

Interactive comment on “Estimation of antecedent wetness conditions for flood modelling in Northern Morocco” by Y. Trambly et al.

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This article describes an operational event based model, tailored to perform flood forecasting in a catchment in northern Morocco. According to the authors findings there exists a strong dependency between the ability to perform good flood forecasting and the knowledge of the wetness conditions of the soil in the river basin. This stresses the need for an accurate estimate of the soil water content at the moment a flood forecast is performed. Different methods of estimating the antecedent wetness conditions are proposed. A simple soil water accounting model, based on the surface water balance of the GR4J model, provided the best estimate for soil wetness prior to flood events. The soil wetness obtained by this model is compared to two remote sensing products

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(AMSR-E and ASCAT), where a good agreement is found.

General comments

This article addresses an important challenge in flood forecasting. In general it is well written and the results are presented adequately. However, some parts could be explained with more clarity.

1. From the text it is not clear, how exactly you obtained the values for S . On page 9373, line 23, you write that you used different fixed values (which?). On page 9374, line 5 you write that you calibrated the parameter S . Also, figure 3 indicates that you obtained different values of S through calibration. If I understood it correctly, you first calibrated T_c and S_t , using a set of S . Then you chose a fixed value of T_c and S_t for all episodes to obtain S or the parameters of the estimator, respectively. However, in figure 3 you present 16 values for each parameter (S , T_c and S_t). Since you calibrated these values for 16 periods, it looks like you have calibrated all three parameters S , S_t and T_c together. Please provide some clarification on that matter.
2. I quite like the general idea of testing the three wetness estimators in an “operational” setup. However, as you always use a subset of 15 events one would expect the parameters found to be quite homogeneous. How would a more rigorous splitting of the available data influence model performance? A good test for robustness is usually if one uses the “driest” half of all events for calibration and the “wettest” half for validation (and vice-versa), where “driest” and “wettest” could be in terms of rainfall, discharge, etc.

Moreover, a test under real operational conditions would also include to check whether the forecast model used is not prone to “false alarms” (e.g. large rainfall events that did not cause floods). I understand that you are quite limited in terms

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of data availability. Maybe you could adapt your phrasing in that sense, that your “operational” setup is rather constrained by the lack of data.

3. It is not entirely clear to me how you generated the soil moisture time series from raw (surface soil moisture) ASCAT and AMSR-E data. As I see it, you perform normalization of the time series and calibration of T using the SMA model you compare the data with. Why is it justified to do that? If soil moisture data from remote sensing are to be applied on completely ungauged basins, one will not be able to perform a normalization and a calibration in that manner. Given the very short time series available for both products, ASCAT and AMSR-E, would it be possible to estimate the parameter T similar to the parameters of the three “model based” methods? If an estimation of T is not possible, how would it influence flood forecast performance if a global value (e.g. 20 days, as used by Wagner et al. for the ERS-1/2 data) would be assigned?

Specific comments

Page 9369, line 7 Do you use a linear regression fit, as described in Brocca et al. (2011)?

Page 9369, line 21 Please define the meaning of parameter T_d shortly, or refer the reader to the HEC-HMS Technical Reference.

Page 9370, line 19 – 20 The sentence “Attenuation is modeled by a linear reservoir, representing the impact of basin storage, S_t (h).” is a bit misleading. S_t is not the basin storage, but the inverse of the rate at which the basin storage is depleted.

Page 9370, line 22 Is the inflow I_t specified in this equation equivalent to the excess rainfall P_e from Eq. 2? If yes, please write the equations in a more consistent manner.

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Page 9371, line 22 Please add, that only S_t and T_c are calibrated. This becomes clear only from the results section.

Page 9374, line 13 You should indicate, that you obtained your results by taking the logarithm of discharge.

Technical corrections

Page 9365, line 7 The area indicated for the Mdouar catchment should probably be 655 km².

The fontsize used in figure 2 through 5 might be too small, considering the space constraints in the final document with two columns.

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