

Space-Based and Marine X-Band Radar Remote Sensing of the Arctic Domain

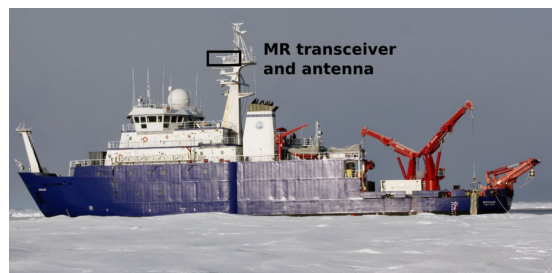
Marine X-band radars (MRs) have been widely used for ship navigation. In recent years, oceanographic marine radar applications have received growing interest. The promise of oceanographic MR aboard a research vessel or icebreaker opens new avenues of research. In ice zones, the system offers improved detection of icebergs, bergy bits, and growlers that can significantly damage a vessel. Furthermore, differentiation between open water, ice pans, leads, and ridges are essential information for route planning. Science experiments will benefit from the ability to characterize the sea ice cover, e.g. flux measurements. In addition to sea ice monitoring, the system offers near real-time surface wave and near-surface current monitoring. Further science applications include in open waters the study of bathymetry, winds, internal waves, oil spills, as well as both atmospheric and oceanic flows (Langmuir circulation).

A new set of commercial (e.g. Cosmo-SkyMed, ICEYE, TerraSAR-X, Umbra) and public (Sentinel-1) synthetic aperture radar (SAR) satellites offer a multi-scale approach to satellite remote sensing of icebergs, ice properties, and dynamics in the Arctic waters. More research is needed in melting pond classification, open water detection, and larger-scale ice deformation. Satellite data will be directly downlinked to the Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) campus and processed in-house.

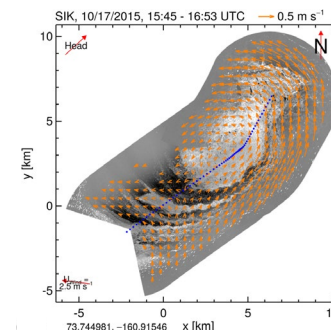
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Above: R/V Sikuliaq in the Marginal Ice Zone equipped with a marine ice radar. Right: Marine radar sea ice drift corrected image mosaic.



Above: A SAR image of various sized ice floes in the Beaufort Sea. Right: Electro-optical image of ice with open water leads.



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