

## ***Interactive comment on “Dynamic mechanism of extremely severe saltwater intrusion in the Changjiang Estuary occurred in February 2014” by Jianrong Zhu et al.***

### **Anonymous Referee #1**

Received and published: 12 July 2020

In this manuscript, the authors investigated an extremely severe saltwater intrusion in February 2014 in the Changjiang Estuary by means of a three-dimensional numerical model. It was shown that the catastrophic saltwater intrusion leading to a cut off freshwater input for 23 days into the Qingcaosha Reservoir can be primarily attributed to a persistent and strong northerly wind, which drove substantial landward Ekman transport to form a horizontal estuarine circulation. The paper is generally well written. However, there are still several major concerns that should properly addressed in order to improve the quality of this manuscript. In particular, the underlying mechanism of extremely severe saltwater intrusion with regard to the persistent and strong northerly wind should be detailed in the discussion part.

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1) Section 2.1: It can be seen from observed salinity (in Figure 2a) that at normal condition the salinity at the upstream Chongxi station is higher than other stations, while during the abnormal condition (i.e., the studied case) the maximum salinity concentration appears at Baozhen station. I would suggest the authors to clarify the difference between these two conditions since the underlying mechanism for saltwater intrusion may be completely different. For instance, to what extent the spilling of saltwater from the North Branch into the South Branch may impact the dynamics of saltwater concentration during this abnormal condition when compared with the normal condition.

2) Section 2.1: With regard to this section, I would suggest to move the analysis of the observed data into “Results” section 3.

3) Calibration and Validation of the numerical model: Although the saltwater intrusion model has been extensively calibrated and validated, I would suggest the authors to present the calibration for the salinity along the channel (i.e., Baozhen, Nanmen, Chongxi and Qingcaosha). For the time being, we can only see the reproduction of the salinity in Baozhen station, while the performances in other available stations are unknown. In addition, it would be better to clarify the basic calibration parameters used in the numerical model in the manuscript.

4) Section 4: In principle, the discussion part should systematically discuss the potential mechanism of saltwater intrusion with regard to the persistent and strong northerly wind. How the wind affects the individual terms in the momentum equation? The relationship between residual water level rise and wind? The generation of Ekman transport and the resulted horizontal circulation etc. In current form, the discussion part is more or less the same as the conclusions part since we see an identical sentence “With more frequent persistent and strong northerly wind caused by climate change, more attention should be paid to extremely severe saltwater intrusion events and freshwater safety in the Changjiang Estuary because the Qingcaosha Reservoir takes water from the Changjiang Estuary for the 13 million people in Shanghai.” in both sections.

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