



Improving current forecasts for the German Bight using HF radar measurements

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Three HF radar stations located at the islands of Wangerooge and Sylt as well as on the mainland in Büsum are operated in the German Bight as part of COSYNA system. The WERA system operates at 12.4 MHz and provides surface current measurements every 20 min. The observations are merged with numerical model data to optimise state estimates on a pre-operational basis.

The presentation introduces the spatio temporal interpolation (STOI) method, which is a statistical approach to correct data from a free model run using an analysis window of typically one tidal cycle. The technique is thus able to resolve intra-tidal time scales. The scheme is based on an EOF analysis to estimate the model error background statistics and is capable of providing improved short term forecasts.

Statistics of the free model run, the HF radar data and the STOI analysis are shown for several month. Both the three dimensional primitive equation model GETM and the operational BSH model are used to provide free model run data. GETM setups with boundary forcing from the MYOCEAN North West Shelf model are used. Maps of innovation and residuals are presented. Furthermore forecast errors for different forecast horizons are discussed. Results are also compared to independent measurements taken at the FINO-1 and FINO-2 platforms. The impact of the analysis is, e.g., illustrated by drifter trajectory simulations.

First results are also shown regarding an extension of the STOI method, which includes a model restart to further improve the dynamical consistency of the results. Issues related to the treatment of the boundary forcing and the meteo forcing used during the forecast period are discussed. The impact of the HF radar data on water level estimates are analysed.

Furthermore, some results concerning the potential impact of existing and hypothetical HF radar systems are presented, which were obtained making use of the STOI method as well as statistical OSE and OSSE techniques.