

SMOS sea ice product: Operational application and validation in the Barents Sea marginal ice zone - DTU Orbit (08/11/2017)

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Brightness temperatures at 1.4. GHz (L-band) measured by the Soil Moisture and Ocean Salinity (SMOS) Mission have been used to derive the thickness of sea ice. The retrieval method is applicable only for relatively thin ice and not during the melting period. Hitherto, the availability of ground truth sea ice thickness measurements for validation of SMOS sea ice products was mainly limited to relatively thick ice. The situation has improved with an extensive field campaign in the Barents Sea during an anomalous ice edge retreat and subsequent freeze-up event in March 2014. A sea ice forecast system for ship route optimisation has been developed and was tested during this field campaign with the ice-strengthened research vessel RV Lance. The ship cruise was complemented with coordinated measurements from a helicopter and the research aircraft Polar 5. Sea ice thickness was measured using an electromagnetic induction (EM) system from the bow of RV Lance and another EM-system towed below the helicopter. Polar 5 was equipped among others with the L-band radiometer EMIRAD-2. The experiment yielded a comprehensive data set allowing the evaluation of the operational forecast and route optimisation system as well as the SMOS-derived sea ice thickness product that has been used for the initialization of the forecasts. Two different SMOS sea ice thickness products reproduce the main spatial patterns of the ground truth measurements while the main difference being an underestimation of thick deformed ice. Ice thicknesses derived from the surface elevation measured by an airborne laser scanner and from simultaneous EMIRAD-2 brightness temperatures correlate well up to 1.5. m which is more than the previously anticipated maximal SMOS retrieval thickness.

General information

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