

Baroclinic vertical modes around the East Asian seas

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Determination of appropriate spatial resolution is important for configuring regional models. First baroclinic Rossby radius of deformation serves as an objective length-scale for ensuring the horizontal grid spacing, while little equivalent quantifiable standard exists for the vertical grid. Stewart et al. (2017) proposed a method to determine vertical grids based on analysis of baroclinic modes commensurate with the theoretical capabilities of a given horizontal grid. Many models adopted this method, but most focuses are placed in the global ocean or ideal case. Therefore, we analyzed baroclinic vertical modes around the East Asian seas by using serial observation data provided by Korean Oceanographic Data Center (KODC).

Results show that at least 3 vertical levels between surface and 20 m are required to resolve the first baroclinic mode for a regional model with $1/20^\circ$ horizontal grid in this area. For the second baroclinic mode, the regional model needs at least 3 vertical levels between surface and 10 m and another 3 vertical levels between 10 m and 30 m depth. However, this criterion is different by each sub-region and season.

Acknowledgement: This study was supported by the research year project of Kongju National University.

Keywords: Baroclinic mode, East Asian seas, Regional ocean model, Vertical grid

