Ocean Sci. Discuss.,
https://doi.org/10.5194/os-2017-73-AC3, 2017


# *Interactive comment on* "Effect of winds and waves on salt intrusion in the Pearl River Estuary" *by* Wenping Gong et al.

**Wenping Gong et al.**

zhangheng@mail.sysu.edu.cn

Received and published: 29 November 2017

Comment (1) from referee #3 Although salinity intrusion under different hydrological and tide forcing conditions has been fully studied for many estuaries, wind and wave effects, especially wave effects, have not. This study focuses on the wind and wave effects on salinity intrusion in the Pearl River Estuary, which provides good information for the impacts of wind and waves on salinity intrusion in an estuary. The model has been calibrated using two observations. Overall, the model skills are acceptable for this study. The authors conducted a series of model diagnostic studies for the impact of local and remote winds with different directions as well as the change of transport processes associated with the change of wind, which provide good information for understanding the underlying processes.



Response: We thank for the reviewer's constructive comments.

Comment (2) from referee #3

Figure 7 compared different mechanisms for salt intrusion, which shows the different processes associated with different wind forcings, i.e., remote and local winds, in particular, the tidal oscillatory transport and steady shear are different with respect to remote and local winds. However, they were not clearly discussed. It will be good if the authors can incorporate these into the discussion sections.

Response:

We have already explained the changes in the steady shear transport flux by the local winds (page 8 line 38 to page 9 line 6) and by the remote winds (page 9 line 30-31). The local NE winds change the estuarine circulation from vertically sheared to horizontally segregated, and change the salinity distribution from vertically stratified to horizontally differentiated, therefore increase the steady shear transport flux. Under other wind directions, such as the SE wind, the wind mixing may decrease the estuarine circulation and salinity stratification, and thus the steady shear transport. The remote wind is to increase the mixing at the estuary's mouth by downwelling current, with an effect similar to tidal straining during flood tides, and to decrease the estuarine circulation, thus generally decrease the steady shear transport flux. For the tidal oscillatory part, the remote wind is to decrease the magnitude of the tidal fluctuations of salinity due to more mixing, while for the local wind, the mechanisms seem difficult to analyze. Overall, the tidal oscillatory flux is an insignificant component in the total salt transport flux, we do not further explore it.

Comment (3) from referee #3

As there are many model scenarios with different conditions, the paper is not easy to follow and some materials can be removed (i.e., the discussion of salinity at the mouth as the change of salinity at the mouth can be seen from other figures).

Response:

We appreciate reviewer's comment. After careful consideration, we choose to keep the change in salinity at the mouth in the discussion. Though other figures show salinities at the mouth, but it is difficult to compare them under different scenarios. Moreover, Figure 16a show the temporal evolution of the salinity at the mouth, and links closely to the time series of diffusivity and bottom current along the longitudinal transect. These processes need to be combined together for explaining the effects of different winds.

Comment (4) from referee #3

Some figure captions need some revision to make them more clear. i.e., Fig. 14. Are currents and axial currents are same?

Response:

This is a typo. We revised the caption to make it clear accordingly.

---

Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2017-73, 2017.