Interactive comments on "Numerical analysis of potential contributions of the proposed Huangpu Gate to flood control in Taihu Lake basin"

Zhang Hanghui, Liu Shuguang,
Department of Hydraulic Engineering,
Tongji University, 200092, Shanghai
May 14, 2017
zhang_hanghui@hotmail.com
RE: **hess-2016-310**

Dear Editor:

We appreciate the comments from the reviewer very much, and truly believe these comments can help us to improve the quality of our manuscript. We hope the manuscript after modification would achieve publication status. We provide responses to the general and specific comments and technical corrections in sequential order as follows. We also make efforts to correct the mistakes and improve the English of the manuscript.

Best regards.

Yours sincerely,

Zhang Hanghui and Liu Shuguang

The following is a point-by-point response to the reviewers' comments.

Part I Responses to Referee #1

General Comments:

This is a second version of the manuscript that was previously reviewed by this reviewer. The authors made some changes to address my "specific comments". But they did not provide any response to my "general comments". For example, whether the simulation results are parameter dependent and whether it is possible to assess the uncertainty for the existing results.

In addition, I did not see much improvement of the writing compared to the last submission. There are still a lot of grammar errors/typos and inappropriate wording (enumerated at the end of this review). I STRONGLY encourage the authors to ask a native speaker to professionally proofread the manuscript before submission for next round review.

Responses to General Comments:

A: First of all, we feel very sorry we missed one piece of your comments. Regarding your comment whether the simulation results are parameter dependent and whether it is possible to assess the uncertainty for the existing results，our answer is Yes. Of course, the simulation results are related to the parameters，In this paper, we focus on the potential impacts of constructing an estuary gate on the flood control in terms of evacuating flood discharge and reducing peak water levels, which is indeed important from both scientific and engineering points of view. So we did not analyse the sensitivity of parameters.

Regarding another important suggestion to professionally proofread the manuscript, we also have improved the English of the manuscript.

Responses to Specific Comments:

Q(1) Page 6 Line 6: This is not a 4-year period.

A: Yes, this is not a 4-year period, and data for the model are two consecutive years. We have corrected this mistake.

Q(2) Page 6 Line 8: The authors mentioned that the model was tested for the 1954, 1991 and 1999 flood events, but why only show 1999 in this study?

A: As a fact, the model was tested for the1954, 1991 and 1999 flood event. However, we only have the data for 1999 flood event. So the year 1954 and 1991 in Page 6 Line 5 of the new manuscript were deleted.

Q(3) Page 10 Line 4: Please be clearer of "The potential contribution".

A: We have checked and rephrased the conclusion about the potential contribution. Please find it in the "Conclusions" of our new manuscript.

Q(4) Figure 1(b): Please show station names in the map.

A: Please find them in the new Figure 1 (a).

Q(5) Figure 3: The x-label should include the year. Please also check other figures.

A: We have checked the figures and added the information to the figure caption. Please find them in the new Figure 3-4 and 11.

Response to technical corrections:

(1) Page 1 Line 13-14: Change "is dependent on" to "depends on" >> Page 1 Line 14: "depends on".

(2) Page 1 Line 15: Change "is a quite … connects" to "plays an important role to connect" >>. Page 1 Line 15: "…is an important river in the basin. It connects the Taihu Lake upstream and the Yangtze Estuary downstream,.."

(3) Page 1 Line 20: Change "The results" to "Results", change "an effective mean" to "effective" >>. Page 1 Line 21: "Results"; Page 1 Line 21: "effective"

(4) Page 1 Line 27: Change "flows to" to "flows into" >>. The sentence has already been deleted.

(5) Page 1 Line 34: Change "To fight … of flood" to "Traditional methods for flood" >>. The sentence has already been deleted.

(6) Page 2 Line 1: Change "operating" to "operated" >>. Page 2 Line 29: "operated".

(7) Page 2 Line 6: Please rephrase "empties into" >>. The sentence has already been deleted.

(8) Page 2 Line 34-38: Please rephrase "However, …, 2002)." >> Page 3 Line 1-4: This sentence has already been rephrased.

(9) Page 3 Line 7: What does "amounts to" mean? Please rephrase and check other places >>. Page 3 Line 2: " is up to…", and the sentence has been rephrased.

(10) Page 3 Line 11: Please rephrase "typified" >>. Page 3 Line 16: "is characteristic of…".

(11) Page 3 Line 21: Change "suffer" to "suffering" >>. Page 3 Line 26: "suffering".

(12) Page 3 Line 24: Change "occur" to "occurring" >>. Page 3 Line 29: "occurring".

(13) Page 5 Line 16: Delete "was" >>. Page 5 Line 13: "was tested".

(14) Page 5 Line 24: There are two "in" >>: Page 5 Line 20: one "in" has been deleted.

(15) Page 10 Line 23: Change "implementations" to "implementation" >>. Page 10 Line 20: "implementation".

Part II Responses to Referee #2

Main Comments:

In this paper, the authors investigated the potential impacts of constructing a sluice gate (or an estuary gate) on the flood control in terms of evacuating flood discharge and reducing peak water levels, which is indeed important from both scientific and engineering points of view. The possible impacts of different operating mode of the proposed sluice gate on the hydrological conditions in the upstream part of the gate were analysed based on the numerical simulation for different scenarios. However, the authors focused on the application of HOHY model rather than the analyses of underlying mechanism of different operating modes for flood control. In addition, the authors did not investigate the potential siltation both upstream and downstream of the sluice gate, which is extremely important for real yet practical use of constructing a sluice gate for flood control purpose in an estuary.

A: First of all, this paper not only investigated the application of the HOHY model, but also expanded the model. Second, the Taihu Lake is upstream of the Huangpu River, and the inflow from the upstream area is the main part for the Huangpu River rather than the tidal water from the Yangtze River downstream. From Table 9-1 (Yan, 1992), the sediment concentration upstream is of 0.049 kg/m^3, and that is of 0.213 kg/m^3 downstream. Both of them are relatively few. For this reason, the problem caused by sediment and siltation is not serious in the Huangpu River estuary. Also because of this, our research focus on the potential contributions for evacuating flood discharge and reducing flood risk after the construction of the estuary gate. As is known to all, investigating the gate's potential contribution is of great engineering significance for the flood control of Shanghai metropolis and the whole basin. Clearly, it is very useful for flood management of the local authority and basin authority.

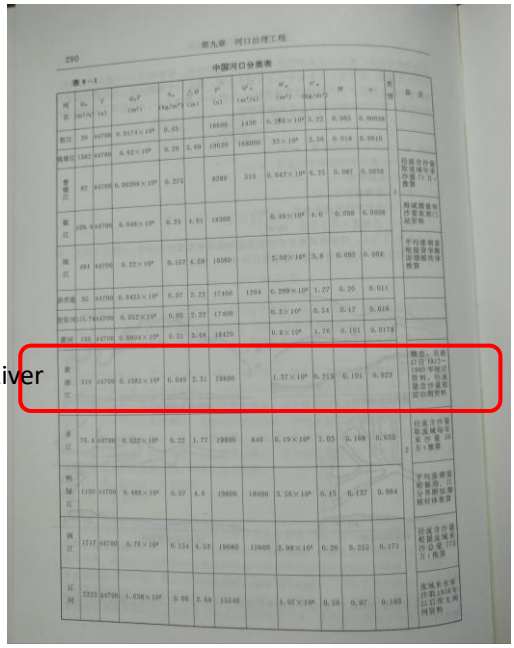

Table 9-1: the classification of the estuaries in China (from Yan, Yan, 1992)

Yan Kai: China coastal engineering, Hohai University Press, 1992 (in Chinese)

Q(1) It appears that the authors focused on the application of HOHY model to investigate the potential impacts of different operating modes of the gate on the hydrodynamics in the upper region of the studied arear. I would suggest the authors to concentrate on the analysis of the underlying mechanism or link between different operating modes and parameters relating to flood control.

A: We agree that analysis of the underlying mechanism or link between different operating modes is a very important subject. However, from our point of view, it is also important to study the potential evacuation benefits of the proposed Huangpu gate. The reasons are as follows: First, the Huangpu River is an important evacuation waterway in Shanghai metropolis; with rising sea level and increasing human activities, the flood problem of the Huangpu River estuary has become increasingly complex, such as the awkward situation of upstream floods, high tide and local rainstorms occurring simultaneously. Therefore, investigating the gate's potential contribution is of great engineering significance for the flood control of Shanghai metropolis and the Taihu Lake basin. Second, although the Thames Barrier in England and the Delta Storm Surge Barriers in Netherlands have proved to be effective controls at the estuary, they can only serve as a qualitative reference. This paper made a quantitative study with the model, which is not only useful for the estuary management but also useful for flood management. Third, the Huangpu River estuary is multi-functional; it not only can block the high tide of the river, but also can accelerate evacuating upstream flood and local waterlogging. This paper simulated the potential functions of the estuary gate through various scenarios and also expanded the HOHY model; therefore, it is of academic significance.

Q(2) The paper did not mention the potential siltation due to the construction of an estuary gate at all. There are numerous studies on the impact of estuary gate or tidal barriers on hydrodynamics and sedimentation in riverine system and estuaries (e.g. Schmidt et al., 2005; Carroll et al., 2008; Ji et al.. 2011; Ji et al., 2016; Zhu. et al., 2017). It was shown that the sediments from upstream part could be trapped upstream of an estuary gate and cause problems such as increased bed elevation and reduced water storage volume. Hence sedimentation reduction measures, such as sediment flushing, manual dredging, channel contraction or a combination of flushing and channel contraction, are the major concerns of building such a construction. Hence it is not reliable to have such a conclusion of building an estuary gate on the basis of only hydrodynamics simulations.

A: Sediment and siltation is a common problem in estuarine gates and is a major issue to consider before building a gate. The Huangpu River estuary construction is a very complex issue, involving problems such as sediment, siltation, ecology, shipping and so on. As we said in response to main comments, sediment and siltation is not very serious in this area and will not be included in this paper. We focus on the most important point after the construction of the gate, which is to investigate the potential contributions of constructing such an estuary gate to flood control and who will benefit from the proposed gate. More important, this paper not only makes clear the contributions of the gate to the estuary area, but also its contributions to the Taihu Lake Basin, which is also very important to flood management by Taihu Lake Basin Authority.

Q(3) It is noted that most of the references are written in Chinese, which is not suitable for publishing a paper in an international Journal, such as HESS..

A: Huangpu River is a very important river in Shanghai, China. Estuary gate construction is still in the preliminary demonstration-of-benefit stage; most scholars studying this subject are Chinese and most literatures are also in Chinese. This amendment, we once again added more English literatures as follows.

Wang Liang, CaiYongli, Chen Hongquan, Dag Daler, Zhao Jingmin, and Yang Juan: Flood disaster in Taihu Basin, China: casual chain and policyoption analyses, Environ Earth Sci., DOI 10.1007/s12665-010-0786-x, 1119-1124, 2011

Zhou zhengzheng, Liu Shuguang, ZhongGuihui, and Cai Yi:Flood Disaster and Flood Control Measurements in Shanghai. Natural Hazards, ISSN 1527-6988, 2016

Hu Qingfang and Wang Yintang: Impact assessment of climate change and human activities on annual highest water level of Taihu Lake. Water Science and Engineering, DOI: 10.3882/j.issn.1674-2370, 2009