



Climate change impact estimates for North Sea storm surge conditions

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The multi-decadal storm surge conditions can undergo the influence of anthropogenic climate change. That can lead to the intensification of the storm surge extremes in the future and consequently increasing risks for the coastal areas. Here we focus on the North Sea basin and in particular on the German Bight. Probability and magnitude of the potential storm surge changes caused by the alteration of the atmospheric patterns and wind climate in the region are investigated. Four transient future climate projections (1961-2100), reflecting two IPCC emission scenarios (A1B and B1) and two different initial states, are used to simulate the storm surge scenarios. The potential wind-induced changes in storm surges are studied by comparing future statistics (2001-2100) with the corresponding reference conditions (1961-2000). The four climate projections show temporal and spatial differences in magnitude and patterns of the climate change signals. For the German Bight time series of annual storm surge extremes show strong variations on decadal time scales. This variability within and between the four climate projections appears to be large compared to the tendency towards an increase in severe surge up to the end of the 21st century. The role of external surges for the storm surge climate in the German Bight is additionally investigated by applying an extended storm surge model domain and thus enabling the direct consideration of the atmospheric conditions from the North East Atlantic. Altogether our study provides the information and data for further and more detailed climate change impact estimates in the coastal areas, estuaries, harbors and the corresponding risk assessment.