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A Numerical Model for Long Barotropic Waves and Storm Surges along the Western Coast of Norway

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ABSTRACT

A finite-difference scheme is used in order to study the generation and propagation of long barotropic waves and storm surges along the western coast of Norway. The performance of the numerical scheme is investigated by comparing with analytical solutions for a model with a straight coastline and a continental shelf of uniform depth and width. Simulations with a model of the west coast of Norway show that the wind stress and the atmospheric pressure are of about equal importance for the largest storm surges. The maximum elevation of the sea surface occurs at the coast and the sea level decreases nearly linearly over the shelf. The surge amplitude at the coast agrees well with observations. The sea level changes outside the shelf are small and for the most part due to the pressure. Shelf waves are mainly generated by the wind stress and Kelvin waves are mainly generated by the pressure field.

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