First of all, we would like to sincerely thank Referee 2 for his thorough review of the manuscript and constructive suggestions. The responses to the questions are presented as below.

- Summary

Overall, this is a very interesting paper that approaches the issues of the combined impact of temporal and spatial resolutions on the efficiency of a hydrological model, by using both distributed and lumped versions of the same hydrological model, and different densities and time resolutions of precipitation. I find it however unnecessarily complex, the authors should not try to show us everything they have done, they should try to simplify it into a coherent ensemble. I suggest removing the part on the different rainfall densities, and only keeping the densest network (high density daily disaggregated into hourly). This will allow the authors to focus on the spatial and temporal resolution issues. Also, I suggest to widen the scope of the analysis, which only focuses on high flows presently (because of the chosen criterion).

Response: There are two main reasons that we presented the results based on different spatial resolutions in the manuscript. Firstly, results indicate the insensitivity of model performance to different spatial resolutions of rainfall for the study catchments, the increase of spatial resolution improved the simulation insubstantially. Secondly, compared to the idea of increasing spatial resolution of model inputs, which causes the complexity of model structure and parameters, using higher temporal resolution of rainfall by disaggregation method could be an easier and much lower cost way to improve model performance. The authors hope to keep the results based on different spatial resolutions of rainfall to emphasize the effects of disaggregation method in model improvement. In the revised manuscript, we will extend the discussion with the sensitivity analysis of model simulation to the choice of performance criteria.

- Literature issues

I would say that your literature review is quite superficial. Of course, given the considerable increase of published literature, it has become obviously impossible to read everything that is published on a given topic. However, when you aim to publish a paper in a given journal: : : you should perhaps try to look at what has been published there in more detail. It is a little annoying that you seem to ignore a paper that is precisely on the topic you address in your paper:

Lobligeois, F., V. Andréassian, C. Perrin, P. Tabary, & C. Loumagne. 2014. When does higher spatial resolution rainfall information improve streamflow simulation? An evaluation on 3620 flood events. Hydrology and Earth System Sciences, 18: 575-594

And this is a pity because when you write that "the increase of spatial resolution improved the performance of the model insubstantially or only marginally for most of the study catchments", this is precisely what Lobligeois et al. find…

Response: We thank the referee for the comments and apology for the ignorance of the references. We will rewrite the literature review part with an updated introduction, referring to the ongoing progress of the researches for the sensitivity analysis of model inputs both on temporal and spatial scales. In the revised version, we will describe in more details about the attempts for improving model performance and the motivation of our paper. We will also compare and discuss our idea with previous work on impacts of input variables in hydrological models.

- Vocabulary issues

I understand that you use "pluviometer" for "recording pluviometer / raingage" and "daily station" for "non-recording pluviometer / raingage". This makes your paper difficult to follow.

Response: We will replace "pluviometer" with "sub-daily station" in the revised manuscript.

- Redaction issues

Your conclusion (especially the last paragraph) is difficult to understand. Try to be more explicit.

Response: We will reorganize our conclusion part in the revised manuscript to make it more understandable.

- Performance criteria

By using the Nash and Sutcliffe criterion on non-transformed flows (instead of, for example the NS on the square-root or the log or the inverse of flows) you make an explicit choice to focus on high flows only. Why? Could you extend your study by using another transformation in addition?

Response: The aim of this work is to investigate the sensitivity of model to rainfall data and sequentially find effective way for increasing accuracy of flood prediction. We pay for attention to high flows so the Nash-Sutcliffe efficiency was selected as objective function to evaluate model performance. In our previous study, we have compared the lumped HBV model performance for difference objective functions in a number of catchments on daily scale. Three criteria: (1) the Nash-Sutcliffe (*NS*), (2) Kling-Gupta efficiency (*GK*) that accounts for the water balances and the correlation of observed and simulated discharge series(Gupta et al., 2009), (3) the combination of NS and the NS of logarithm of the discharge (*NS+LNS*), were used to evaluate HBV for 15 catchments(Bárdossy et al., 2016). In addition, the model parameters calibrated for every catchment were used to simulate the remaining 14 catchments for testing the transferability of parameters. As shown in the figure below, results for different performance criteria differ considerably. The difference of model performance for the performance measures can be explained by different focuses: *NS* is mainly focusing on high flows as it represents the squared difference between the observed and discharge series, *GK* focuses on water balances and good timing, and N*S+LNS* criterion is strongly influenced by low flow events. Model behavior is dependent on how one evaluates the performance of the model. From the matrix we could also find that the model performance for different criteria shows similar treads. In this study, each calibration process requires 90000 running of HBV model to obtain 10000 best parameter sets. Due to the heavy computation, it is a little bit difficult to extend the study by using some other performance criteria within a short time. We will add the discussion of the choice of performance measures in the conclusion part.

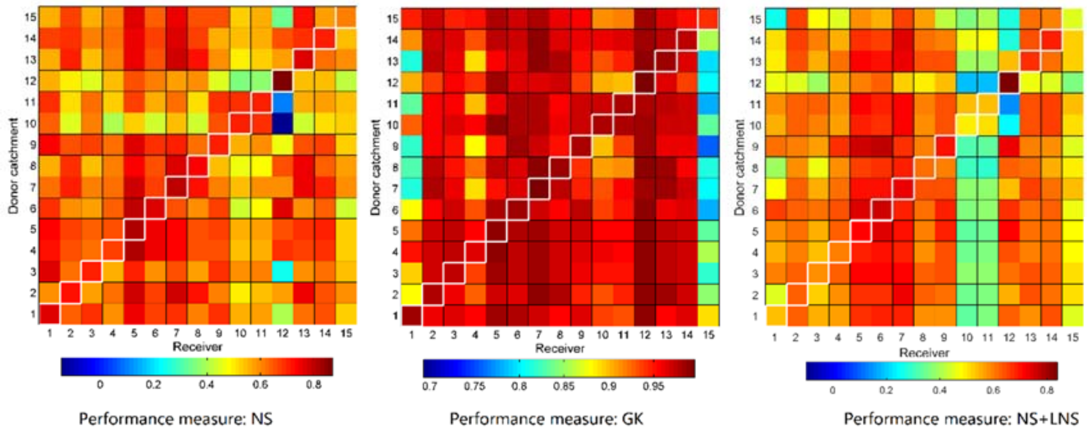

Figure. Color-coded matrices for the model performance of parameter transfer for 15 catchments using three difference performance criteria.

- Interception

I would like to know how the interception process is accounted for in your version of HBV? This is important for your comparison, because the simple solutions that work well at the daily time step (i.e. neutralization of daily rainfall by daily pot. Evaporation) may not work as well at the hourly time step, which may require an interception store.

Response: In our model, the interception process is consisted in evapotranspiration. The approach of Penman equation (Penman, 1948) is used to estimate the daily potential evapotranspiration according to the long-term monthly mean air temperature and long-term monthly average potential evapotranspiration using observed daily average temperature. Due to the limitation of observed hourly temperature, air temperature and potential evapotranspiration were assumed to be constant over the whole day in our study. The actual evapotranspiration is calculated based on the available water in soil and permanent wilting point based on the

- Typos

There are a few typos in the paper. Please make a careful check.

Response: We sincerely apologize and will carefully review our manuscript.

References:

Bárdossy, A., Huang, Y., and Wagener, T.: Simultaneous calibration of hydrological models in geographical space, Hydrology & Earth System Sciences Discussions, 12, 11223-11268, 2016.

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