Geophysical Research Abstracts
Vol. 20, EGU2018-3890, 2018
EGU General Assembly 2018

Numerical simulation of seasonal migration of the North Equatorial Current bifurcation in Regional Model – discussion of open boundary condition

Bingrong Sun (1,2,3), Zhaohui Chen (1,2,3), Lixin Wu (1,2,3)

(1) Ocean University of China, Qingdao, China (sunbingrong@stu.ouc.edu.cn), (2) Physical Oceanography Laboratory/CIMST, Qingdao, China, (3) Qingdao National Laboratory for Marine Science and Technology, Qingdao, China

The dynamics of the seasonal variation of the North Equatorial Current (NEC) bifurcation is studied using a 1.5-layer nonlinear reduced-gravity Pacific basin model and a linear, first-mode baroclinic Rossby wave model. The model-simulated bifurcation latitude exhibits a distinct seasonal cycle with the southernmost latitude in June and the northernmost latitude in November, consistent with observational analysis.
In this study, we concentrate on the simulation of seasonal migration of NEC bifurcation latitude (NBL) in Regional Model. Performed by 1.5-layer nonlinear reduced-gravity model and Hybrid Coordinate Ocean Model (HYCOM), the seasonal migration of NBL is not only determined by wind locally, as suggested in previous studies, but also significantly effect by the eastern open boundary condition, such as the different locations of eastern boundary and the different types of boundary condition in Regional Model. The model demonstrates that the annual propagation of baroclinic Rossby wave west of date line play an important role in determining the amplitude and seasonal phase of the NEC bifurcation. In simulation of Regional model driven by the nested open boundary condition which delivered from basin model can get more realistic seasonal cycle of NBL than the reanalysis products which act as boundary condition which is associated with the self-consistency of parameter space and dynamic system in Regional model.
Although the reanalysis data are closer to the observation through the processing of various assimilation methods, but in the simulation of Regional model, it could conducted the dynamical mismatch between the boundary condition delivered from reanalysis data and the numerical system and eventually enhance the system error and the disorderly of the simulated seasonal signal of NBL in western boundary.
Therefore, when we research the mesoscale or sub-mesoscale dynamic process in low-latitude western boundary with high-resolution Regional models, we should set the boundary condition which nested from basin model, choose the suitable location of eastern boundary and take the reanalysis product carefully, otherwise, the simulated large-scale climatology circulation pattern may have not a small deviation from realistic and then affect the simulation and analysis of the small-scale dynamic process which we interested in.