Operational Synthetic Aperture Radar Based Sea Ice Classification

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Over decades, synthetic aperture radar (SAR) has become an invaluable tool for operational and scientific monitoring of ice infested maritime regions. In contrast to optical imaging, SAR is not affected by cloud coverage or lack of daylight. While air-borne and ship-borne SAR cannot always be used during adverse weather conditions, space-borne SAR image acquisition is not impeded by weather incidents and can cover almost any region on the globe with short revisit times. Satellites such as ALOS-1 and ALOS-2 in L-band, RADARSAT-1 and 2, ENVISAT and Sentinal-1 in C-band and TerraSAR-X (TS-X) in X-band have proven the usefulness of SAR sensors for investigating sea ice in Arctic and Antarctic regions. The size of SAR images extends up to a few hundred kilometers in width and length and provides much higher resolution information compared to other conventional sensors (e.g. passive microwave) and are ideal for the long term-monitoring conducted by meteorological services around the world. The operational sea ice classification processing chain is able to process all commercially available SAR images in different frequency band [1, 2]. Our algorithmic approach for an automated sea ice classification consists of two steps. In the first step, we perform a polarimetric feature extraction procedure. The resulting feature vectors are then ingested into a trained neural network classifier to arrive at a pixel-wise supervised classification. During the symposium we will show examples of above mentioned products which are not only helpful for campaign planning but also might provide useful information to scientists across different scientific domains.

References:

[1] S. Singha, A.M. Johansson, N. Hughes, S. M. Hvidegaard, "Multi Frequency Fully Polarimetric Sea ice classification and validation using Airborne Laser Scanner", IEEE Transaction on Geoscience and Remote Sensing, Volume X, Issue X, Pages X‑X, 2018 (in Press).

[2] S Singha and R. Ressel, "Arctic Sea Ice Characterization using RISAT-1 Compact-Pol SAR Imagery and Feature Evaluation: A Case Study Over North-East Greenland", IEEE Journal of Selected Topics in Aplied Earth Observations and Remote Sensing, Volume 10, Issue 8, Pages 3504‑3514, 2017.