Review of "Dynamic mechanism of extremely severe saltwater intrusion in the Changjiang Estuary occurred in February 2014" by Zhu et al.

In this manuscript, authors simulated the severe saltwater intrusion in the Changjiang Estuary in February 2014 based on numerical model. They believed that the severe saltwater intrusion was induced by persistent strong northerly winds. The manuscript is not well written, and has many issues and doubts which are as follows.

Major issues:

1. There are many studies about the influence of winds on saltwater intrusion in the estuary. But authors only mentioned two papers (Xue et al., 2009; Li et al., 2012) about the Changjiang Estuary. Even about the Changjiang Estuary, there are not only two papers.
2. About the strong wind event, it should be defined such as wind speed and duration. Authors said that from February 5 to 14, 2014 a persistent and strong northerly wind occurred lasting ten days. And they presented that only a strong northerly wind lasting 8 days can produce a severe saltwater intrusion in the Changjiang Estuary. But seen from plot c of Figure 2, on 5-6 the wind directions were southerly and easterly, and the winds seemed not strong. On 12-14, the winds were not strong as well. Authors should show what magnitude of wind event could induce severe saltwater intrusion. In plot c of Figure 2, the curve of wind speeds should be added. Thus the magnitude of winds can be seen clearly. What kind of data was used in plot c, instantaneous value, 2 minutes average, or maximum in a gust of wind? They should be presented clearly. In addition, the weather station locates inside the estuary near the mouth. The wind direction at this station may be different from the sea.
3. This severe saltwater intrusion event is strange. The peak salinity at Baozhen and Nanmen stations reached 20.1 and 12.4 respectively. But why did the salinity only reach 8.6 at Qingcaosha? The location of Qingcaosha is close to Baozhen, and downstream of Nanmen. It can be seen from plot a of Figure 2 that salinity at Qingcaosha was much lower

than Baozhen. In addition, salinity at Chongxi station is from the North Branch. Before 7 February salinity was high at Chongxi, very low even close to zero at other stations. But during the severe event salinity was very high at other stations, but low at Chongxi station. These need explanation.

4. Authors presented that the water level rose distinctly at the coast during the event (Figure 2, line 91). Why did the water level inside the estuary not rise obviously (Figure 5, lines 133-135)? Authors said that the water level inside the river mouth was mainly determined by tide and river discharge. This needs explanation. Seen from plot b of Figure 4 and plot b of Figure 7, the water level rise inside the estuary was much larger than the coast. This is inconsistent with authors' expression and observations at Baozhen. The water level rises in figure 7 and figure 8 seem the same both for 10-13 February. In addition, about plot d in Figure 2, how was the water level rise obtained or how did authors calculate the water level rise? This should be presented clearly in methods section.

5. The main work of this manuscript is modeling of salinity and water level during the severe event. But authors only presented the results at Baozhen station (Figure 5). The results at other stations should be shown as well. Figures 6-8 only present the time-averaged results on 10-13 February.

6. The dynamic mechanism of the severe saltwater intrusion event is the objective of this manuscript. The manuscript proposed the mechanism: landward Ekman transport forms a horizontal estuarine circulation that flowed into the North Channel and out of the South Channel. This mechanism or result is not new. It has been presented in authors' previous work (Wu Hui, Zhu Jianrong, Choi Byung Ho, 2010. Links between saltwater intrusion and subtidal circulation in the Changjiang Estuary: a model-guided study. Cont. Shelf Res. 30 (17): 1891–1905.). But authors did not mention this work. This reference did not occur in the manuscript as well. The strong winds were not persistent for very long time. And the wind directions were not always northerly, even southerly in some periods. Why did the severe saltwater intrusion last

23 days? This is the question the manuscript should answer. About the results presented in discussion part and figure 9, it is doubtful. About plot b, can two-day strong winds induce the higher than normal salinity in after 8 days? About plots c and d, there are similar doubts. What is the mechanism of this? This needs detailed explanation. In addition, many studies mentioned that water withdrawal between Datong and estuary could increase saltwater intrusion in dry season. Is there possibility that during the severe event water withdrawal downstream Datong was large contributing to this event as well?

7. The structure of the manuscript is strange. In section 2.1 observed data, authors introduced the severe saltwater intrusion events, which should be moved to introduction section or results section. In section 3 results, section 3.1 is not necessary. The results under normal situations and special situations can be compared in order to show the difference. But the result under normal situation is not the important results for the objective of the manuscript. In other words, it is not necessary presented separately. In addition, the discussion part is too simple.

8. Some presentations or data in the manuscript are unreliable. Besides some mentioned above examples are as follows.

   (1) About the data source, in section 2.1 (observed data), authors said that the observed data was conducted by State Key Laboratory of Estuarine and Coastal Research, East China Normal University. But in acknowledgements part authors said that the observed data was provided by Shanghai Hydrology Administration.

   (2) Page 3, line 57, "... caused by very low river discharge of approximately 7000 and 8000 m^3 s^{-1} lasting three mouths (mouths should be months), respectively". In this sentence, "8000 m^3 s^{-1} in 1999" and "lasting three months" are not correct. In dry season of 1979, river discharges in January and February were really very low between 7000 and 8000 m^3/s at Datong station. In March the monthly mean discharge was more than 10000 m^3/s during which severe saltwater intrusion also occurred. In 1999 the monthly mean river discharges at Datong were all larger than 9000 m^3/s. In February extremely severe saltwater intrusion occurred as well inducing continuous 25 days of

unsuitable drinking water at Chenhang Reservoir upstream of Qingcaosha, during which discharge was 9110 m^3/s.

Minor issues:

1. In page 2, lines 30-31, what is the maximum spring tide and minimum neap tide? The proper expressions should be the maximum tidal range of spring tide and minimum tidal range of neap tide. Or, the maximum tidal range and minimum tidal range are enough.
2. In page 3, lines 49-50, "which was the largest estuarine reservoir in the world, the Qingcaosha Reservoir, was built.". There is syntax error in this sentence.
3. In the last paragraph of introduction, authors said that an extremely severe saltwater intrusion event in February 2014 occurred, and this is a catastrophic event never occurred. But we did not see how severe and catastrophic. The compare between this event and historical severe events should be presented as well in order to show the severe magnitude.
4. About the river discharge used during modelling, did you consider the time required for water traveling from Datong to the estuary? Usually the discharges several days in advance are used because Datong station is located more than 600 km upstream of the estuary.
5. Caption of Figure 2: Temporal variations in the measured data in February. Plot d does not present the measured data. The water level rises are calculated results.
6. Caption of Figure 3 is not clear. And there are syntax errors.
7. What is the climatic wind? This expression is strange.
8. Captions of Figures 5, 6, 8 are not clear.