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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Ensemble flood forecasting to support dam water release operation using 10 and 2 km-resolution JMA Nonhydrostatic Model ensemble rainfalls" *by* K. Kobayashi et al.

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Dear Anonymous Referee #2,

"The authors present the hydrometeorological analysis of a severe event in the Kasahori dam catchment in Japan. The analysis involves the full hydrometeorological forecasting chain using ensemble weather simulations and a distributed hydrological model. Their emphasis is on the verification of the performance of the forecasting chain through post event analysis and validation with radar and raingauge rainfalls.

They compare results with two spatial resolutions of the meteorological model and perform an exercise of position shift to improve model performance. They obtain some interesting conclusions on the performance of state of the art modelling tools in flooding events. The topic is relevant for the audience of NHESS, the research is methodologically sound and the paper is well organized and written. The methodology for the analysis is correct and the conclusions are correctly supported by the results and discussion. Therefore, I believe the paper deserves publication in NHESS. "

Thank you very much for the comments above.

"However, I think the paper still needs additional work to cover the scope mentioned in the title. My major concern is related to the paper title and approach. The paper title mentions dam water release operation as the main purpose of the forecasting exercise. However, the paper presents very little detail on dam operation and how such operation may be conditioned by model forecasts. In the Introduction (page 7414, lines 15-26) a brief discussion is presented on how rainfall forecast was useful in the decision of allowing a preliminary dam release. In the rest of the paper they only present data on the dam catchment, but we do not have any information of the dam spillway, the reservoir flood control capacity or the operating rules proposed for the dam in connection with the quantitative forecast. Only in the section on Ensemble flow simulation a very brief reference is made (page 7423, lines 8-9) to the decision to release water in the dam being linked to a discharge threshold of 140 m3s-1. In my opinion, the paper in its current form does not cover the aspects related to dam operation promised in the title. With the current title I would have expected to see analyses on how the flood hydrographs would have been routed through the dam under different management decisions and a detailed discussion on how the forecasts could be incorporated in the decisions, proving the usefulness of the approach. All analyses and discussions are only focused in the inflow hydrograph to the dam, with no reference to the implications for dam management. In dam management hydrograph shape and volume are equally as important as peak discharge. Real time issues and data assimilation are also of

interest. I suggest that the authors either remove the reference to dam operation form their title or include all these aspects in the analysis. “

We fully understood your concern. First, in the paper, the details of the dam operation was not well described. We will add the following explanation regarding the operation by the due date in the revised paper.

(1) In the rainy season, the reservoir water level is decreased to the normal water level for the rainy season (Elevation Level (E.L.) 194.5 m).

(2) If a flood risk due to extreme rainfall is expected by weather monitoring/prediction, the water level is further decreased to the preliminary release water level (E.L. 192.0 m).

(3) When the inflow exceeds 140 m3/s, the gate opening is fixed so that the outflow amount is determined only by the water pressure. This is, in a broad sense, natural regulation. The gate opening is not adjusted until the water level reaches E.L. 206.6 m.

(4) When the reservoir water level reaches E.L. 206.6 m, “Tadashigaki” (emergency) operation is taken; the outflow is set equal to the inflow.

However, after the flood event in July 2011, the dam has been under renovation to increase its flood control capacity. With such circumstances, it is difficult to obtain the data expressing the relationship between e.g. the gate opening, the reservoir water level, and the outflow amount. Thus, we cannot carry out the study to optimize the dam operation in the paper, though we still believe that the ensemble inflow simulation is enough interesting for readers. For this reason and considering your comments, we would like to change the title

from

“Ensemble flood forecasting to support dam water release operation using 10 and 2 km-resolution JMA Nonhydrostatic Model ensemble rainfalls”

to

“Ensemble flood simulation for a small dam catchment in Japan using 10 and 2 km-resolution JMA Nonhydrostatic Model ensemble rainfalls.”

We will write in the concluding remark that the study of the optimization for the dam operational rule is remained as the future work.

“My minor comments are the following: “

“On section 4.3 (page 7417, lines 7-9) some rainfall data are presented. Cumulative data correspond to a certain period and is therefore presented in mm, but maximum rainfall is also presented in mm while it should have been presented as rainfall intensity in mm/h. “

Thank you very much for your comment. This will be revised by the due date.

“On section 6 (page 7419, lines 12-15) the authors indicate that actual runoff observed in the catchment is larger than rainfall. This is very unusual and I think it deserves a deeper discussion. Did they perform a baseflow runoff separation?”

In the model CDRMV3 applied, the initial discharge Qi is set at the catchment outlet of the river. Normally Qi is the observed discharge in the beginning of the simulation. Then, the Qi is converted to the water depth h in each grid of the entire catchment depending on the ratio of the flow accumulation value for the particular grid and the flow accumulation value at the outlet. Thus, before the simulation, all the grids already have the initial water depth depending on Qi. This could be considered as the base flow in the model concept. The base flow separation is, however, complicated so that now we used the straight line method for the base flow separation, as a rough estimate, based on the initial Qi to answer your comment in time. As the result, the total discharge in mm becomes 556.3mm while the total rainfall is 568.5mm.

“On page 7421, line 2, change “have” into “has” “

Thank you very much for your comment. This will be revised by the due date.

“The paper has a total of 24 figures, but in my opinion some of them could be removed or at least be joined to simplify the analysis. For instance, figures 7 and 8 could be joined in one single figure. Same for figures 12 and 13, for figures 15 and 16 and for figures 18 and 19.”

Thank you very much for your comment. This will be revised by the due date.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 7411, 2015.