

***Interactive comment on “Comparison of soil moisture fields estimated by catchment modelling and remote sensing: a case study in South Africa” by T. Vischel et al.***

**Anonymous Referee #1**

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Comparison of soil moisture fields estimated by catchment modelling and remote sensing: a case study in South Africa. By Théo VISCHEL, Geoff Pegram, Scott Sinclair, Wolfgang Wagner, Annett Bartsch

The paper aims at comparing the soil moisture estimates derived from a scatterometer on board on the European Remote Sensing satellite (ERS) to the same quantities estimated by means of a distributed physically based hydrological model. The paper in my view can be accepted with minor corrections.

General Comments From the hydrological point of view, without expertise in the field of remote sensors and in particular of scatterometers, the paper is extremely clear, easy

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to be read and very effective in demonstrating how the two estimated quantities are highly correlated. Not all the results may be fully convincing (such as for instance the low values in the Nash-Suttcliffe coefficients, which should be further discussed), but in my view the paper points out the potential benefit for using (1) hydrological distributed models to improve the satellite based soil moisture estimates and (2) the latter to set up the initial soil moisture conditions in hydrological models.

Specific Comments 1) The authors should further emphasise the benefit for using a distributed hydrological model which allows to represent the horizontal flow that tends to redistribute soil moisture, how this distribution can be compared to the one deriving from the scatterometer measurements and how these measurements can be assimilated in the model in distributed form.

2) The authors should try to interpret the bias both in terms of hydrological model deficiencies and/or satellite estimates.

#### Technical Corrections

1) Page 8, Line 8: Eliminate ms in the sentence given that it will be successively defined as a non-dimensional quantity (%), to read: "Ĕ.resulting in the definition of topsoil moisture contents (<5 cm) which can be expressed as a relative quantity ranging between 0 and 1 (respectively, 0-100%), scaled between zero soil moisture and saturation."

2) Page 19, Line before last: Rewrite as: "to be multiplied by a factor of 100 instead by a factor of 10 as suggested by Liu and Todini (2002) to account for macropores and preferential paths in the horizontal direction,"

3) Page 25, Last reference: The correct reference is:

Liu Z., Martina M.L.V. and Todini E., 2005. Flood forecasting using a fully distributed model: application of the TOPKAPI model to the Upper Xixian catchment. *Hydrol. Earth Syst. Sci.*, 9, 347 - 364.

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