全球河川モデルによる沿岸域氾濫シミュレーションにネスティング手法の導入が及ぼす影響の評価

Impacts of a nesting approach on inundation simulation by a global flood model for estuaries and deltas

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Deltas and estuaries in the world have been vulnerable to flood risks. Mega delta regions hold societal and economic significance due to the large populations and the co-occurrence of multiple flood disasters. Global flood models (GFMs) are useful to estimate flood risk in mega deltas. Most of them employ 1D river flow equations, meaning that they can be used to conduct hydrodynamic simulation with the entire drainage areas of deltas. However, it is challenging to model flood inundation in estuaries and deltas due to the complex water flow processes there. It is especially the case of interaction between fluvial and coastal flood processes. While The inclusion of 2D inundation processes can help to address this issue, to use 2D models for large-scale inundation simulations is computationally heavy. A nested modelling, meaning to use a local 2D model forced by a global model, can be a solution.

The objective of this study is application of a nesting method for improving flood modelling in estuaries and deltas with a GFMs' framework. We utilize the global river routing model CaMa-Flood and the 1D/2D hydrodynamic model Delft3D Flexible Mesh. The Delft3D Flexible Mesh models is constructed. The simulation domain is set to include the river mouth and coastal deltas, forced by daily river discharge upstream calculated by CaMa-Flood. We present the first results of the study, showing improved simulations of flood inundation estimations for Bangladesh. Some different model configurations, such as CaMa-Flood runs with and without Delft3D Flexible Mesh, are tested and the results were quantitatively compared with observed discharge and flood inundation extent.

