

## **FIELD VALIDATION CAMPAIGN IN THE BARENTS SEA FOR SEA ICE MAPPING AND MODELING**

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### **Abstract**

A field validation campaign was carried out in the Barents Sea by the Jet Propulsion Laboratory (JPL), the Naval and National Ice Center (NIC), the Naval Research Laboratory (NRL), and the Technical University of Denmark (DTU) using the US Coast Guard (USCG) icebreaker Healy during October-November 2001. The objectives are: (1) to measure active and passive microwave signatures of sea ice together with ice physical characteristics for developing and verifying sea ice satellite mapping algorithms, and (2) to make ice observations for improving and validating sea ice growth model in the marginal ice zone for ice forecast. NIC will use backscatter data measured by the SeaWinds scatterometer carried by the QuikSCAT satellite for sea ice mapping. QuikSCAT/SeaWinds scatterometer, launched by NASA in June 1999, operates at Ku-band frequency with both horizontal and vertical polarizations. During the experiment, near-real-time images including QuikSCAT backscatter images and composite products of QuikSCAT wind field with SPAROS ice edge were obtained aboard the USCG ship. Furthermore, concurrent RADARSAT SAR data, SSM/I images, and OLS products were downloaded. A set of software was developed to overlay Healy ship tracks on QuikSCAT and RADARSAT images using ship GPS data. The JPL Ku-band polarimetric scatterometer and the NRL X-band polarimetric radiometer were deployed on the Healy icebreaker to collect collocated active and passive polarimetric signatures of various sea ice types. Sea ice and snow samples were taken to determine ice physical and crystallographic properties. Meteorological and oceanographic data were also acquired. Various ice types were measured at 18 different measurement stations and ice observations were made at 74 locations. Results showed dramatic interactions of wind, ice, and ocean that profoundly impact both the retreat and the advance of sea ice cover. Satellite images reveal that the regional pattern of sea ice cover has a close relationship with ocean bathymetry, which determines the distribution of Arctic and Atlantic water in the Barents Sea. A sea ice barrier was formed rapidly across the southeast side of Svalbard, which could pose navigation hazards to fishing vessels in this area. This field campaign provides valuable data to improve and validate sea ice mapping products and sea ice modeling results for both operational applications and scientific studies.