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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Satellite-driven downscaling of global reanalysis precipitation products for hydrological applications" *by* H. Seyyedi et al.

Anonymous Referee #4

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The authors applied a previously developed precipitation error model to downscale the gridded GLDAS precipitation to the resolution of TRMM satellite precipitation product and then they used the downscaled and error corrected precipitation to drive a hydrological model for flood simulation. The results of the experiment in a medium sized river basin supports their major finding of the study, i.e. the ensemble mean of the downscaled GLDAS performs significantly better than the original GLDAS dataset with similar performance to the TRMM 3B42V7 product which was used for the error model calibration. The results are interesting and meaningful, toward to derive flood frequency at larger scales which requires long-term time histories of the streamflow. The paper is

well written with the logic and major points both clear. However, I think the paper can be improved if the authors would consider address the following comments/suggestions: (1) Some more discussion of the literature of the existing long-term forcing (particularly precipitation) would make the motivation and contribution of the study even clearer. For example, given other good products like Sheffield et al. 2006 (with follow-on updates), what would the advantage of the product from this study? Sheffield, J., G. Goteti, and E.F. Wood, 2006: Development of a 50-yr high-resolution global dataset of meteorological forcings for land surface modeling. J. Climate, 19(13), 3088-3111.

(2) There is a lacking of discussion or experiment on quantifying or to differentiate the benefits from the error model or the spatial scale effect, as the improvements in the ensemble mean simulation can also be largely contributed from the higher resolution simulations, particularly for the size of the river basin of this study. This should be included in the paper as it is well in the scope of the study to show whether the benefits are mainly from the error model or not. Otherwise, a simpler method of downscaling, say just through pdf matching with bias correction, might be a better option. I think the authors should have addressed this issue for better convincing.

(3) Similar to the reviewer #3, what would be if the TRMM V7 and StageIV are shifted in this study, as both products have believers and both are adjusted by gauges (probably same/similar gauges). The authors don't have to address this, but if the authors happened to have tried that, some words on that would be interesting to read.

Others minor comments: P9071: lines 3-9,A recent paper by Wu et al 2014 in wrr, "Real-time global flood estimation using satellite-based precipitation and a coupled land surface and routing model", seems pertinent to here.

L15/p9074, how were these rain events derived?

P9077:10-15, what was the precipitation used for the model justification here?

P9086: Lines 14-16, how was the random error of simulated runoff derived here? Not

clear to me. The explanation (lines 16-19) is unclear. Please rephrase it.

P9086: L20-24, what do you mean “make discharge errors worse”? Relative to what? How much worse ? where is the support of this? Many studies indicated the precipitation error tends to be magnified in runoff in a relative manor? Isn’t this the major cause? What is finding on this in this study? From the conclusion, “ the discharge gets worse” should not be the finding of this study. I was confused.

P9078: lins1-2. A sentence to describe how TRMM data is specifically used in the the calibration will be helpful. Is it used as the target data set? Please clarify.

Fig. 5, caption, four seasons. Please use different line types for better reading of the figures.

Fig. 10- what are the hydrographs for? Please further develop the caption to describe the fig. better. The summer plot seems not consistent to Fig.8 where shows the values of GLDAS ensemble mane than the TRMM.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 9067, 2014.