

Interactive comment on “A comparison of ASCAT and modelled soil moisture over South Africa, using TOPKAPI in land surface mode” by S. Sinclair and G. G. S. Pegram

Anonymous Referee #1

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Soil moisture is one of the most important parameters required for understanding and predicting hydrometeorological processes in Africa. Yet, there is no or only limited soil moisture information for most parts of Africa. This paper addresses this issue by introducing and comparing two independent sources for soil moisture information that both have the potential to be operationally implemented and used. The first soil moisture estimate is derived from meteorological observations using the TOPKAPI hydrological model. The second estimate is derived from the advanced scatterometer (ASCAT) operated by EUMETSAT. The results indicate a good agreement of over the western part of Southern Africa, while over the eastern part of the country correlations are low.

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Overall, the paper is a valuable contribution to the field and should be considered for publication in HESS after the following comments have been addressed:

1. While the ASCAT soil moisture product is already described in the peer-reviewed literature, it seems that the TOPKAPI model implementation is introduced for the first time in this paper. If this is the case then the description of the model and its input data sources should be expanded to some extent. Also, more information on the quality of the input data (TRMM 3B42RT, LSA-SAF DSSF, SAWS Unified Model forecasts) and of intermediate model outputs (e.g. actual daily ET) should be given, e.g. by comparing the input data and model results over the 164 weather stations.
2. It appears that soil moisture simulated with TOPKAPI represents a much deeper soil layer (whole root zone?) than measured with METOP ASCAT (< 2 cm). Therefore, a direct comparison of TOPKAPI SSI with the ASCAT surface soil moisture (SSM) data is not meaningful. On the other hand, the comparison with the filtered ASCAT data (SWI) makes sense as these represent the soil moisture content in deeper soil layers. Thus I would recommend to present the regression analysis only between TOPKAPI SSI and ASCAT SWI.
3. The authors demonstrate a periodic error of the ASCAT SSM data which appears to be related to the 29 day repeat cycle of the satellite. It would be good if the authors could clarify with the satellite data providers where this error is coming from. Also, it would be good to have a regional zoom of Fig. 22.
4. In some regions the low correlation between TOPKAPI SSI and ASCAT SWI might be due to very stable soil moisture conditions during the observation period. To identify these areas, also the bias and the (bias-corrected) RMSE should be calculated.
5. Some of the low correlations might also be caused by the errors in the TRMM rainfall product (e.g. Fig. 14). Therefore it is recommended that the authors compare the TRMM rainfall data with ground observations and SCAT SSM data over the 164 weather stations.

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