

Hydrol. Earth Syst. Sci. Discuss., author comment AC1
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Reply on RC1

Xiaoying Zhang et al.

Author comment on "Advance prediction of coastal groundwater levels with temporal convolutional and long short-term memory networks" by Xiaoying Zhang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-236-AC1>, 2022

Reviewer 1:

Major points:

R1_1: Based on the platform information, the efficiency of the two developed DL methods needs to be checked. They often take minutes to hours to complete a network construction, especially for the advance prediction part.

RESPONSE: Thanks for the suggestions. We will check the training and predicting time for both models and modify the corresponding parts in Section 4 and Table 4.

R1_2: The manuscript built two models and compared their results simultaneously, it would be better to include the LSTM in the title and further clarify the performance of the two models in the abstract and discussion part.

RESPONSE: Thanks for the suggestion. We agree with the reviewer's comment. The two models are actually both good at predicting variables in long-term time series. The LSTM was the most widely used approach and the TCN was a new framework and has not been used in the groundwater region. The results show comparable results between the two models. Based on the suggestion, we have modified our title into "Advance prediction of coastal groundwater levels with temporal convolutional and long short-term memory network" by including LSTM network. We will adjust the introduction, highlights and discussion to better state the results of LSTM. A statistical t-test will be as well conducted to determine the significance of the difference.

R1_3: Minor points: Highlights: please check if the monitoring wells are all located in the same aquifer and be consistent through the paper.

RESPONSE: Thanks for the comment. We will check the depth of the monitoring wells in the geological cross section to find out if the monitoring wells are all located in the same aquifer. We will also modify all the corresponding parts that related to "aquifer" through the paper.

R1_4: Line 27: a full name of TCN is needed here.

RESPONSE: Suggestion will be followed. A full name of TCN, temporal convolutional

network will be added in the abstract.

R1_5: Line 29: change the "first" to "beginning", and the following three months data.

RESPONSE: Suggestion will be followed.

R1_6: Line 31: Please check the time steps"24, 72, 18 and 360 time steps in advance.". It should have an increasing order.

RESPONSE: Thanks for the comment. It should be 180 time steps. We will modify it and add the corresponding days to the time steps.

R1_7: Line 32: The sentence is redundant with two "prediction" statements. And why only the one time step result is stated here, please modify the words. All the results from different leading periods should come together. Meanwhile, please correspond the time steps to the real time when talking about leading periods.

RESPONSE: Thanks for the comment. As we have 2 wells with 5 different leading periods including the one step prediction, so we will remove the detailed information for one time step parts and state the results with the advanced prediction together.

R1_8: Line 54: China experiences critical saltwater intrusion as well and has great research on this area, please check the paper (you could add two papers that you want us to cite).

RESPONSE: Thanks for the comment, we agree with the reviewer. Two papers that related to the serious saltwater intrusion will be added here.

R1_9: Line 62-64: This sentence does not make sense, please check.

RESPONSE: Suggestion will be followed. The sentence will be revised.

R1_10: Line 117: delete "several"

RESPONSE: Suggestion will be followed.

R1_11: Line 128: change "prediction" to "predict"

RESPONSE: Suggestion will be followed.

R1_12: Line 132: change "concept" to "concepts"

RESPONSE: Suggestion will be followed.

R1_13: Line 140: delete "basically"

RESPONSE: Suggestion will be followed.

R1_14: Line 144: change "have been" to "were"

RESPONSE: Suggestion will be followed.

R1_15: Line 150: please make sure that you are describing the data is integrate and how the wells are distributed in this area.

RESPONSE: Suggestion will be followed. The sentence has been revised to state an

integrate data.

R1_16: Line 159: change "three wells" to "two wells"

RESPONSE: Thanks for pointing this out. Suggestion will be followed.

R1_17: Line 160: Please check the total real available data items in this area, as the precipitation is daily monitored.

RESPONSE: Thanks for the comment. We will recalculate the data size. The groundwater level and tidal were hourly monitored within 13 months, and the precipitation, as the reviewer indicated, is daily monitored. Therefore, the total collected data was $9480*3+396=28,836$.

R1_18: Line 366: please check the typo error "may not ensugare better rFesults."

RESPONSE: Suggestion will be followed.

R1_19: Line 392: The Fig.7 includes prediction stages as well. Please is the description "The simulated groundwater level in the training and testing stages" correct.

RESPONSE: Thanks for pointing this out. We will add the prediction stage in this sentence. Meanwhile, we will further clarify the results are for the prediction stage in the same paragraph.

R1_20: Line 396: "the values of RMSE are 0.0019 and 0.0166 for BH1", I only found one well for two values, which needs to be checked.

RESPONSE: Thanks for pointing this out. The results are for BH01 and BH05 separately.

R1_21: Line 460: It would be better if you add the leading periods with the markers in Fig.10. Then it can clearly show the precision of each model.

RESPONSE: Thanks for the suggestion. We will add the leading time in the new revised Figure 10.