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Hydrology and Earth System Sciences Discussions

Interactive comment on "Uncertainties on mean areal precipitation: assessment and impact on streamflow simulations" *by* L. Moulin et al.

Anonymous Referee #1

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The manuscript entitled 'Uncertainties on mean areal precipitation: assessment and impact on streamflow simulations' by L. Moulin, E. Gaume and C. Obled is a very interesting one. The topic (influence of uncertainty in mean areal precipitation (MAP) on streamflow simulation) is of course very relevant in the hydrologic field, the adopted methods are scientifically valid and up to date, and the presentation is clear and concise. The authors suggest an areal rainfall error model based on ordinary kriging interpolation method and first order autoregressive models (AR(1)). The basic tool for the geostatistical analysis is a "scaled estimation error variance" which is computed from a scaled climatological variogram model of the rainfall field. Two lumped rainfall runoff models are used to propagate the uncertainty in MAP estimates to runoff simulations.

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Interactive Discussion

Discussion Paper

One major objective is to identify possible relationships between the model sensitivity and the size of the study catchments. The case study is an interesting one, with use of good quality data from catchments characterised by severe flood events. The main interest of the paper is, in my opinion, in the fact that it poses the problem in a very clear way. Given the intrinsic complexity of the treated topic, the paper is necessarily somewhat inconclusive, i.e. it does not lead to a definite assessment on the influence of MAP uncertainties on runoff simulations across different catchment areas. However, the simple fact of clearly posing the problem makes the paper significant and worth of publication in HESS. I have two comments/suggestions for improving the paper.

1. At Section 4.2 (p. 2081-2) the authors address the issue of validating the temporal dependence error model. A central role here is played by examination of Figure 6, which is difficult to be read due to small symbols and characters. I expected use of normalised rainfall errors here, in parallel to Table 3. It is not clear enough here how Figure 6 is used to justify the choice of a temporal correlation equal to 0.6. Moreover, I do not understand why it is necessary to use a correlation coefficient which 'slight underestimates' (Line22-23 p. 2082) the observed quantiles. I would have expected here a correlation parameter able to fit the observed quantiles. The authors should also justify in a more thorough way and discuss the possibility to use a spatially uniform correlation parameter. This choice plays an essential role later in the study, and should therefore clearly evaluated.

2. At Section 5.2.2 (p. 2087, lines 15-25) the authors comment on results reported in Table 5, which gives the percentage of measured discharges comprised between the 90% confidence limits. The percentages are given for measured discharges exceeding various thresholds and accounting for measurement uncertainty. The authors note that i) this percentage increases with increasing the threshold used for the analysis, and that ii) For the smallest catchments (Rieutord, Chambon-sur-Lignon), the simulated 90% confidence interval contains almost 90% of the measured streamflow values when a tolerance factor of 20% is considered (Table 5). However, examination of Table 5 does

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not support completely the last conclusion, which is correct only for the smallest and the largest basins when Qobs $>$ Q10. In the other cases, percentages are all less than 90.0%. The authors should discuss these aspects, and about the (somewhat) implied point that the 90% confidence interval (based on simulated discharges) should include 90% of the measured discharges. Moreover, it is not clear how measurement uncertainties were estimated and accounted for in this analysis.

Once the issues raised in the review have been addressed to the Editor's satisfaction, I recommend publication in HESS.

Minor (typing) errors

Pag. 2076, line 5:..stationnary.should be 'stationary'

Pag. 2080, line 15 ' is an weighted...' should be '...is a weighted...'

Figure 6 Is difficult to read, please increase size of symbols and characters

Figure 10 Figure colours do not match caption's indication

Figure 11 Not mentioned in the text, please remove it.

Table 1 report runoff coeff as P/Q; it should be Q/P.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2067, 2008.