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Natural Hazards and Earth System Sciences
Discussions

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 #1

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General comment

This paper is very interesting and very well written. It compares different soil moisture (SM) satellite products from an hydrological point of view. In particular, it tries to asses if these products could be useful in real time, as part of future flood warning system in Morocco. I think the paper could be published, after some minor changes.

Main remarks

1. The methods and data are globally well described, but sometimes a bit difficult

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to follow due to the huge amount of information provided. I would see 2 tables: a table summarising the different available SM products, and another one concerning the punctual measurements in each catchments

2. I would also remove the Extended collocation analysis: it takes time to read and understand the method (3.2), while the results are presented in only few lines (4.4), confirming previous findings.

3. I agree with the authors concerning the usefulness of the SM satellite products. However, I don't think that they could totally replace a Soil Moisture Accounting (SMA) scheme, especially for real time flood forecasting. First, as mentioned by the authors, the latency of those satellite products could be an issue as well their coarse spatial resolution. My opinion is that an interesting perspective to mention is to assimilate SM satellite products into continuous models in order to correct the state of its production function. I am not sure that using an event-based hydrological model is a good option for (flash) flood forecasting. But I agree, this question is far beyond the scope of this paper.

Minor remarks

4. P02L68: no date in Western and Bloschl

5. P04L132: A table could summarise the punctual hydro-meteo data (type, number, starting date, ending date, time step, catchment, . . .)

6. P04L139: I think that with a such short observation period (1 year for Rheraya and 6 years for Issyl) you also have strong uncertainties on high flow, because of the rating curve. How the discharge were calculated? Are gauging during floods available?

7. P05L153: I don't know if the Oudin's formula has been tested before in Africa.

8. P06L187: "Hargreaves-Samani equation" => you said you were using the Oudin formula?

9. P05L189: A table could summarise these data (type, starting date, ending, time resolution, spatial resolution, latence,missing values. . .)

10. P07L252: replace “ranging between 1 and 1000” to “ranging from 1 to 1000mm”

11. P08L278: you must finish this paragraph by explaining the criteria r and RMSD (with in_situ and SMA as ‘reference’

12. P08L279: remove this paragraph

13. P10L348: how is CN (and S) calibrated? On which criteria?

14. P11L355: same question for Sc and Tc

15. P11L368: I assume that Sc and Tc are also calculated using the leave-one-out procedure (as for S)

16. P11 equation (9) and (10): is N the number of time step, or the number of event? I think that here, this is the number of event, while previously (see remark 11), it is the number of time step

17. P12 equation (12): express le bias correctly (with sums)

18. P12L381: N => number of event or time step? + be coherent you also have ‘n’ in 10 and 11 (see rq 16)

19. P12L395: replace “from between 0,59 and 0,64” by “from 0,59 to 0,64”

20. P12L398-401: mention the % in the data table (see remark 9). But maybe, it is better to calculate the ‘continues’ r and RMSD, over a same time ‘common’ period, what ever the product you consider. Indeed, I think that the discrepancy in time period could have an impact on the scores.

21. P13L424: same remark

22. P14L457: delete 4.4 paragraph

23. P14L474: replace “table 3” by “table 4”

24. P16L537: this sentence should be in the introduction

25. P17L583: maybe replace “Javelle et al 2010”, by “Javelle et al 2016: Setting up a French national flash flood warning system for ungauged catchments based on the AIGA method, DOI: 10.1051/e3sconf/20160718010

26. P17L587: additionally to the latency issue, there is also the spatial resolution issue. On this subject, see for instance this product: https://www.theia-land.fr/humidite-du-sol-a-thrs-cinq-series-mises-a-jour/

27. P17L579-590: see my remark 3. I think that in the future, we must investigate assimilating SM satellite data into continuous hydrological models.

28. P30 Table6: “-1938.07” should be on one line

29. Figure 2 to Figure 5: time scale with dash every 1rst January (to better see the seasonality)

30. Figure 7: replace in the legend “Q_SM_obs” by “Qobs”

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