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# Towards improved storm surge models in the northern Bay of Bengal

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**Abstract**

The northern Bay of Bengal is home to some of the deadliest cyclones recorded during the last decades. Storm surge models developed for this region significantly improved in recent years, but they still fail to predict patterns of coastal flooding with sufficient accuracy. In the present paper, we make use of a state-of-the art numerical modeling system with improved bathymetric and topographic data to identify the strengths, weaknesses, and to suggest areas for improvement of current storm surge models in this area. The new model is found to perform relatively well in reproducing waves characteristics and maximum water levels for the two extreme cyclones studied here: Phailin (2013) and Sidr (2007). The wave setup turns out to be small compared to the wind-driven surge, although it still plays a significant role for inland flooding. Relatively large tide-surge interactions mainly due to shallow water effects are also evidenced by the model. These findings plead in favor of further efforts to improve the representation of the bathymetry, especially in the nearshore area, and the implementation of models including tides and radiation stresses explicitly. The main limit of the model is its inability to predict the detailed patterns of coastal flooding satisfactorily. The reason lies mainly in the fact that topographic data also need to be further improved. In particular, a good knowledge of embankments characteristics (crest elevation and their condition) is found to be of primary importance to represent inland flooding correctly. Public authorities should take urgent action to ensure that better data are available to the scientific community, so that state-of-the-art storm surge models reaching a sufficiently high level of