



Sea ice concentration from satellite passive microwave algorithms: inter-comparison, validation and selection of an optimal algorithm

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Sea ice concentration (SIC) has been derived globally from satellite passive microwave observations since the 1970s by a multitude of algorithms. However, existing datasets and algorithms, although agreeing in the large-scale picture, differ substantially in the details and have disadvantages in summer and fall due to presence of melt ponds and thin ice. There is thus a need for understanding of the causes for the differences and identifying the most suitable method to retrieve SIC. Therefore, during the ESA Climate Change Initiative effort 30 algorithms have been implemented, inter-compared and validated by a standardized reference dataset. The algorithms were evaluated over low and high sea ice concentrations and thin ice.

Based on the findings, an optimal approach to retrieve sea ice concentration globally for climate purposes was suggested and validated. The algorithm was implemented with atmospheric correction and dynamical tie points in order to produce the final sea ice concentration dataset with per-pixel uncertainties.

The issue of melt ponds was addressed in particular because they are interpreted as open water by the algorithms and thus SIC can be underestimated by up to 40%. To improve our understanding of this issue, melt-pond signatures in AMSR2 images were investigated based on their physical properties with help of observations of melt pond fraction from optical (MODIS and MERIS) and active microwave (SAR) satellite measurements.