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Discussions
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# *Interactive comment on* “Numerical study of hydrodynamic and salinity transport process in Pink Beach wetlands of Liao River Estuary, China” *by* Huiting Qiao et al.

**Huiting Qiao et al.**

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Response to evaluations of Reviewer #2: We agree with your major comments and suggestions. The replies are follows:

1. We have simulated the impact of vegetation on water depth and salinity in this coastal wetland, the results show that the effects of wetland vegetation on water depth and salinity of wetland domain is not obvious, it can be seen in Fig. 1 and Fig.2. The Liao River estuary has a complex terrain with a large area of tidal flats and shoals, where the vegetation grow up. During the ebb tide, vegetation area is not submerged by tide. Only in spring tide, the vegetation can be merged and its salinity is influenced

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by the water from open sea. From the Fig. 1and Fig.2, one can see that water depth in vegetation area does not change significantly compared to non-vegetated, and the variation of salinity is not obvious.

As the reviewer mentioned, whether it is in the wet season or dry season, the discharge has a great influence on salinity. The authors have finished the simulations about salinity concentration in Liao River estuary, Fig. 3. and Fig. 4 show that the patterns of salinity change with wet season and dry season. But due to limit length of this manuscript, it has not been provided in this study. If necessary, we will add this part to the revised version.

2. As shown in Fig. 3. and Fig. 4, there is more salinity intrusion with low discharge, we will make a comprehensive analysis that the effect of vegetation on flow and salinity in revised version.

3. We refined the model grid from the upper reaches of the river to the central part of the domain, i.e. at the Pink Beach wetland, which is the focus of the present study, with finer grid resolutions, as small as 98 m. Model grid size increases gradually away from the flats and estuarine deltas, and max cell reaches about 2460 m near the open boundary. Page 11, in figure 3, the tidal range is a little under predicted in the model, it may be related to the inaccurate tidal level extracted by the open boundary and the accuracy of the measured value. These reasons will be added to the revised manuscript.

4. The assessment of water level, e.g. correlation, mean-square error will be given in revised manuscript. We have explained that the figures 5 and 6 represent the currents, the left is current speed and the right is current direction. We will expand to make it clear in revised manuscript.

5. In figure 8, the left-hand panel shows the distribution of flow field in flood tide during the spring tide. In figures 7 and 8, the number of vector arrows will be reduced to make them clear and reference speed will be added to revised manuscript.

6. Considering reviewer suggestion, the figures 9 and 10 may be removed in revised manuscript.

7. Page 19, in MIKE 21 hydrodynamic and salinity model, M is Manning's coefficient for bed roughness, nv is Manning's coefficient for the vegetation resistance, M and nv are reciprocal. In this paper, m represents the vegetation density, we can name it in another name in case of confusing with M. Page 20, line 14, the model has been verified in the previous article. We will increase more statistics to test the accuracy of the model in Pink Beach wetland in revised manuscript.

8. We have mapped that the position of salinity contours with different discharge rates (Fig. 5, Fig. 6 and Fig. 7), but didn't put it into this manuscript due to the limited writing.

9. According to the reviewer's suggestion, we will make more discussions about the impact of vegetation on the flow, and add an arrow to indicate the speed. In figure 17 (a), the black ellipses represent vegetation areas, the other is non-vegetated area.

10. The figure 18 showed that five stations in the Pink Beach wetland were selected from upstream to downstream to analyze the longitudinal distribution of salinity in the tidal cycle under the same runoff conditions, the location of P1, G1, P3, G2 and P5 is shown in figure 13.

11. Figure 19 estimates the salinity variation of G1 and G2 under different river runoffs in Pink Beach. Obviously, the effect of runoff on salinity distributions in the Pink Beach is fairly distinct. When the river discharge is low, the mixture of the upstream freshwater is weak and salinity is greater.

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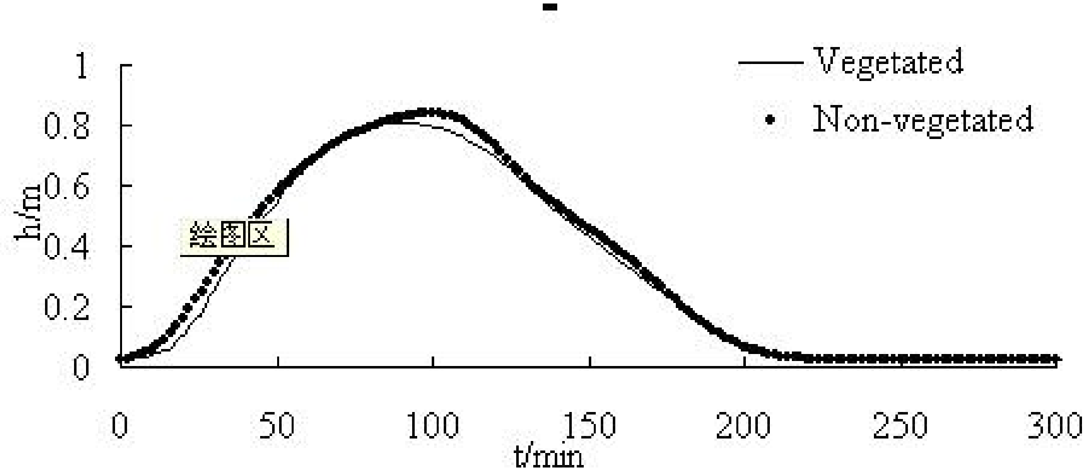
Vegetated
● Non-vegetated
h/m
1
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Fig. 1.

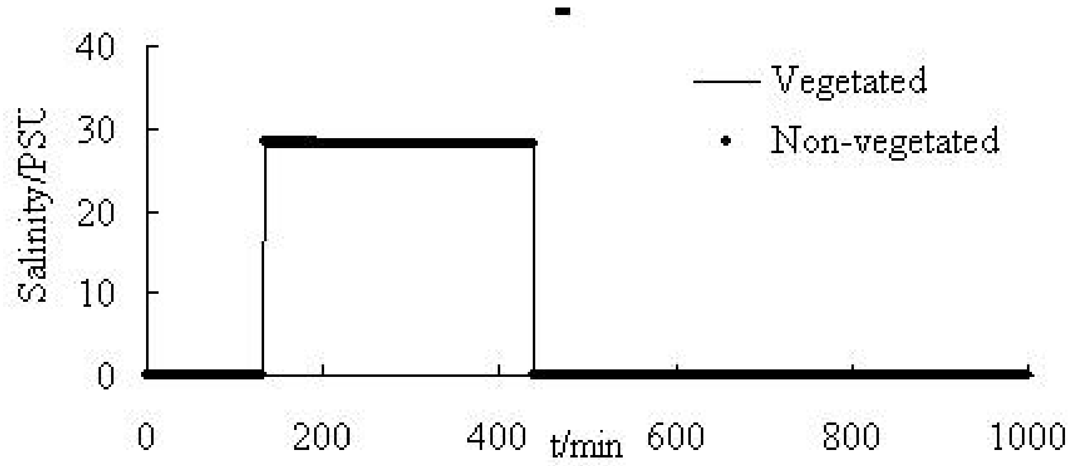

**Fig. 2.**

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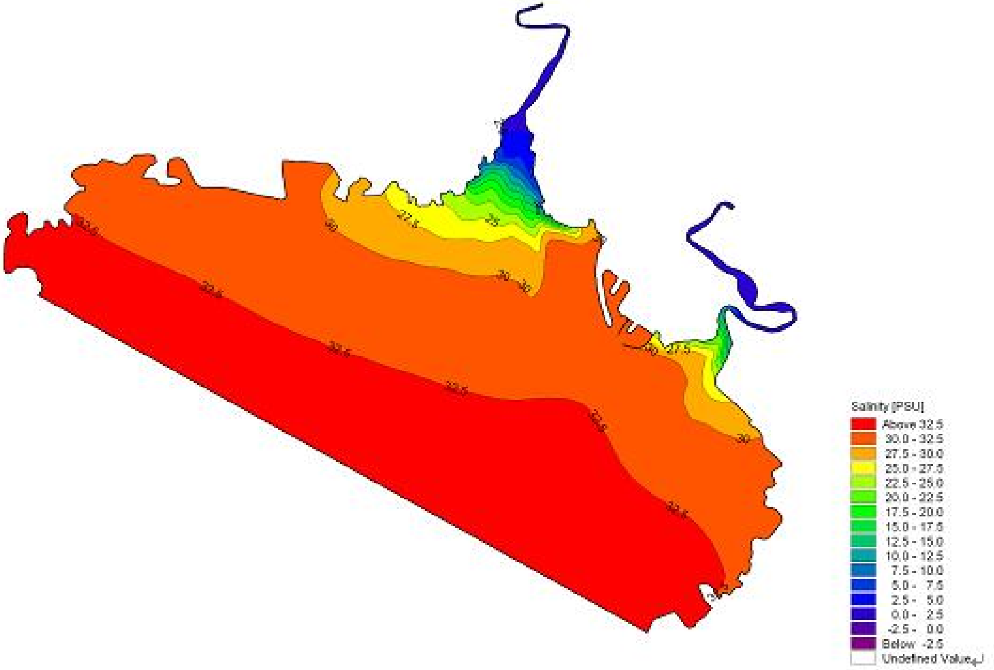
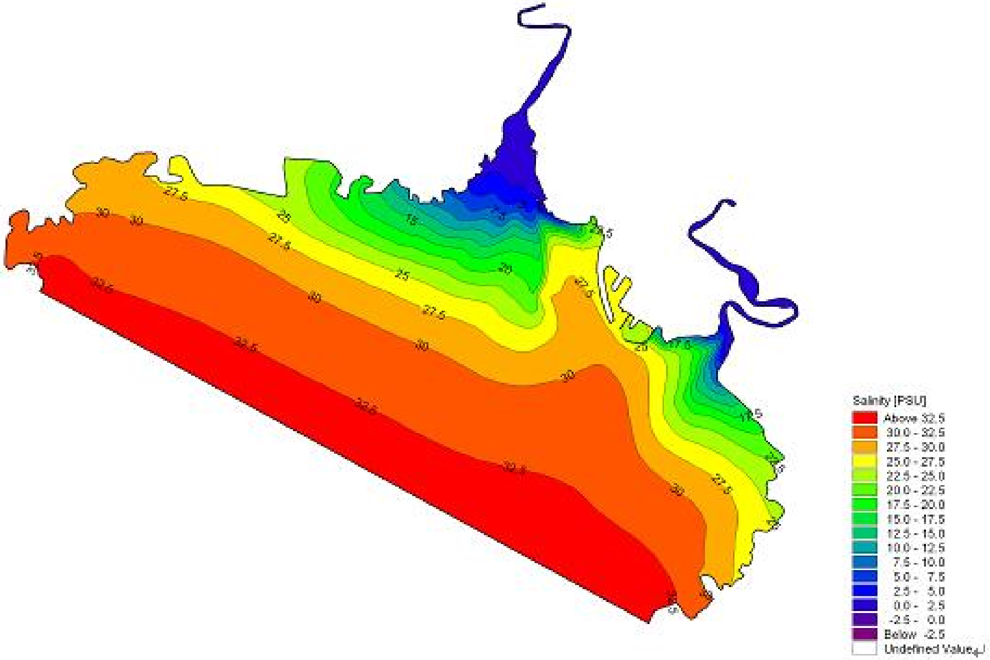


(a) Dry season

**Fig. 3.**



(b) Wet season ↵

**Fig. 4.**

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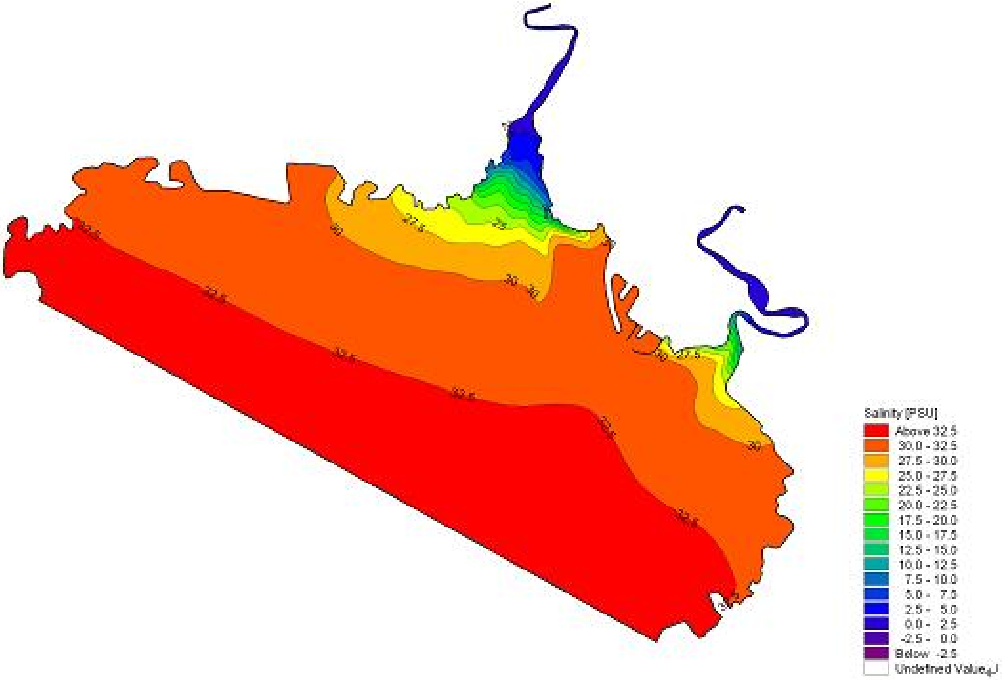
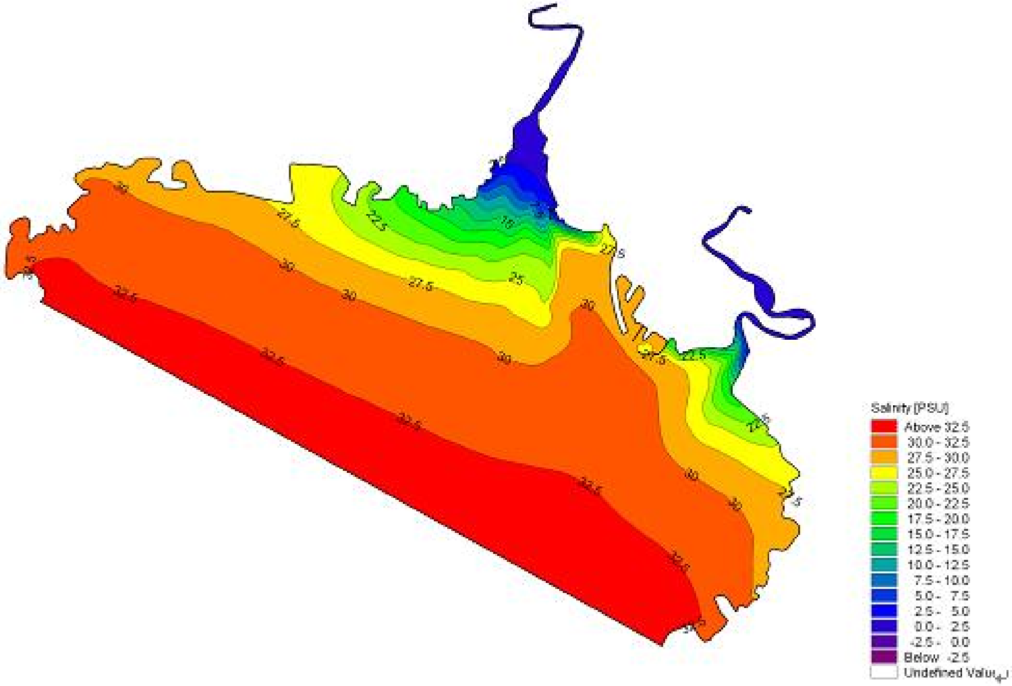


(a) 101m$^3$/s ↵

**Fig. 5.**



(b) 285m$^3$/s ↵

**Fig. 6.**

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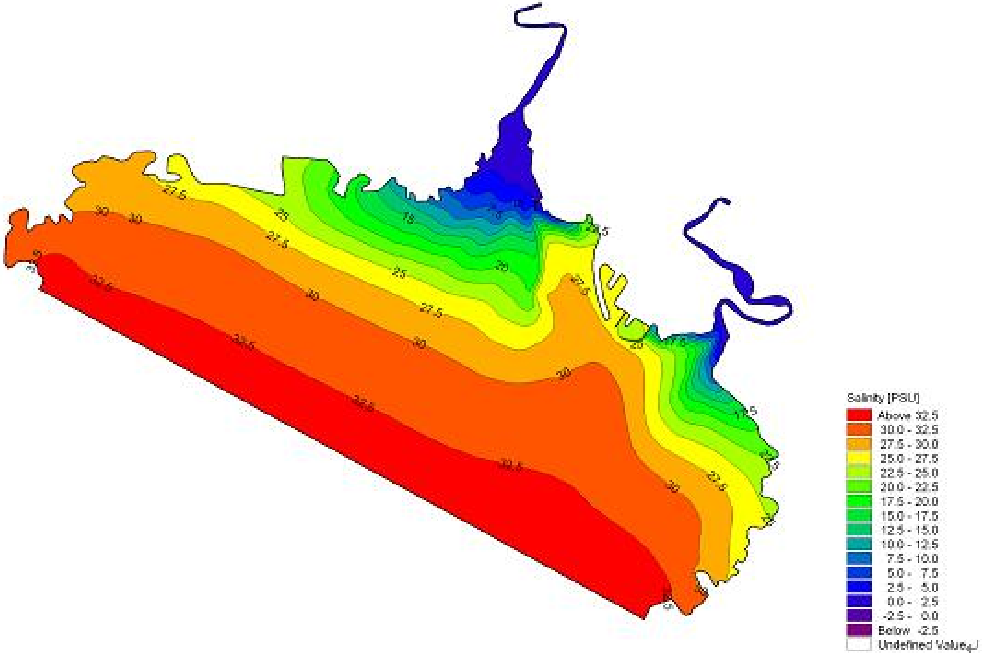

(c) 450m$^3$/s ↵

**Fig. 7.**