



Analysis of one year of HF radar data acquired in the German Bight

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Surface current measurements are taken on a pre-operational basis by three HF radar stations in the German Bight. This area is very shallow and dominated by tides. The HF radar is part of the COSYNA system, which aims at the implementation of an integrated observing system for the North Sea. The radars provide meridional and zonal current components at intervals of 20 minutes in areas where at least two stations overlap and only radial components elsewhere.

An analysis of the radar observations is performed for a data set of one year. A tidal decompositions is carried out to identify dominating constituents for different areas. Furthermore, the two dimensional surface current dynamics is analysed using tidal ellipses parameters. The generation of over tides in the shallow water areas is demonstrated. Different factors driving this mechanism are discussed. A closer look at the neap/spring tide cycle provides insight into the relative role of bottom friction processes. The relation between the inclination of tidal ellipses and bathymetric features is studied in this context as well. Current, salinity and temperature profile measurements taken at the offshore platform FINO-3 are used in addition to study stratification effects. The impact of the meteo forcing is investigated based on several case studies such as storm events and rapid changes of wind direction. For this purpose residual currents are estimated from the radar data. Finally the divergence of the observed current fields is analysed and the relation to water level dynamics is discussed.

The study is meant to support the ongoing work on data assimilation and quality control within COSYNA. The relevance of the presented analysis for this work is explained and illustrated. The work is of value for the optimisation of HF radar system setups in other regions as well.