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Hydrology and Earth System Sciences
Discussions

Interactive comment on "SMOS near real time soil moisture product: processor overview and first validation results" *by* Nemesio Rodríguez-Fernández et al.

Anonymous Referee #1

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The manuscript reports a new effort in developing an SMOS NRT SM product by using a neural network approach. The NN algorithm uses six SMOS brightness temperatures at incidence angles from 30 to 45 deg binned at 5 deg intervals for horizontal and vertical polarizations and ECMWF IFS soil temperature at 0-7 cm depth. Snow depth and soil temperature at 0-7 cm depth < 274K from ECMWF IFS are also used to exclude certain (snow covered and frozen) situations.

The NRT SM product was compared to ESA SMOS L2 SM product and to the in-situ data from the SCAN and the USCRN soil moisture networks in USA and satisfactory statistics were reported. The used ECMWF soil temperature is from the layer of 0-7 cm, and the in-situ soil moisture sensors are installed at 5 cm depth.

Major comments

The used methods, data and assumptions are described in sufficient details with results of comparison reported and conclusions drawn. However in discussion of the results, some more in depth analysis of the differences and uncertainties between the different products would be very useful for the use of the current product.

1. The depth of the retrieved SM SMOS NRT SM used ECMWF SM at 0-7 cm to train the NN, thus its retrieved SM should represent SM at the same depth, while ESA SMOS L2 SM represents that of the emission depth or sensing depth. In discussing the differences in between both products and those to the in-situ SM which is measured by sensors installed at 5 cm depth and represents an averaged SM around 5 cm, it would be important to point out such issues. In particular it would be important to explain why the correspondence is less good where very low correlation coefficients are reported and where and when such cases occur.

2. The effective soil temperature SMOS NRT SM uses ECMWF 0-7 cm soil moisture as its effective soil temperature. Previous studies have concluded that the model temperature at this depth is not the most adequate one to use (e.g. Dente et al., 2014) and this would increase the uncertainties in particularly semi-arid and arid areas (e.g. Lv et al., 2016). It is also noticed that the SMOS L2 SM uses the Wigneron soil effective temperature. The authors need provide an analysis to settle this issue.

References:

Dente, L., et al. "Combined use of active and passive microwave satellite data to constrain a discrete scattering model." Remote Sensing of Environment 155 (2014): 222-238.

Lv, Shaoning, et al. "A reappraisal of global soil effective temperature schemes." Remote Sensing of Environment 183 (2016): 144-153.

Technical comments

While the manuscript is written in clear language, many typos need to be corrected. Some are listed as follows:

P6L11: constrains -> constraints

P9L12: Levemberg-Marquard -> Levenberg-Marquardt

P9L18: this results -> these results

P11L5: please explain what is ‘short-scale dynamics’

P12L16: for of -> for

P12L5: patters -> patterns

P12L6: spacial -> spatial

P14L24: shows –> show

P19L14: taken into account trough -> taken into account through

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