

Role of beach morphology in wave overtopping hazard assessment

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Understanding the role of beach morphology in controlling wave overtopping volume will further minimise uncertainties in flood risk assessments at coastal locations defended by engineered structures worldwide. XBeach is used to model wave overtopping volume for a 1:200 yr joint probability distribution of waves and water levels with measured, pre- and post-storm beach profiles. The simulation with measured bathymetry is repeated with and without morphological evolution enabled during the modelled storm event. This research assesses the role of morphology in controlling wave overtopping volumes for hazardous events that meet the typical design level of coastal defence structures. Results show disabling storm-driven morphology under-represents modelled wave overtopping volumes by up to 39% under high H_s conditions, and has a greater impact on the wave overtopping rate than the variability applied within the boundary conditions due to the range of wave-water level combinations that meet the 1:200 yr joint probability criterion. Accounting for morphology in flood modelling is therefore critical for accurately predicting wave overtopping volumes and the resulting flood hazard and to assess economic losses.