Comparison of detectability of ship wake components between satelliteborne C-Band and X-Band Synthetic Aperture Radar (SAR)

Abstract:
The detectability of ship wake signatures on C-Band and X-Band SAR differs with respect to radar frequency. In preceding studies was identified that the individual components of ship wakes need to be compared separately. For the comparison data from four satelliteborne SAR missions are collected: TerraSAR-X (TS-X), RADARSAT-2 (RS-2), Sentinel-1 (S-1) and CosmoSkymed (CSK). The data is labelled by manually retracing of wake components to derive wake component lengths. A collocation with Automatic Identification System (AIS) data is performed to obtain information on the ship's properties, which influence the detectability. Other influencing parameters are environmental conditions and acquisition settings. Detectability models (on the basis of Support Vector Regression (SVR)) are trained, which reproduce the detectability of wake components indicated by the derived wake component lengths in dependency to influencing parameters. The comparison of models reveals that certain wake components are better detectable in X-Band than in C-Band SAR.

Short Abstract:
The detectability of ship wake signatures on C-Band and X-Band SAR differs with respect to radar frequency. For comparison of detectability of individual wake components data from four satelliteborne SAR missions are collected: TerraSAR-X, RADARSAT-2, Sentinel-1 and CosmoSkymed. The data is labelled by manually retracing of wake components to derive wake component length. Detectability models are trained reproducing the detectability of wake components in dependency to influencing parameters.