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Ocean regional circulation model sensitizes to resolution of the lateral boundary conditions

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Dynamical downscaling with nested regional oceanographic models is an effective approach for forecasting operationally coastal weather and projecting long term climate on the ocean. Nesting procedures deliver the unwanted in dynamic downscaling due to the differences of numerical grid sizes and updating steps. Therefore, such unavoidable errors restrict the application of the Ocean Regional Circulation Model (ORCMs) in both short-term forecasts and long-term projections. The current work identifies the effects of errors induced by computational limitations during nesting procedures on the downscaled results of the ORCMs. The errors are quantitatively evaluated for each error source and its characteristics by the Big-Brother Experiments (BBE). The BBE separates identified errors from each other and quantitatively assess the amount of uncertainties employing the same model to simulate for both nesting and nested model. Here, we focus on discussing errors resulting from two main matters associated with nesting procedures. They should be the spatial grids' differences and the temporal updating steps. After the diverse cases from separately running of the BBE, a Taylor diagram was adopted to analyze the results and suggest an optimization intern of grid size and updating period and domain sizes.

Key words: lateral boundary condition, error, ocean regional circulation model, Big-Brother Experiment.

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