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FerryBox within the Coastal Observatory COSYNA: Examples of observations and potential benefit for data assimilation in hydrodynamic models

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The aim of the Coastal Observation System for Northern and Arctic Seas (COSYNA) is to obtain a synoptic description of the key state variables of coastal seas and their physical, chemical and ecological drivers and responses in the German Bight (North Sea). The system consists of a network of in situ observations, remote sensing, and coastal predictions systems. The modules of in-situ measurements will be briefly described. One of these major components for continuous observations are FerryBox systems aboard different types of ships as well as at fixed stations on shore.
The long-term experiences with FerryBox systems for monitoring typical coastal processes will be presented by means of examples of observation. The benefit of FerryBox data compared to other observations will be critical assessed. Short term processes such as algal blooms or freshwater intrusions with subsequent higher nutrient loads at certain locations can be successfully monitored due to the high density of FerryBox measurements in space and time.
From the same reason FerryBox data can be ideally combined with hydrodynamic models using data assimilation techniques. The potential of FerryBox sea surface temperature (SST) and salinity (SSS) measurements for the improvement of model state estimates in the German Bight will be shown critically assessed.
Model-data comparison shows that the reanalysis produced by data assimilation fairly well represents the physical properties in the German Bight. The overall root-mean-square errors between temperature and salinity fields of reanalysis and observation are significantly reduced after the assimilation of the FerryBox data. Furthermore, seasonal variation in temperature is well reproduced and the predicted synoptic variation is significantly correlated with its counterpart from the mooring measured temperature.