Modelling of storm surges in the Elbe Estuary

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This paper presents results of the development and application of the flow model of the Elbe Estuary in northern Germany. Hind cast simulations of the extreme storm events in 1967, 1976 and 1999 are presented. Both, two-dimensional depth-integrated and three-dimensional models, have been developed based on the Delft3D Modelling System due to Delft Hydraulics. The model implements a curvilinear grid with grid spacing ranging from 150m to 10m in the horizontal. Up to 10 layers have been used over the vertical. The Elbe Estuary Model is nested to the existing North Sea Model at the Research and Technology Centre of the University of Kiel enabling predictions in real time. Model set-up and sensitivity studies are described and results of the extensive model validation covering a wide range of conditions are presented. The predictive ability of the model resulted quite high. The results of the hind cast simulations of the three storm events are analysed and discussed in detail.