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Adapting the spatial tidal characteristic analysis to a numerical model of the German Bight

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The analysis of spatial tidal characteristic of water levels and velocities (e.g. tidal high water, flood velocity) originally developed for the assessment of estuarine hydrodynamics is extended to coastal area conditions. This way of representing large-scale dynamics is a valuable addition in our knowledge about tidal currents and circulation of the German Bight. Moreover, it allows to characterize hydrodynamic properties for navigational or waterways engineering purposes. A new perspective is given with a view onto spatial variances. An objective representation through tidal characteristic parameters of the system behaviour can be given and the amount of data is reduced. Furthermore, the reduced data size leads to less complicated data management and publishing.
To analyse spatially specified tidal dynamics in coastal areas, the propagation of tides is defined using reference position networks. Following, for every tide (water levels) and tidal phase (velocities) extreme values (e.g. tidal high water), mean values (e.g. mean flood velocity) and integrals (e.g. residual currents) are calculated from the simulation data.
The analysis is based on results of a three-dimensional numerical model using UnTRIM2 which covers the North Sea with focus on the German Bight. In the EasyGSH-DB project a period of 20 years is modelled and the year 2006, containing 706 tides, is considered for the extension of the tidal analysis. The described method is successfully applied and a wide set of tidal characteristic values is calculated, which allows to consistently describe e.g. important hydrodynamic parameters i.e. flood and ebb velocities and their relation. An additional use is a spatial comparison of changes for different years and hydrodynamic forcing. The concentration to tidal characteristic values provides new insights of the dynamic within the German Bight.