Sea level assimilation experiments: How useful are the sea level data from coastal tide gauges for modelling of hydrophysical fields in the Gdansk Basin

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Abstract

The IOUG network of the sea level measurement stations at the eastern part of the Polish coast (Gdansk Basin) was established to deliver a valuable data set. These data set can be used to validate and improve by assimilation model results in the Gdansk Basin. These data will be obtained routinely from an Operational System of Coastal Waters and combine in an optimal way at a nowcast - forecast system that will provide important information to study and predict dynamics of the hydrophysical fields in the Gdansk Basin.

In this study a simple sea level data assimilation scheme, based on a time weighted nudging method was tested to assimilate data from coastal tide gauges in the region. As a model, a three-dimensional sigma-coordinate baroclinic model of the Baltic Sea, with a horizontal resolution of 5 km and 24 sigma-levels in vertical, was applied. The model is based on the Princeton Ocean Model (Blumberg and Mellor, 1987), known as POM. The sea level data of different time resolution from the five selected coastal tide gauges were inserted continuously updating the model solution at every time step. Model was forced using three months (August - October 1995) forcing data from the PIDCAP'95 experiment².

The model results were compared with the in situ measurements of temperature and salinity. A few numerical experiments were performed to test usefulness of the applied assimilation scheme to improve the calculated hydrophysical fields. The experiments where sea level data were assimilated shows an improvement skill almost at all depths compared to reference profiles of temperature and salinity.

References


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² Pilot Study for Intensive Data Collection and Analysis of Precipitation