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## **Scientific & Science-related Collaborations with Other Parties During 2012-2013**



## Scientific and Science-related Collaborations with Other Parties During 2012-2013

Background Paper Submitted by Republic of Korea

Conscious of the importance of the collaborations and the spirit of the Antarctic Treaty, and in accordance with Article 6 of the Protocol, the Republic of Korea collaborated with other parties during 2012-2013 in conducting polar scientific research and related activities.

### **1. Institutional efforts to contribute to an international ocean observation network under SOOS initiative**

Since 2012, Korea Polar Research Institute (KOPRI) has been conducting a planning study to contribute to an international ocean observation network under SOOS initiative (Southern Ocean Observation System: under SCAR and SCOR auspices). The network we mainly pursue is a coordinated international collaboration targeting the Pacific sector of Southern Ocean including the Amundsen Sea as well as part of the Ross Sea sector.

To this end, KOPRI has been in a series of dialogues with interested experts of British Antarctic Survey (BAS: UK), Univ. of East Anglia (UEA: UK), US ASPIRE research group (Amundsen Sea Polynya International Research Expedition), Univ. of Paris: VI (France), Univ. of Gothenburg (UGOT: Sweden), the Third Institute of Oceanography (China). A workshop for further implementation plan is scheduled in May, 2013 in Korea.

The outcomes of this workshop will be followed up and further developed during the Asian SOOS activity workshop in Shanghai the following week and the SOOS workshop of national program operators during COMNAP meeting in July in Seoul.

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### **2. International Collaborative Marine and Quaternary Geoscience Research on Abrupt Environmental Change in the Larsen Ice Shelf System**

For the International Polar Year (IPY), KOPRI scientists participated in an international, multi-disciplinary field program (USAP LARISSA program) to address the issue of rapid changes occurring in the Antarctic Peninsula region as a consequence of the abrupt collapse of the Larsen Ice Shelf. The overarching goal of this project is to describe and to understand the basic physical and geological processes active in the Larsen embayment.

The Korean icebreaker *Araon* is sailing to and working in the western coast of Antarctic Peninsula due to bad sea-ice condition of the Larsen Ice Shelf to install moored instruments on the ice and to attempt new approaches in the marine photochemical field. Eighteen USAP scientists involved with LARISSA program will participate in this cruise for shipboard sampling and mooring on the ice.

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### **3. Expedition to the Antarctic Ridge**

From 28th Jan. to 5th Feb, 2013, KOPRI conducted a research survey on KR1 segment in Australian-Antarctic Ridge using *Araon*. This is successive of previous two cruises in 2011. The main purpose of this cruise was to locate the vent sites, which was accomplished this time.

We well located the three vent sites within 1 km range using CTD Tow-yo. The tow-yo was successful as we attached OBS and ORP sensor to the CTD. NOAA scientist joined this cruise and collaborated for CTD Tow-yo. We named this new vent field as 'Araon'. Sea-water samples were taken from the vent site, and a variety of gas samples including CH<sub>4</sub> and H<sub>2</sub> were analyzed on board. <sup>3</sup>He and trace metals will be analyzed soon and used to characterize the chemistry of the vent with other data set. Exciting finding of this cruise is the hydrothermal biology including the crab and starfish taken by dredge. It appears that these vent biology are unique species in the southern ocean and have great importance to understand the hydrothermal vent biology communities in that. Also we did multi-beam mapping of the seamount in the south of the ridge axis. The proton magnetometer was also towed during the mapping. These geophysical data, and four rock core samples obtained from the top of the seamount, will do key role to understand the tectonic evolution of this area.

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### **4. International Collaborative Work for Marine Geology and Geophysics in the Ross Sea**

The Korea Polar Research Institute (KOPRI) and The Nazionale delle Ricerche in Antartide (PNRA) of Italy had a joint research expedition aboard *Araon* in the Ross Sea, during 10 ~ 23 February 2013. Eight Korean scientists and four Italian scientists from University of Trieste and OGS participated in the cruise.

Two countries have their own scientific program related to the cruise, K-PORT of Korea and ROSSSLOPE of Italy. The common aim of both programs is to reveal geological, geomorphological, geophysical characteristics of the sea floor, water-mass circulation and Late Cenozoic environment variations in the Ross Sea, Antarctica. In 2011 the project leaders of the two programs agreed on this collaborative work to exchange scientific facilities and knowledge.

The initial target was to acquire geological samples and seismic data in the slope area of Iselin bank to support IODP proposal but it had to be changed due to severe weather and ice conditions. As an alternative way to achieve scientific goal, the target area was changed to the Central basin where the effect of high salinity shelf water and ice shelf water is important to understand oceanographic environments of the Ross Sea. We sailed for 5 ship days for the joint work, and we collected geological samples on 3 sites using box and gravity corer, swath bathymetry data, sub-bottom profiling data, and 120 channel air gun seismic data.

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### **5. Measurement of physical and mechanical sea ice properties for construction of the Jang Bogo Station**

The Korea Polar Research Institute (KOPRI) and AARI (Arctic and Antarctic Research Institute: Russia) had joint activities to investigate the sea ice properties for the unloading of construction materials on the fast ice in Antarctica during construction of the Jang Bogo Station in austral summer season 2012/13.

We measured the sea ice thickness and ice strength during unloading. Out of these measurements, daily recommendations were given to the construction workforce with regard to the limits to the unloading weight, time of the safe standing on ice, and crossing of ice cracks.

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## **6. Korea-NZ collaborative research on New Zealand EEZ**

Korean R/V Araon has been calling into Lyttelton port (Christ Church) in New Zealand for the past few summers to support the research cruises in Antarctica (Weddell Sea, Amundsen Sea, Ross Sea, etc) and to reach the site of Jang Bogo station. Araon which has scientific instrumentations including geophysical surveying equipment onboard has taken this opportunity for surveys on New Zealand waters as part of collaborative research with scientists from New Zealand research institutions (GNS, etc) along the ship track in the New Zealand EEZ.

In the 2012/13 austral summer season, it undertook swath mapping transects in the areas of Campbell Plateau, New Zealand. This survey yielded five lines of multibeam, SBP, and gravity data. By collecting and processing the data, it is anticipated that the resulting larger sea floor image will enable a more complete understanding of the pattern of basement faults and gas pockmark distributions.

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## **7. KOPRI's international research grant to promote scientific cooperation**

In late 2012, Korean Polar Research Institute advertised a research grant program named K-PISCOP (Korea-Polar International Science Cooperation Program) inviting international investigators to cooperate with Korean scientists on Korean research infrastructure. Two awardees were selected after a round of application and review and the collaborative works have started. Although the program is in its infancy stage, the intent is to continue and gradually expand the scheme.

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