

# ***Interactive comment on “Establishing relationship between measured and predicted soil water characteristics using SOILWAT model in three agro-ecological zones of Nigeria” by OrevaOghene Aliku and Suarau O. Oshunsanya***

## **Anonymous Referee #1**

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### General comments:

This study compared the measured and predicted soil physical properties (soil available water, bulk density, field capacity, hydraulic conductivity, moisture content, maximum water holding capacity, and wilting point) at three agro-ecological zones of Nigeria. The model examined is the version 6.1.52 of the Soil Water Characteristics Program (SOILWAT model). The motivation behind this study was that soil available water has important impacts on soil nutrients availability, and the use of numerical models to estimate soil physical properties is necessary to avoid time consuming and labor

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intensive soil measurements.

However, all soil physical properties predicted by SOILWAT model were significantly different from the measured values at all of the examined agro-ecological zones, which suggests that current version of the SOILWAT model cannot be applied to represent soil water characteristics. Extensive improvements are needed for the SOILWAT model before it can be used for irrigation planning. I suggest rejecting this manuscript at this time.

Specific comments:

Page 2, In 37-39: Is there any reference that supports this statement? If so, please cite here.

Page 3, In 96: What type of grassy vegetation is predominant here? C3 or C4 photosynthesis pathway?

Page 4, In 112: Please indicate the location of this agro-ecological zone as the format used in "Derived Savannah".

Page 4, In 117: Please indicate the location of this agro-ecological zone as the format used in "Derived Savannah".

Page 6, In 181: Which type of the T-test is used in the analysis? One-tailed or two-tailed?

Page 7, In 221-223: Please rephrase the sentence. The R-squared value (0.44) could be acceptable here, but it doesn't mean that SOILWAT model can be used to predict soil available water.

Page 7, In 225-228: If model performance relies highly on soil organic matter, why didn't the authors include this information in the SOILWAT model?

Page 8, In 239-245: Why didn't include silt adjustments in SOILWAT model to improve its performance for bulk density?

Page 8, In 255-260: Why didn't include appropriate local adjustments for soil organic matter to improve the model results?

Page 9, In 272-278: I agree with the authors that soil density can largely affect soil hydraulic conductivity simulations, but can it cause an order of magnitude difference between the measured and predicted soil hydraulic conductivity? Was there anything wrong in the SOILWAT model configurations?

Page 10, In 329-333: The authors claimed that additional variables can help improve the simulation results from SOILWAT model; however, no results were shown to support this statement. More efforts are needed before using the SOILWAT model to predict soil moisture characteristics for irrigation planning and scheduling.

Page 15, Table 1: Please correct the format for "moisture-conductivity" and "gravel effects" (center, bold, and underline).

Page 21, Fig. 1: Please provide a better resolution figure to replace this one. It's hard to tell the characters in each shaded box.

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Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-165, 2016.

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