

Adaptive Grid Techniques for Baroclinic Tidal Models

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Abstract

This paper describes the implementation and testing of three adaptive grid techniques for the vertical structure of shallow water models. The techniques are based on an r-method in which the nodes are moved vertically based on velocity gradients, velocity differences and residuals. The performance of the three methods is compared in a one-dimensional simulation of a stratified tidal flow in which the pycnocline moves vertically during the tidal cycle. The method based on velocity gradients is the most accurate and robust, reducing the errors by over 50% relative to fixed grids. CPU costs for the best adaptive grids are only 5% larger than for fixed grids.

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