Foreword to the March 2003 EOS Aqua AMSR-E Arctic Sea Ice Field Campaign Special Issue

UCH of our knowledge of the global sea ice cover, including its seasonal and regional variability, its longterm trends on decadal time scales, and its interaction with other components of the climate system, stems from sea ice data records derived from satellite passive microwave observations. One of the more recent satellite multichannel microwave radiometers launched is the Advanced Microwave Scanning Radiometer for the Earth Observing System (EOS) (AMSR-E), which was designed and built for the National Aeronautics and Space Administration (NASA) by Japan's National Space Development Agency (now part of the Japan Aerospace Exploration Agency). AMSR-E was launched on May 4, 2002, onboard the EOS Aqua spacecraft. AMSR-E has a long heritage, starting with NASA's Scanning Multichannel Microwave Radiometer from 1979 to 1987 and the Defense Meteorological Satellite Program series of Special Sensor Microwave Imagers since 1987, and promises to provide a more accurate measure of the Earth's sea ice cover and its variability because it has more channels and about double the spatial resolution than its predecessors.

Through the support of the NASA EOS Project and NASA's Cryospheric Sciences Program and with the participation of scientists from NASA, other government agencies, and universities, a coordinated Arctic field campaign to validate the AMSR-E sea ice products was completed in March 2003. The standard AMSR-E sea ice products include sea ice concentration, ice temperature, and snow depth on sea ice. The field campaign consisted of seven aircraft flights using the NASA P-3 covering portions of the Bering, Beaufort, and Chukchi seas. Each of the seven flights had a specific validation objective. The Bering and Chukchi Sea flights were particularly useful for providing independent assessments of the characteristics and concentrations of a variety of sea ice types. The flights made near Barrow, AK, and over a Navy ice camp in the Beaufort Sea were coordinated with extensive surface-based measurements of snow and ice physical properties, and data from these flights were used primarily for the validation of the sea ice temperature and snow depth on sea ice products. The aircraft flights were also coordinated with high-resolution Landsat-7 Enhanced Thematic Mapper Plus and RADARSAT imagery that were acquired, processed, and analyzed to validate the AMSR-E sea ice concentrations. All of the validation data sets collected are archived and are publicly available at the National Snow and Ice Data Center in Boulder, CO (http://www.nsidc.org).

Some of the papers in this Special Issue report on the results of the validation campaign, providing the research community with a first measure of the accuracy of the AMSR-E sea ice products. These results will form a baseline for future AMSR-E sea ice validation studies. Other papers also provide insight into the reasons for the particular validation results obtained, suggest potential algorithm improvements, and enhance our understanding of microwave remote sensing of sea ice for studying geophysical processes. TGARS is a natural venue in which to publish these results, as it is the same journal in which the Aqua mission was described including the AMSR-E sea ice algorithms (EOS Aqua issue, vol. 41, no. 2, Feb. 2003).

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