



An application of a cubic-grid OGCM to a study of the role of the Agulhas Current system in the thermohaline circulation

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Our group is developing an ocean general circulation model (OGCM) for high-resolution global simulation of the thermohaline circulation. The OGCM employs a quasi-homogeneous cubic grid originally proposed by Purser and Rancic (1998) in order to improve numerical efficiency. The cubic-grid OGCM can be applied not only to global simulations but also to simulations for regional phenomenon by enhancing the grid resolution around the target region with grid stretching technique. Although the grid stretching is not relevant to the original aim of this development, it provides us an comprehensive way to understand a role of a regional phenomenon in the global circulation within one modeling system. Now the model is applied to the study of the Agulhas Current system. In the Agulhas Current system, the Indian water is transported to the South-Atlantic and this interbasin exchange controls the warm water route of the thermohaline circulation. The interbasin exchange occurs mainly through the shedding of the Agulhas eddies so that the model applied to this study is required to have high-resolution enough to reproduce the eddy activities around the South Africa. The model should be global so that the role of the Agulhas Current could be discussed in the framework of the thermohaline circulation. The cubic grid model is suitable for this purpose and now we are carrying out a global eddy-permitting simulation with this model. In addition to the global one, regional simulations for the Agulhas Current system are also being carried out with the stretched-grid cubic-grid model. The eddy dynamics in this region is simulated with various conditions and the results are reflected to the global simulation. In the presentation, we will describe the cubic-grid OGCM, the strategy of the study on Agulhas Current and the results from the global and regional cubic grid models.