



Assessing compound flooding risk through dynamic simulations: application in Recife, Brazil

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Compound flooding (CF) is an extreme event taking place in low-lying coastal areas as result of the interaction between co-occurring high sea level and large amount of precipitation. The coupling of the two hazards is a complex process, which depends on several factors; e.g. the timing, evolution and intensity of the forcing variables, the topography and the flood protection in place, among others. Dynamic flooding simulations are computationally expensive, but once based on reliable data they are the most reliable approach to assess CF risk. The city of Recife (Pernambuco, Brazil) has 1.6 million inhabitants and is subject to frequent flooding due to the combination of its coastal location, the low-lying topography and the confluence of two rivers (Beberibe and Capibaribe). In the present contribution we conduct a CF assessment combining (i) historical and future river discharge and sea level data; (ii) a high resolution DEM of the city of Recife obtained from a LIDAR survey; and (iii) the Delft3D model. Different sets of simulations were carried out to address the following issues: (i) the importance of considering CF effects; (ii) the effect of the timing of river discharge and extreme sea level; (iii) the effect of sea level rise, given the range of existing projections. The results of the simulations highlight that not considering CF effects results in a 20% underestimation of the flood extent and flood depths; while climate change can severely enhance CF risk potential.