

Effect of Tide-Surge Interaction on Storm Surge Levels Around The Coastline of Sri Lanka

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ABSTRACT

Storm surges associated with tropical cyclones are more likely to occur along the northern and eastern coasts of Sri Lanka. Cyclone landfalls on the north and east in the recent past include those of December 1964, November 1978, November 1992, and December 2000. In the present study, we examined the effect of tidal fluctuations on the surge heights due to wind forcing along four selected stretches of the northern, eastern, southern and western coasts of Sri Lanka. The coastal stretches selected for the study also represent different shelf geometries with respect to the slope and the width of the continental shelf. Numerical simulations were carried out for each of these sites for three different wind speeds, first with tide only and wind only scenarios, and then for the tide and wind combined scenario in order to investigate the significance of the interaction between the two components. The results confirm that the tide-surge interaction is non-linear; the non-linear term enhances the surge levels when the tide is near its lowest, while weakening the surge levels when the tide is near its highest. Accordingly, for the cases of high-tide and low-tide landfalls, respectively, the tide is destructive and constructive to the total storm tide. We also find that the width of the continental shelf and shallowness of bathymetry have a significant influence in enhancing the tide-surge interaction.
