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Quantification of flood hazard for the megacity of Lagos, Nigeria, by hydrodynamic simulation

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Climate change leads to rising temperatures and therefore stimulates the water cycle. As a consequence, extreme events in rainfall and associated flooding are projected to increase in frequency and severity in many regions of the world. Especially in developing countries with high population growth and often unregulated settlement, flood risk may increase due to both increased flood hazard and enhanced exposure. One such example is the megacity of Lagos, Nigeria, belonging to the largest cities in Africa. Floods within the city are recurrent and caused by storm surges from the Atlantic, heavy precipitation, and river floods. Flood risk is an issue and even expected to increase due to enhanced extreme precipitation, sea level rise, enhances storm surges, as well as illegal settlement, poor management, insufficient or blocking of drainage channels, missing early warning systems, and insufficient data.

The aim of this study is to deliver a first quantification of flood hazard for the city of Lagos based on hydrodynamic simulation with the model TELEMAC-2D. A focus is put on the use of freely available data sources and the design of reproducible workflows in order to enable local decision-makers to individually apply and refine the established workflows. The biggest challenge is the generation of the model mesh as the basis for subsequent hydrodynamic modelling due to limited data availability and the size of the model domain (about 1000 km²).