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Adaptive Wavelet Collocation Method in Shallow Water Model: Validation Study[1] SHANON RECKINGER, Fairfield University, OLEG VASILYEV, BAYLOR FOX-KEMPER, University of Colorado at Boulder — The adaptive wavelet collocation and Brinkman penalization methods are applied to the shallow water model and validated. The wavelet method solves the equations on temporally and spatially varying meshes, which allows a higher effective resolution to be obtained with less computational cost. The grid adaptation is achieved by using the ability of wavelet multiresolution analysis to identify and isolate localized dynamically dominant flow structures, e.g., vortices, and to track these structures on adaptive computational meshes. In addition to studying how the shallow water model behaves on non-uniform, time varying grids, this work also sets out to improve the representation of continental topology through an extension of the Brinkman penalization method. This numerical technique works by altering the governing equations in such a way that no slip boundary conditions are enforced. When coupled with the adaptive wavelet collocation method, the flow near a complex boundary can be well defined. In previous work, the methods were presented, fully derived, and convergence was demonstrated. In this work, a variety of benchmark studies will be presented to validate the model and insight will be given on possible directions for wavelets in ocean modeling.

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