Hydrology and
Earth System
Sciences
Discussions

*Interactive comment on* "Use of satellite and modelled soil moisture data for predicting event soil loss at plot scale" *by* F. Todisco et al.

**Anonymous Referee #1**

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I have reviewed this manuscript and I have the following comments.

GENERAL COMMENTS The manuscript describes an approach for predicting event soil loss at the plot scale in the Masse area of central Italy. The authors compare the performance of an improved version of the Universal Soil Loss Equation (USLE) against measured data collected between 2008 and 2013. According to the authors, the novelty of this study is the inclusion of soil moisture observations in the event rainfall-runoff erosivity factor of the RUSLE/USLE equation. The authors assert that this enhances the capability of the model to account for variations in event soil losses.

In terms of the quality of the paper, the writing style is quite varied throughout the manuscript. Some sections e.g. the abstract and introduction are reasonably well writ-

ten with clearly stated arguments. Other sections require extensive language editing to ensure that the manuscript flows nicely. In the abstract the abbreviation USLE must be written in full at first mention as some readers may not be familiar with it. On the results, it is bad practice to duplicate results except if there is a clear benefit in doing so. For example, in Fig 3, the modeled and satellite derived soil moisture values are presented first as a line graph (a) and then again as a regression relationship (b). Choose one format that best projects your results. Remove the raster in Fig 3a and 5a, respectively.

SPECIFIC COMMENTS I have a few issues on the methodology presented in this manuscript. Firstly the authors use satellite derived soil water content data at a spatial resolution of 25 km for a plot level study ~ 22 m x 8 m. Given the large spatial variation in soil water content, clarity is required on the methods used to downscale the satellite soil water content to the plot scale. This detail is necessary in order for the study to be repeatable. Examples of downscaling approaches can be found in Friesen et al., 2008 and Gharari et al., 2011, among others. Secondly, the soil water content data is also derived from a soil water balance model. Validation of the modeled or the satellite derived soil water content data with actual water content measurements on the plots is needed. The authors should, at least, give an indication of how accurate their soil water content data is given that inclusion of soil moisture in the erosion model is their main contribution. Thirdly, the quality of the soil water content estimates from the soil water balance method can be improved by replacing the empirical Blanney-Criddle method of estimating evapotranspiration (section 3.2) with the physically based and more accurate Penman-Monteith approach. The authors are well placed to implement this given that they had a weather station at the site (second par, pg 2951). Lastly, claims that power relations in the SM4E model gave better estimates than linear relations (pg 2957 line 20-25) should be supported by suitable statistics which is another area of weakness in the paper.

TECHNICAL CORRECTIONS - Abstract, write the abbreviation USLE in full at first mention; - Pg 2950 line 4: replace the phrase "large availability" with "widespread

availability"; - Pg 2950 line 20: replace the phrase "compared with" with "evaluated against"; - Pg 2951 line 9: Replace "gauging station" with "weather station" - Pg 2951 line 23-27: This sentence is too long, consider splitting. - Pg 2952 lines 1-2: indicate the source of the remote sensing data. A website will do; - Pg 2952 line 12: Indicate the depth of the rootzone; - Pg 2956: line 12: Good agreement between the ASCAT and SWBM soil moisture does not necessarily mean that they are accurate. Ground-truthing seems necessary here. - Pg 2958 lines line 1: Statistics needed to indicate that the power functions gave significantly more accurate results.

REFERENCES Friesen J., Rodgers PG., Oguntunde JM et al (2008). Hydrotope based protocol to determine average soil moisture over large area for satellite calibration and validation results from an observation campaign in the Volta Basin, W Africa. IEEE Trans. Geosci. Remote Sens. 46(7), 1995-2004.

Gharari S., Hrachowitz F et al (2011). Hydrological landscape classification: investigating the performance of HAND based landscape classifications. Hydrol Earth Syst. Sci. 15, 3275-3291.

COMMENTS END.