



Reconstruction of the storm tide 1906 in the German Bight

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In the night from 12 to 13 March 1906, a very severe storm tide occurred in the German Bight. Extremely high water levels were caused by a coincidence of high astronomical (spring) tides and high surge levels caused by strong north-westerly winds. For large parts of the East Frisian coast, high water levels caused by this event still represent largest on record.

So far, atmospheric data to investigate this event were limited. Recently, such data became available from century long reanalyses in which only surface data were assimilated. In this study we analyse the capability of wind and pressure fields from two global reanalyses, namely the Twentieth Century Reanalysis (from 1851 onwards) and the ERA-Clim reanalysis (from 1900 onwards) to reproduce the 1906 storm tide event. In addition, historical data from daily weather maps by the Deutscher Wetterdienst were digitized and isobaric maps were drawn. The latter comprise additional data that were so far not available for assimilation in the reanalyses. From these pressure maps geostrophic winds and subsequently near-surface marine wind speeds were calculated using a simple boundary layer parametrization.

Wind and pressure fields from the reanalyses and the digitized data were used to drive a hydrodynamic tide-surge model (TRIM-NP) and to simulate the water levels of the 1906 event. Astronomical tides from FES2004 were used as lateral boundary conditions so that tide-surge interaction is accounted for.

Wind, pressure and water level fields from the different data sets are compared and put into perspective with the limited available water level observations. Initial results suggest, that the large scale structure of pressure fields is similar between both reanalyses and the digitized maps while core pressures are deeper and pressure gradients are somewhat enhanced in the digitized maps. While results in principle are similar, initial analyses suggest somewhat higher wind speeds and surges when the additionally digitized data are accounted for.