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Interactive comment on "Multi-constellation GNSS interferometric reflectometry with mass-market sensors as a solution for soil moisture monitoring" *by* Angel Martín et al.

Anonymous Referee #2

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Paper summary: This paper presents data from a GNSS-IR field experiment, the purpose of which was to compare soil moisture retrievals from a geodetic-quality GNSS receiver to a mass market one, while also considering the relative performance of GPS, GLONASS, and GALILEO data. Gravimetric soil moisture data were used as validation. The authors found that the mass market receiver performed similarly to the geodetic-quality one.

General comments: I found this study to be succinct, and it did not try to overreach its goals. However, there were some problems with the methodology that should be cleared up before it is published. Particularly, the authors used the relationship be-

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Discussion paper

tween SNR phase and soil moisture from the work presented in Chew et al. (2014) to convert SNR observations to soil moisture for their own sensors. But, the relationship that we developed in that work is ONLY applicable to the Trimble NetRS receiver and choke ring antenna. Different antennas and receivers could have vastly different relationships between SNR phase and soil moisture. For example, the Zephyr antenna actually has a negative relationship between phase and soil moisture, not a positive one. So, using this conversion factor with the particular hardware used in this study is not appropriate. Instead, the authors should just present the correlations between phase and gravimetric soil moisture for the different antennas/receivers and constellations used, and they should derive their own relationships (and put these in a table). The mistake in methodology erases their conclusions about the relative performances in terms of RMSE of the different constellations and geodetic-quality versus mass market receivers. The conclusions should be re-thought after the methodology is revised.

If you do not have residual soil moisture values, you can usually estimate them based off of the soil type (as was done for the PBOH2O GNSS-IR network). Though, that requires having a long enough time series to make the assumption that, at some point during the time series, soil moisture was low enough to hit the residual value.

It is too bad that during the entire experiment, there was only one dry down. It would be a much stronger paper if the experiment could be redone during a more interesting time of year (in terms of soil moisture variability), though perhaps this is not possible.

The figures showing the time series of soil moisture retrievals are very difficult to see. The black versus grey dots, and how clustered they are together, make it difficult to distinguish any relative differences.

The spatial resolution of SMAP is actually 40 km (gridded to 36 km) since the radiometer is the only instrument onboard that works.

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