Anonymous Referee #2

Referee comment on "Quantifying the uncertainty of precipitation forecasting using probabilistic deep learning" by Lei Xu et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-432-RC2, 2022

This study attempts to improve the accuracy of precipitation forecasting by jointly considering multi-source data-model uncertainties in deep learning based modeling framework. A case study conducted in the southern and northern China showed that the developed modeling framework is effective to reduce the uncertainty in precipitation forecasting. In my opinion, this study is valuable and the methodology developed is based on rigorous mathematical formulas that is worthy of recognition. Some of my main comments are listed below

Response: Thank you very much for the reviewing of our manuscript.

Line 9-26. It is suggested that some summative results should be added to the Abstract.

Response: Thanks for your suggestion. We will include the key results in the abstract in the revision.

Line 138-159. Adding some key formulas about the TCH algorithm can facilitate the understanding of whole framework.

Response: Thanks. The key formulas for TCH method will be added in the manuscript.

Some variables in equations need further explanation, such as the 'I' in Equation (1).

Response: We will check all the equations and symbols to make sure that all the variables are explained clearly.

Line 209. Typographical error. Should be 'estimated'

Response: This error will be corrected.

Line 349-366. There are many experimental settings. It is suggested to explain them in bullet points, or use a clearer presentation.

Response: Thanks for your suggestion. The bullet points or a summary table will be used to clearly express the experimental settings.

Line 377. In Figure 5, it is recommended to plot the uncertainty estimation results of all datasets for visual comparison.

Response: Sure. The uncertainty estimation for all datasets will be plotted in the revision.

Line 402: Add two numbers estimated by Loquercio et al. (2020)'s and Srivastava et al. (2014)'s methods for an intuitive comparison.

Response: Thanks for your suggestion. The specific mathematical values will be added in this sentence for intuitive comparison.

The Results Section lacks some detailed analysis on how the developed method can improve the prediction accuracy.

Response: We will add detailed analysis on how the proposed framework influences the predictive results, including the RMSE and uncertainty.