Marine Target Detection in Single and Dual Channel SAR Images

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Synthetic Aperture Radar (SAR) data for target detection are used today in operational maritime surveillance services in several countries and the European Union. However, further research is still needed to be able to fully exploit the information available from current and future SAR missions. The launch of new advanced SAR sensors (e.g. like RADARSAT-2) enables us to use single, dual and full polarimetry in automatic algorithms for target detection. Detecting targets (e.g. ship and icebergs) within SAR images can be made more reliable if several polarizations are combined with appropriate radar incidence angles during acquisition.

The capabilities of the SAR instrument in application to marine target detection and classification has been extensively documented, and operational services has to a certain extent been implemented, most often in a semi-supervised mode requiring a trained operator to quality assure and modify the output of an automatic detection algorithm. In this study we aim to improve the robustness of existing automatic algorithms, which will yield a better starting point for implementation of operational services. We focus on marine target detection in the High North, where we are not only interested in vessel detection, but also in detection of icebergs and discrimination of vessels and icebergs. As both shipping routes and exploration and production of oil and gas are moving towards higher latitudes, this aspect of marine target detection will be very important to support both environmental and economical interests as well as health and security.

It is a problem in operational systems that the specified false alarm ratio is not met in practice because the data do not fit the assumed model under varying conditions. Our goal is to obtain improved statistical data models for single, dual and full polarimetric SAR data over sea that will contribute to robust target detection under various acquisition parameters (incidence angle and polarization) and sea states. We will here present results based on single and dual polarized SAR products.