Wind wave modelling in a tidal inlet

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The northern part of the Netherlands is protected from the North Sea by a series of barrier islands. Between these islands are tidal inlets that allow the penetration of waves into the shallow Waddensea. The amount of penetration under storm conditions is important for the determination of the dikes protecting the lower parts of the Netherlands. The wave conditions in the tidal inlet and the amount of wave penetration are modelled by numerical wind wave models to determine these wave conditions.

In this lecture attention will be given to the physical processes playing a role in the tidal inlet under storm conditions, followed by a discussion of the numerical model setup. Important aspects are the role of the wind, shallow water wave breaking, wave-current interactions and the set-up of the computational grid. In addition, the interplay between numerical aspects and the modelling of physical processes will be addressed. Examples will be given of the hindcast of historical events and a comparison with measured wave data.