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Correction Factors for COSMO-Wind Fields, used for operational forecasts in the Elbe River Estuary (Project OPTEL)

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The aim of the project OPTEL is the operational prediction of tides, water levels, and storm surges in the northern part of the River Elbe. Therefore two numerical models with a high spatial resolution of the flow of the Elbe are developed and tested by the German Federal Maritime and Hydrographic Agency and the German Federal Waterways Engineering and Research Institute.
For the operational prediction of water levels wind fields over the Elbe are needed with comparable high spatial resolution to the resolution of the hydrographic models. But the calculation of such wind fields with a meteorological forecast model would be too time consuming and therefore results of wind fields from the operational weather forecast models COSMO-EU and COSMO-DE of the German Weather Service will be used. Unfortunately the horizontal resolution of these forecast models is very coarse (approx. 2.8 km and 7 km) and at the geographical position of the Elbe only for a few grid points the roughness of water is assumed, which causes erroneous wind speed results above the Elbe.
Correction factors for the wind speeds above the Elbe were calculated on a regular grid with a resolution of 250 m. These factors depend on wind direction intervals and on the model, for which they were calculated. With the wind model WAsP (Wind Atlas Analysis and Application Program) wind fields are first calculated, using the coarse roughness of COSMO as a boundary condition. Other wind fields are computed with WAsP by using finer roughness and topographic fields as boundary conditions. These wind fields are compared and correction factors for wind speeds at each grid point of COSMO-EU and COSMO-DE are found.