
Poster Presentation

OVERVIEW OF THE ARAON'S ARCTIC MARINE GEOSCIENCE EXPEDITIONS

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ABSTRACT

The area of the Arctic Ocean is about 60 times that of the Korean peninsula. It is thought that Arctic shelf areas, which are underlain by stable permafrost and gas hydrates, are being altered and destabilized by the effects of sea level change. A recent global concern is the potential release of methane from decomposing subsea permafrost and associated permafrost gas hydrates in the Arctic shelves, which could represent a 'time bomb' that may accelerate future global warming. The other concern is new phases of exploration and development expected in the near future because the Arctic shelf and slope regions contain substantial offshore hydrocarbon resources. Such geologic processes mentioned above can result in the occurrence of significant geohazards and environmental issues. In order to improve our knowledge of marine geological environment/structures and sub-seabed processes related to above two concerns in the Arctic shelf and slope, five research expeditions with the Korean icebreaker Araon, operated by the Korea Polar Research Institute (KOPRI), have been undertaken since 2013. Three expeditions (2013, 2014, and 2017) were conducted in the Beaufort Sea (within Canadian EEZ) as a the Canada-Korea-USA international research program and two expeditions (2016 and 2018) were carried out in the East Siberian/Chukchi Sea areas through a collaboration between Korean, Russian, and Japanese institutions. The IBRV Araon is a well-equipped scientific icebreaker. The field program has collected data on sub-surface geology, subsea permafrost/gas hydrate, and gas venting structures in the Arctic shelf/slope. The program has also documented near surface geological/ocenological processes, such as permafrost degradation, submarine slope failures, water column properties and methane release. In 2017, the MBARI (Monterey Bay Aquarium Research Institute)'s state-of-the-art ROV/SUV were very successfully operated onboard the Araon. Major findings/results from five Araon expeditions are 1) deep multichannel seismic (MCS) and very high-resolution sub-bottom structures of the shelf and slope areas in the southern Beaufort Sea, East Siberian Sea and Chukchi Plateau, 2) regional gas hydrate occurrence on the Arctic slope: first gas hydrate sampling on the western slope of the Chukchi Plateau and detection of gas hydrate BSR (bottom simulating reflector) in the continental slopes of the Yukon and Chukchi Plateau, 3) offshore permafrost structures from the OBS (ocean-bottom seismometer) and MCS surveys, 4) high dissolved methane concentration in the middle East Siberian shelf, 5) detailed seafloor changes of mud volcanos and shelf-edge pingo-like structures in the Beaufort Sea from repeat ROV/AUV surveys, and 6) regional occurrence of manganese nodules on the upper slope of the East Siberian Sea. Araon Arctic expeditions will continue in the Beaufort (2019) and East Siberian Sea/Chukchi Seas (2020) to expand our research activities