientists have performed the monitoring in various regions of the Arctic. As a member of the international community and good partner of the Arctic states, Korea has contributed the Arctic research to understand the impact of climate change on the Arctic environment.

Korea Polar Research Institute (KOPRI), the leading organization of Arctic research, has an Ice Breaking Research Vessel, Araon. Using Araon, we have conducted multidisciplinary research in the Arctic Ocean. Since 2010, we have the Arctic expedition every year. Sea ice-covered area in the Pacific Central Arctic Ocean (CAO) is a major study site of the Korean Arctic program, regularly visited by its flagship and an icebreaker, Araon. We did Ocean-Sea Ice-Atmosphere Integrated Observations from 6-25 August 2017 in Northern Bering Sea to Southern Chukchi Sea, Chukchi shelf, and Chukchi Borderland to the East Siberian Sea. The aims of the cruise are to identify key environmental parameters in rapid transition due to the sea-ice decrease in the Pacific Central Arctic Ocean (CAO), to predict change patterns, and to understand sea ice dynamics and sea ice ecosystem. The chief scientist of this program is Dr. Sung-Ho Kang (shkang@kopri.re.kr), and 52 Scientists from 11 Countries (Korea, USA, Japan, China, France, Spain, UK, Germany, Italy, Croatia, Russia) have joined this cruise. KOPRI have provided a platform for international cooperation, welcoming numerous foreign scientists on board, providing instrument deployment opportunities and accommodating the ongoing and

planned research initiatives.

The second Arctic cruise is Arctic MARine Geoscience Expedition (AMAGE). To monitor methane releasing from the Arctic shelves due to global warming, we have visited the Beaufort Sea during 27 August and 16 September 2017. This program has three main research questions: Is Arctic subsea permafrost/gas hydrate currently thawing? Is massive methane release really occurring from the Arctic Shelves? Can methane release in the Arctic Shelves cause the rapid global warming?

We have also monitored environmental changes in Circum-Arctic Permafrost including Ny-Alesund in Svalbard, Council in Alaska, Cambridge Bay in Canada, Storhofdi observatory in Iceland, and Station Nord in Greenland. We have focused on green house gas that emitted from permafrost. We have operated greenhouse gas flux system and LED sensor to detect the color change of plants. We measured the net CO₂ exchange, photosynthesis, and soil respiration. We have continued climate manipulation experiment more than 5 years. We have also monitored Dimethyl sulfide (DMS). In Russia, we started the monitoring of Greenhouse gas (and energy) fluxes exchanged between the atmosphere and permafrost in the Ice Base Cape Baranova in collaboration with AARI (Arctic & Antarctic Research Institute of Russia).

In Svalbard, using Helmer Hanssen, we did Fjord cruise to understand paleo-environmental changes and glacial history. We are going to reconstruct paleo-environmental changes of Svalbard fjords since the last glacial maximum. We have also studied the chemical fate of Arctic pollutants trapped in various ice media and monitoring of new contaminants

All the data are deposited at Korea Polar Data Centre belonged to Antarctic Master Directory managed by NASA. We share up to date information on the Arctic to stakeholders, researchers and anyone who is interested in Arctic through a website, Arctic Knowledge Center.

As an observer state of the Arctic Council, we will sincerely continue to carry out the Arctic environmental monitoring with Arctic states.