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Global coastal flood hazard mapping

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Over 10% of the world's population lives in low-lying coastal areas (up to 10m elevation). Many of these areas are prone to flooding from tropical storm surges or extra-tropical high sea levels in combination with high tides. A 1 in 100 year extreme sea level is estimated to expose 270 million people and 13 trillion USD worth of assets to flooding. Coastal flood risk is expected to increase due to drivers such as ground subsidence, intensification of tropical and extra-tropical storms, sea level rise and socio-economic development. For better understanding of the hazard and drivers to global coastal flood risk, a globally consistent analysis of coastal flooding is required.

In this contribution we present a comprehensive global coastal flood hazard mapping study. Coastal flooding is estimated using a modular inundation routine, based on a vegetation corrected SRTM elevation model and forced by extreme sea levels. Per tile, either a simple GIS inundation routine or a hydrodynamic model can be selected. The GIS inundation method projects extreme sea levels to land, taking into account physical obstructions and dampening of the surge level land inwards. For coastlines with steep slopes or where local dynamics play a minor role in flood behavior, this fast GIS method can be applied. Extreme sea levels are derived from the Global Tide and Surge Reanalysis (GTSR) dataset. Future sea level projections are based on probabilistic sea level rise for RCP 4.5 and RCP 8.5 scenarios. The approach is validated against observed flood extents from ground and satellite observations. The results will be made available through the online Aqueduct Global Flood Risk Analyzer of the World Resources Institute.