

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-403

Kuo-Chin Hsu (Referee)

Referee comment on "Karst spring discharge modeling based on deep learning using spatially distributed input data" by Andreas Wunsch et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-403-RC1>, 2021

The manuscript proposed to use convolutional neural network (CNN) associated with gridded meteorological data for Karst spring discharge modeling. CNN was applied to three karst spring watersheds in Europe. Results of 2D CNN model associated with gridded meteorological cells were compared to that of 1D CNN using climate station input data. The manuscript is well written and technical sound.

General comments:

- CNN is a mature data-driven tool which highly relies on data availability and quality. The authors argue that less data is needed in the proposed approach to obtain satisfying results compared to previous deep learning approach and overcome the short of data from climate stations. The results show that 2D modeling is not necessary better than that of 1D and previous modeling in Lez spring. A question raised is that whether the key input data has been identified. For example, pumping may play an important driving factor but is not included in training and screened out by Bayesian model. Gridded meteorological data may not be enough to improve the model performance. The authors needs to address their contribution. Guide line for data preparation will be helpful for the suggestion of use machine learning.
- The modeling uncertainty is quite low to almost without uncertainty that seems abnormal. The authors may explain this.

Specific comments:

- Line 203, write the long short term memory for abbreviation of
- Lines 213-215. Although the all programs are available from Python community. Technical functions should be described for the used library or framework should be explained.

- It is not clear functions for training, validation, optimization and testing periods in Table 1. The should be explained in main text.