

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 #4

Received and published: 26 January 2010

General remarks _____

This study compares a soil moisture product based on TOPKAPI model used as a land surface model (without lateral redistribution of water) and a satellite soil moisture product from ASCAT on METOP. The originality of the approach is to use a simple methodology to provide near-real time estimates of soil moisture over South Africa which can be useful for agricultural applications and/or decision making. However, there are some inaccuracies in the data and the model description which can be improved. In addition, the paper shows 22 figures and should be shortened. I recommend a publication with

C3194

minor revisions.

Major comments _____

1) A major comment is that it is difficult to understand which ASCAT product was used in the study. Is it the surface soil moisture product (related to the 0-5 cm soil moisture) or the SWI product developed by TUWIEN which represents the 0-100 cm layer? Authors should clarify this. My opinion is that there is no reason to compare TOPKAPI SSI and SSM ASCAT products since these values are not representative of the same soil layers. On the other hand, the comparisons with the exponentially filtered time-series make sense.

2) There are no comparisons of the TRMM 3B42RT product with in situ rain-gauges. Can the low agreement of the Western Cape site be due to an erroneous rainfall estimates from TRMM ? Figure 10 shows the rainfall network in South Africa. A comparison of the TRMM 3B42RT product is strongly lacking.

3) There are too many figures that are not very useful: - figure 3 is not very instructive and figure 4 illustrate only a short period. A new figure which describes the bias or rmse map over South Africa should be better. - as the comparison with SSM is not relevant, some figures can be removed. - figure 16 would be better if it shows the correlation and the bias of SSI and filtered ASCAT SSM product.

Minor comments _____

1) Can authors explain the reason of a comparison at 0.5° resolution? The TRMM rainfall estimates are at the 0.25° resolution so why 0.5° ? In addition, it seems that the figures 12 and 13 correspond to a 0.5° resolution whereas it is state in the legend that it is at the 0.25° resolution.

2) Legends of fig. 12, 13 and 14 have to be shortened as “same as Fig. 11 but for the Eastern Cape site”...

3) The eq. 6 is not the one given by Wagner et al (1999) which select all ssm values

C3195

during a 20 days period as : $y(t) = \frac{\sum(y(t-1)(\exp(\alpha)))}{\sum(\exp(\alpha))}$ with $\alpha = \Delta t/k$ and not : $y(t) = (1-\alpha)y(t) + (\alpha)x(t)$. Can you explain ?

4) p. 7453 lines 7-8: I think that there is confusion between removing the high frequency variability from the ASCAT time series and the objective to produce a deeper soil moisture index.

5) A brief description of TOPKAPI is lacking. What are A and B soil horizons (7451, line 21) ?

6) p. 7451 lines 16-25: It is not clear why authors re-process the data since the ASCAT products are provided for surface soil moisture (SSM) and a SWI index which is obtained by filtering the surface soil moisture time series with an exponential function.

7) p. 7748, line 23: I don't understand whether a TOPKAPI simulation was done at $1 \times 1 \text{ km}^2$ resolution. This would require about 1.2 million pixels to cover the whole South Africa. The sentence is not clear.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 7439, 2009.