



Determination of the extra buffering distance in the one-way nesting procedure for the regional ocean

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The Big-Brother Experiment (BBE) evaluates the effect of domain size on the ocean regional circulation model (ORCMs) in the downscaling and nesting from the ocean global circulation (OGCMs). The BBE first establishes a mimic ocean global circulation models (M-OGCMs) data and employs a ORCM to simulate for a highly resolved large domain. This M-OGCM's results were then filtered to remove short scales then used for boundary and initial conditions of the nested ORCMs, which have the same resolution to the M-OGCMs. The various sizes of domain were embedded in the M-OGCMs and the cases were simulated to see the effect of domain size with the extra buffering distance to the results of the ORCMs. The diagnostic variables including temperature, salinity and vorticity of the nested domain are then compared with those of the M-OGCMs before filtering. Differences between them can address the errors associating with the sizes of the domain, which are not attributed unambiguously to models errors or observational errors. The results showed that domain size significantly impacts on the results of ORCMs. As the domain size of the ORCM becomes lager, the distance of the extra space between the area of interest and the updated LBCs increases. So, the results of ORCMs perform more highly correlated with the M-OGCM. But, there are a certain optimal sizes of the OGCMs, which could be larger than nested ORCMs' domain size from 2 to 10 times, depending on the computational costs.

Key words: domain size, error, ocean regional circulation model, Big-Brother Experiment.

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