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SPACE APPLICATIONS FOR TRANSPORTATION IN THE POLAR REGIONS

Abstract

In recent years, satellite observations have revealed drastic shrinkage of sea ice in the Arctic Ocean. Using the advanced microwave scanning radiometer 2 (AMSR2), Japan Aerospace Exploration Agency's (JAXA) brand-new satellite Global Change Observation Mission – 1st Water (GCOM-W1) confirmed that the sea ice extent in the Arctic Ocean in September 2012 was the smallest ever recorded. The reduction of sea ice extent is thought to be one of the serious impacts of global warming and climate change; it also opens possibilities of an Arctic sea route. The Northeast Passage between East Asia and Europe is a voyage 40% shorter than the Suez Canal route. JAXA has been observing Arctic sea ice for over 10 years via a series of AMSRs (AMSR/ADEOS, AMSR-E/Aqua, and AMSR2). In collaboration with the International Arctic Research Center (IARC), sea ice data is distributed through the Arctic Sea-ice Monitor website. In addition to GCOM-W1, JAXA will launch the Advanced Land Observing Satellite-2 (ALOS-2) carrying high resolution Synthetic Aperture Radar and the GCOM – 1st Climate (GCOM-C1), carrying a medium resolution/wide swath multi spectral radiometer in the near future. These new satellites are powerful global observation tools and can provide useful data regarding transportation in the polar region. However, many more satellites will be needed for frequent and operational observations. International collaboration for satellite observation is essential. In addition, forecasts of sea ice extent, thickness and concentration along an expected vessel path is an important tool for maintaining navigational safety in the Arctic Ocean. Navigation safety systems of the future will have to consist of space-based observation system and weather, ocean and sea ice models.