

## **Response to Referee # 1:**

### **Anonymous Referee #1**

Received and published: 26 February 2013.

**The authors appreciate the referee # 1 for giving us the constructive suggestions to improve the quality of the paper. In the revised version, we have modified the details according to the referee's comments. Efforts are also made to correct the technical details. Please refer to our responses for the details given below.**

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**The following is a point-to-point response to the comments.**

### **General comments:**

The paper describes a model simulating hydrological processes in Zhalong wetland, Northeast China. The model takes into account flow exchanges between wetlands and its riverine network, and uses a modified module in the SWAT model to describe further processes within wetlands in the simulation. At the present state the paper represents a fair contribution to the scope of HESS, a good scientific approach and use of available methods, and a fair presentation of the scientific results. Given the scope of HESS, this paper will greatly benefit from a clear and concise discussion of how the hydrological processes studied interacts with some physical, chemical, biological and/or societal processes. Also, some specific and technical details should be revised before publication of the final manuscript.

**[Response: Thanks for the positive comments. We are very sorry for the unclear specific expressions and some technical details. The referee's opinions have inspired us, and we supplement the discussion of how the hydrological processes studied interact with some physical, chemical, biological and/or societal processes(see second paragraph, section 1).]**

### **Specific comments:**

(1) In the abstract open water should not be presented as a key hydrologic process. In the introduction and conclusions the authors claim that: "...the modeling system provides the basis for future assessment of ecological water requirements and effective river water diversion..". It is not clear from the results and discussion section how or why. This point should be addressed by the authors in a more concise way. This will help to improve the manuscript considerably and will help it make more compatible with the HESS scope.

**[Response: Thanks. We agree with this comment. The suggestion has been implemented.**

**In the abstract open water has been deleted. This sentence mainly clarifies that water area and water volumes were simulated by the hydrologic modeling system. Water area and water volume are key hydrologic components of wetland system. The expression that “the modeling system provides the basis for future assessment of ecological water requirements and effective river water diversion” means that wetland hydrological model will be applied to calculate the ecological water requirements in the optimum hydrological conditions (e.g. water depth or water area) and scientifically program the plan of ecological water diversion(which answered the question of when and how much water should be diverted in the paragraph 1 in the introduction). The calculation of ecological water requirements is one purpose of the foundation of wetland hydrological model in our studies of the Zhalong Wetland. This point is addressed in the revised manuscript in a concise way (see the conclusion part).]**

(2) Paragraphs 1, 2 and 3 in the introduction are not connected properly making it hard for a fluid reading. The use of appropriate transitions with connective on words is suggested. In section 2.1 authors mention the importance of Zhalong wetlands in the well being of some endangered crane and waterfowl species. It would be important to mention some examples and if possible references that link the well being of these species with the wetland habitat. That will help to build a stronger case supporting the ecological management of the area.

**[Response: Thanks. We totally agree with the referee’s opinion. The transitions are used in the paragraphs1, 2 and 3 of revised manuscript. The examples and the references are added in the section 2.1.]**

(3) It’s not clear in section 2.1 what is  $Z_c$ ; It is not properly defined anywhere. Furthermore, it should be considered the importance of presenting that value given that the references from where these values were taken are already in the text.

**[Response: Thanks. We have defined the  $Z_c$  and presented the importance of that value in third paragraph in section 2.1. ]**

(4) In section 3.2.1 the authors claim that some inconsistencies between actual manual defined boundaries did no significantly influenced the hydrological simulation. This point should be explained better. It’s not clear why or how.

**[Response: Thanks. The actual boundaries are defined manually from the government**

level. In the delimitation processes, the boundaries are defined mainly according to the distribution of typical wetland resources and waterfowl species, rarely taking into account the hydrological processes. This paper emphasizes the hydrological analysis, and therefore the boundaries which are defined by DEM and digital river network are more rational and scientific. Concise explanations are presented in the corresponding place of revised manuscript.]

(5) In section 3.2.2 at the end of the second paragraph, it is stated that open and closed wetland gain and lose water in the same manner. However, previously it is stated that closed wetlands do not have outlets, meaning that there are no outflows. Then, this last sentence is somehow confusing.

**[Response: Thanks. We are very sorry for the confusing expressions. The meanings of the last sentence are that open and closed wetland all gain water from inflows and lose water mainly by evapotranspiration. The previous statement has been revised.]**

(6) In section 4, second paragraph authors talk about the sensitive parameters used in the model. These are presented as notations and are only defined in table 1. They should be also defined in the text or be mentioned right at the start of that sentence that they are defined in table 1.

**[Response: Thanks. The suggestion is implemented. The more information of the sensitive parameters is added.]**

(7) In section 5.1 it is stated that: “::: the model better simulated the stream flow in the Zhalong wetland, and would be a useful tool for the hydrological study in data limited wetlands”. It is not clear how this can be useful. Some explanation and some references may help support this claim better. In addition, the connection between second and third paragraph can benefit from a better transition.

**[Response: Thanks. Hydrological model is an effective method for hydrological analysis, especially in data limited wetlands. The model system is able to simulate several major components (e.g. water area, water storage, outflow, water depth and so on.). The explanation and some references are added in the revised manuscript. Considering the transition and continuity of the section 5.1, the sequences of paragraphs are readjusted.]**

(8) In section 5.2 author's state: “..Time synchronization of the maximums reveals that the

closed wetlands play a key role in the expansion of open water area and storage”. This claim should be explained in more depth.

**[Response: Thanks. The open wetland releases water whenever the storage exceeds the spillage threshold, while the closed wetland expands the open water area to accommodate the excess water when the storage exceeds the maximum storage. There are obvious correlations between maximum of water area and maximum of water storage in the closed wetlands. Because of that, time synchronization of the maximums reveals that the closed wetlands play a key role in the expansion of open water area and storage. The specific explanations are replenished.]**

(9) In section 5.2 in the last sentence, the authors make reference to the 21st century as a particular point in time. It is recommended to mention a specific year, since 21st century could be very subjective.

**[Response: Thanks. The suggestion is implemented. The specific year is ascertained.]**

(10) Throughout different passages on different sections the authors make reference to the rainy season and make important statements explaining the hydrological behavior of the system. A proper definition of the rainy season (perhaps in section 2.1), in terms of quantity and timing would help to back those claims.

**[Response: Thanks. The definition of the rainy season is added in section 2.1.]**

(11) The conclusions are well structured and presented. However, attention should be paid to the claims suggesting the importance of the results in the sustainable management of the wetland. This again should be discussed in more depth in order to properly conclude in this subject.

**[Response: Thanks. The suggestion is implemented. The detailed discussions are presented in the last paragraph.]**

(12) There are some references missing that will help to support some important claims made by the authors: - First line in intro (p. 14036) - First line in section 5.4 (p. 14049)

- Third sentence in second paragraph, section 2.1 (p.14039): “Soils in the Zhalong Wetland is : :”

- Before last sentence in third paragraph, section 2.1 (p.14039):”Multi-annual means evaporation: : :”

**[Response: Thanks. The missing references are supplied in the corresponding place.]**

**Technical corrections:**

- Last line, third paragraph of introduction: a useful: : :/ better use: an useful. – Before last sentence, third paragraph, section 2.1: Multi-annual means evaporation: : :./better use: Multi-annual mean evaporation.
- Last line, third paragraph, section 2.1: affected by the climate: : :/ better use: affected by climate.
- Fourth sentence, first paragraph, section 3.2.1: inconsintence/ better use: inconsistency.
- Last sentence, first paragraph, section 3.2.2: attributing/ better use attributed. – Before last sentence, first paragraph, section 4: Parameters: : :was determined/ better use: Parameters: : :were determined.
- Last sentence, first paragraph, section 5.1: : : :be a useful tool/ better use: be a useful tool.

**[Response: Thanks. The technical corrections are implemented.]**

**Finally, once again we appreciate you for your good and comprehensive comments. The revisions according to your comments really make this manuscript improve a lot. Thank you!**