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Compound flood forecasting and climate adaptation Destination Earth digital twin

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Coastal deltas are extremely susceptible to flooding from sea, rivers, heavy rain and even more severe combinations thereof. Many coastal deltas are densely populated, and flood risk forms a serious threat that will likely increase in the future. There are two main mechanisms to reduce the devastating impacts of these floods; (1) adaptation to the increasing climate risks and (2) improved early warning and emergency response. We will present the Destination Earth digital twin on coastal compound flood inundation forecasting and climate adaptation that provide information to support reducing of impacts.

Examples for 5 use cases are presented showing flood inundation and flood impact maps resulting from compound combinations of surge, waves, heavy rain and riverine flooding. The results are based on an automated complex but generic workflow that takes the high resolution meteorological forcing from Extremes DT or Climate DT as input to the high resolution hydrological model (Wflow_sbm), the hydrodynamic model (Delft3D-FM) and the wave models (hurrywave and snap wave). Those models provide the boundary condition of the 2D flood inundation model SFINCS. Based on the calculated flood maps, impacts (in flood damage and people affected) are being calculated with Delft-FIAT. Results of the modelling chain and model validation will be to end user. The insights we obtained from our end users will provide valuable inputs for design of the compound flood digital twin.

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