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Discussions

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**Interactive
comment**

Interactive comment on "Challenges in flood modelling over data scarce regions: how to exploit globally available soil moisture products to estimate antecedent soil wetness conditions in Morocco" *by* El Mahdi El Khalki et al.

Anonymous Referee #2

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This paper focuses on the use of different globally available soil moisture products (satellite and reanalysis) to provide initial conditions for an event-based flood model. It is applied on two semi-arid catchments in Morocco and tries to evaluate the added value of these products for real-time flood forecasting in such environment. The manuscript is well written and organized, the methodology is clearly stated and the results convincingly lead to the authors conclusions. I think the paper is almost ready for publication.

I only have one main concern about the data used to force the model. The quality of

precipitation data used to force the model is not discussed, while it could highly impact the model performances. Also, it is not clear which precipitation data is used: it is from rain gages or radar or a combination of both? Given the results, it seems that radar observations are used to force the model. But then, how are used the rainfall stations presented in section 2.2? Are their observations compared to radar? On the other hand, evapotranspiration is also a crucial variable in semi-arid regions. Is the Oudin formula well suited for such environment?

Minor remarks:

L147. Could the authors remind the definition of the runoff coefficient?

L245. Does the SMA model account for any kind of spatial variability or is it just a simple lumped model?

L323. Please define sigma_theta and MSE.

L328. What does the # symbol mean?

L345. Is there any reason related to the model structure for the wide use of SCS-CN in semi-arid contexts? Also, I guess the SCS-CN model is a lumped hydrological model only simulating discharge at the outlet of the catchment. Is that correct?

L377. i and n in Eqs. (10-11) are not defined and could probably be simply removed, as in Eq. (9).

Figure 2. Please replace "Correlation" by "Comparison" in the figure caption. The figure does not show only correlations.

L410. The authors could show the differences between rainfall at site scale and catchment scale (the latter being used in the SMA model).

L421. Is there any possible explanation of the overestimation of soil moisture compared to in-situ measurements (e.g. lower rainfall at the in-situ site than over the entire catchment)?

L474. It is Table 4.

L475. "As shown on Figure 6, the SCS-CN model in calibration..." but "Validation" is written in the caption of Figure 6.

L478. Figure 7 is more likely discussed in section 4.6. Should it be Figure 8?

L486. Please explain (maybe at the end of section 3.3) why a highly negative correlation (close to -1) means that the simulation is good.

L524. Water uptakes during flood could explain the overestimation of the model compared to discharge observations (events 25/03/11, 29/04/11, 02/04/12, 05/04/13 and 25/11/14). But what could explain that the model completely missed the last three events (16/05/11, 06/06/11 and 28/09/12)?

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-119, 2020.