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Temporal and spatial Salinity Variations in the GIN Sea

S. Dransfeld, D. Stammer

Remote Sensing Group, Institut für Meereskunde, Hamburg, Germany

(dransfeld@ifm.uni-hamburg.de)

The launch of the European Space Agency SMOS (Soil Moisture and Ocean Salinity) mission, designed to measure sea surface salinity over the oceans, necessitates detailed studies of the temporal and spatial variability of the salinity signal that it measures. By comparing in situ data sets to a climatology we can obtain an insight into the variability scales and amplitudes of surface salinity occurring in different geographical regions of the world ocean. Taking into account the SMOS sensor characteristics, such as spatial and radiometric resolution, it can be established to what extent we can expect SMOS to capture this surface salinity signal radiometrically in space and time. In view of anticipated calibration and validation efforts for the sensor, it is furthermore vital to know how representative a single (pointwise) in situ measurement is for a region corresponding to a single SMOS pixel and how it varies over time in order to set spatial and temporal constraints for the usage of in situ data as calibration and validation tools. In this study we are using in situ salinity measurements from the global Argo system with focus on the GIN (Greenland, Iceland and Norway) Sea during the period of 2001 to 2003 to study the salinity signal by comparing the data to a recent climatology. These areas are of particular interest since in colder oceanic regions the sensitivity of the 1.4 GHz sea surface brightness temperatures measured by SMOS to salinity is less than in warmer areas. Furthermore ice melt can produce pronounced large-scale variations in the salinity content. A first analysis between 356 Argo measurements and a monthly climatology shows that the RMS difference of ARGO data to a climatological field is 0.59 psu with mean values of 34.52 and 34.33 psu for the ARGO data and the monthly climatology, respectively. Major concern exist if SMOS can actually resolve the variability indicated by these figures.