Hydrol. Earth Syst. Sci. Discuss., 10, C3356–C3359, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C3356/2013/

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Long term soil moisture mapping over the Tibetan Plateau using Special Sensor Microwave/Imager" *by* R. van der Velde et al.

Anonymous Referee #1

Received and published: 22 July 2013

Review of

Long term soil moisture mapping over the Tibetan Plateau using Special Sensor Microwave/Imager

by van der Velde et al.

General comments:

The Fundamental Climate Data Record (FCDR) of F08, F11 and F13 SSM/I satellites is used by the authors to retrieve surface soil moisture over the Tibetan Plateau from 1987 to 2008. In situ soil moisture observations were collected over a 2.5 year period

and, in this study, they are used to validate the satellite product. The trends derived from the satellite product are described. The paper is well written and deserves to be published. However, a number of clarifications have to be made. In particular, the assessment of the SSM/I retrieval is based on monthly values and is not completely convincing. The representation of the day-to-day variability should be assessed. The trend analysis is not complete. The quality of some Figures needs to be improved.

Recommendation: Major revisions.

Particular comments:

- P. 6631, L. 20: is "<" 1.4 GHz appropriate to designate low frequencies ?

- P. 6633, L. 19: "these change" ?

- P. 6634, L. 4: "i.e." or "e.g." ?

- P. 6638, Eqs. (3-4): Pellarin et al. (2003, 2006) have derived similar functions at other frequencies at the global scale. Are Eqs. (3-4) valid at a global scale (i.e. was the same training database as in Pellarin used ?) or are they only valid over the Tibetan Plateau? In Pellarin et al. (2006), the hourly rain rate is used at C-band and X-band. Why is this quantity not used in this study ?

- P. 6638, L. 12: what do you mean by "Taeq is equivalent to Tad and Tau" ? It should be made clear that Taeq is not equal to Tad, nor to Tau. Please write the relationship between Tad or Tau and Taeq.

- P. 6639, L. 18-19: A constant emissivity at 37 GHz ? This is very hard to believe. Since you use a monthly climatology of this quantity, you do not (completely) use this hypothesis. Please clarify.

- P. 6639, L. 25: "To filters out" ?

- P. 6640, L. 12: "the in total" ?

- P. 6640, L. 13: "soil moisutre" ?

- P. 6640, L. 17: "obvered" ?

- P. 6641, L. 11-13: at which time scale is this comparison made ? (daily ? monthly ?)

- P. 6642, L. 6-8: please define the MAE, RMSE, and SEE scores.

- P. 6642, L. 12: I would not use the RMSE score here as this score is influenced by the bias. The bias between a large scale soil moisture product and very local in situ observations is not informative. The local observation in units of m3/m3 may vary a lot from one plot to another. What is needed is the correlation coefficient and the standard deviation of differences. Moreover, assessing the day-to-day variability is crucial. From this point of view, calculating a correlation coefficient using absolute values such as in Fig. 6 is not very useful. This relationship is dominated by the annual cycle. Using scaled anomalies associated to a gliding window (e.g. as in recent Albergel et al. papers) is a way to properly assess the day-to-day variability.

- P. 6642, L. 25: a comparison at the monthly scale permits assessing the seasonal cycle, which is rather trivial. Have you tried to assess the correlation at a daily time scale ?

- P. 6643, L. 17 ("the SSM/I data product is skillful"): again, at a monthly scale, this is rather trivial.

- P. 6644, Sect. 5.2: It would be nice to see a long time series of monthly Tb values. For example over the area presenting the largest trend. Are trends in surface soil moisture seen by the NOAH model ?

- P. 6646, L. 15-22: are such trends in soil freezing/thawing seen by the NOAH model ?

- P. 6647, L. 1: What is the explanation for the decrease in ETpot ? A decrease in wind speed ?

- P. 6647, L. 5-6 ("Such investigation extends, however, beyond the scope of the present study."): maybe. However, since you try to explain the trends to some extent, alternative explanations should be explored. In particular, what about possible perturbing factors such as, for example, soil roughness ? Over sparse vegetation, soil roughness may change in response to changes in the precipitation and in the wind speed regime. Do the available weather stations in the area (or the atmospheric reanalysis used to force the NOAH model) show trends in these quantities ?

- P. 6658 (Fig. 1): scale and numbers in the Landsat image are difficult/impossible to read.

- P. 6664 (Fig. 7): please indicate that the monthly time scale is considered here.

- P. 6667 (Fig. 10): at which location within the Plateau ? Legends cannot be read. You should make two figures (e.g. a separate one for the annual trend), together with a table presenting the scores.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 6629, 2013.