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Global climate changes studied via multidisciplinary observations in rapidly retreating sea-ice regions with bipolar perspectives

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Korea's lately commissioned icebreaker Araon is a vehicle for long-term, multidisciplinary observations, where multinational collaborations are cordially invited to. The Korean polar program plans to focus on and link between Arctic and Antarctic sea-ice regions where ice has retreated rapidly in recent years. The research aims to elucidate the roles of sea ice and nearby waters in larger scale climate changes, and to examine the responses of the system. It will be a multi-level investigation, from satellite imagery to sediment trap, with emphases on feedbacks between the components known to govern the climate system. For example, the variability of sea ice with its changing roles as a regulator of heat exchange and gas transfer between atmosphere and ocean, and the changes of the habitat for the biota are the core of the study. The Pacific side of Southern Ocean will be the primary target site as our preliminary analysis indicates that development of polynya and enhanced biological activities make this area an ideal place to explore the interaction between different water masses with ice, and subsequent impacts on the carbon cycles and ecosystem. Sea ice in the Arctic Basin facing the Pacific is apparently experiencing a loss at an unprecedented rate, and thus could offer insight for the fate of the new water mass entering the area previously covered by sea ice. These two areas are connected by the ship's track through mid-latitudes, which will also serve as a platform of our sustained observations. This program, with international participations, will make a global campaign to acquire the data on the 'Pacific Pathway' and to shed a new light on its role in the global climate system. It is Korea's anticipation that this initiative will be a concerted effort with Southern Ocean Observing System as well as Sustained Arctic Observing Networks.

Keywords: global changes, bipolar, sea ice, Pacific

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