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Hydrology and Earth System Sciences Discussions

Interactive comment on "Estimation of antecedent wetness conditions for flood modelling in Northern Morocco" *by* Y. Tramblay et al.

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Dear Pierre Javelle, thanks for the revision of our paper, please find below the responses for each of your comments, and the proposed modifications have been implemented in the revised paper.

1: changed

2: Figure 3 show the optimal S, St and Tc parameters obtained for each event, using the calibration process explained in section 4.1. Indeed, we checked carefully the possible dependencies between the model parameters, by calibrating each parameter separately. The results of the calibration are shown in figure 3. We reformulated the

paragraph of section 4.1 to better explain the process: "The values of St and Tc were first calibrated for each episode, successively with different fixed S values to avoid dependencies between production and transfer model parameters. Then, the S parameter, representing the deficit of water storage in the basin prior to an event is also calibrated for each episode. Figure 3 shows the distribution of the optimal S, St and Tc values obtained for each event, after this calibration procedure."

3: You are right, each parameter were re-estimated when each i-th event was removed, the S parameters is estimated by the relationships with antecedent conditions estimators, and the St and Tc parameters simply with the median of the other events. However, we found that in this process the St and Tc parameters are very little influencing the simulation results; in our case it is mainly the S parameter that has a great impact on the flood simulations, which is the reason why we put more emphasis on it. We modified the whole section 4.1 and 4.2 to better describe the methodology used. In addition, we added another validation with a standard split-sample approach. The results are comparable to those obtained with the leave-one-out procedure, increasing the confidence in our results.

4: We added this paragraph in the 4.1 section: "Half of the flood events are complex, with different successive peaks of discharge, caused by the long duration of rainfall events in this region. Indeed, the most important rainfall events are usually caused by cyclonic activity over the Atlantic Ocean, they usually last longer than 24h with a strong intermittency." We also added a benchmark model with fixed median S value, to highlight the importance of the initial wetness conditions. The sections 4.2 and 4.3 have been updated.

5: This is impossible since we have only the historic data for the event presented on table 1. There are only a couple of events after 2002, so it is impossible to build a regression with only 3 points. However, since there is a very good relationship between the SMA output, which is a very good predictor for initial conditions in our study, and the satellite data, we are confident that satellite data will also be a valid method for

estimating the initial conditions. We improved the conclusions and perspective section with addressing these concerns in a more detailed way.

6: Changed by 'table3'

7: This is one of the purpose of our study = to show that when no long term data of precipitation (P) and evapotranspiration (E) to set up a SMA model are available, remote sensing moisture data could be helpful to set the initial wetness conditions of the model, without using a long-term calibrated SMA model. Indeed, E can be easily computed with the formula of Oudin et al. (2005), but P data is much more complex to obtain, and satellite data such as TRMM or PERSIANN are not yet reproducing adequately precipitation patterns in the arid zone. Further research should now consider the development of regional relationships in order to avoid the need to use long-term P and E data.

8 & 9: These two references have been removed

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