

Review of “Variability of coastal downwelling circulation in response to high-resolution regional atmospheric forcing off the Pearl River Estuary”

This paper by Lai and Gan investigated the variabilities of coastal circulation and dynamics in response to spatiotemporally variable high-resolution atmospheric forcing off the Pearl River Estuary during the downwelling wind. The authors conducted three numerical experiments based on (1) single station observation, (2) global reanalysis data and (3) high-resolution regional atmospheric model. Results show that the model with high-resolution atmospheric forcing significantly improved the temperature-salinity profiles and ocean current simulation. In addition, the model with high atmospheric forcing improved the estimation of cross-isobath transport. This paper is well-written and organized, and the results are beneficial for ocean modeler to improve their model results and associated studies. I would suggest a minor revision for this paper before publishing it.

Major Comments:

- (1) One of the comment problems in ocean model is the over-heating in the surface layer. Usually the ocean model needs surface temperature nudging to the reanalysis or climatology SST data, such as GHRSSST and MODIS, to avoid over-heating in the surface layer. In this paper, the author mentioned that ROMS were forced by high-resolution wind stress and heat fluxes. I wonder whether ROMS model in this paper only driven by high-resolution heat fluxes without SST nudging, or only driven by high-resolution SST. Please clarify it in the discussion.
- (2) The author used the ERA data with 75 km resolution as the “coarse” resolution product to compared with the WRF 1 km production. Actually, in nowadays, the 12-15 km resolution and 0.2 degree (approximately 22 km) resolution products are quite common, and provided by ECWMF and CFSV2 (from NECP), respectively. Ocean model driven by this 10-20 km resolution products may be closed to that

driven by WRF 1 km product. The author may give some comment on this.