SENTINEL-1 for Baltic and Arctic Sea Ice Monitoring

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SENTINEL-1a (S-1a) SAR data has been used for sea ice monitoring at FMI since December 2015. FMI's operational SAR based sea ice products previously based solely on RADARSAT-2 ScanSAR imagery are now produced using S-1a and RADARSAT-2 (RS-2) imagery jointly. These products include ice thickness and ice drift charts for the Baltic Sea, an ice thickness chart for the Barents and Kara Seas based on multisensor satellite data (S-1a, AMSR2) and a sea ice model data. The Baltic Sea ice chart produced using mainly manual methods by the FMI ice analysts utilizes also S-1a data. The Baltic Sea ice thickness and ice drift products are produced as part of the Copernicus Marine Services (CMEMS) and delivered to users through the CMEMS portal (http://marine.copernicus.eu). Some of the ice parameters (e.g. ice thickness) of the Baltic Sea ice chart are also disseminated through the CMEMS portal. The Barents and Kara Seas ice thickness chart is produced in winter 2015-2016 as part of the EC-funded FP7 POLAR ICE project. It is delivered to end-users through an user-interface specified and developed in an earlier EC-project ICEMAR.

For our sea ice products we mainly use S-1a Extra Wide Swath Mode (EW) dual-polarized L1 GRDM data with the HH/HV (HH=horizontally transmitted, horizontal received, HV=horizontally transmitted, vertically received) polarization combination. S-1a EW GRDM mode has a pixel spacing of about 40m and a swath width of about 400 km. This wide cover with relatively high resolution makes the mode suitable for operational ice monitoring of wide areas such as Baltic Sea. In the presentation the properties and quality of S-1a data, its calibration, noise floor equalization and pre-processing will be discussed. The suitability of S-1a for sea ice observation will be evaluated and S-1a data will be compared to RS-2 data acquired over the same ice fields. Also the FMI sea ice products based S-1a and RS-2 will be compared. Also the operational delivery (data availability and delays) of S-1a data during the ice season 2014-2015 will be evaluated.