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Effects of coupling Delft3D Flexible Mesh and Telemac with wave modelling for storm surge simulation – a case study of the Shanghai area

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The coupled Delft3D Flexible Mesh (D3D FM) - SWAN model with an unstructured grid has been developed recently to simulate storm surge and waves; and another open source model, Telemac-Tomawac, has been widely used for storm surge and wave propagation simulation in coastal areas for more than 20 years. However, the choice of a hydrodynamic model for a specific area in terms of cost, efficiency and accuracy is often a dilemma at the beginning of a modeling project. The objective of this research is to examine the effects of two software packages in terms of accuracy and performance with a case study in the Shanghai area of China. Model performance has been assessed based on model configuration, model calibration, grid generation and computational efficiency. Comparing measured water levels with model results, both approaches were able to accurately predict hydrodynamic conditions in a complex estuarine environment. Both models showed that it can efficiently simulate hydrodynamics in the coastal area under various scenarios for further climate adaptation research. Additionally, both models were used to simulate inundation propagation due to hypothetical failures of flood defenses in the coastal area. A comparison of inundation extent and maximum inundation depth showed that they were equally well-suited for overtopping and inundation simulation.