**Biogeosciences
Discussions**

Interactive comment on "The Unified North American Soil Map and its implication on the soil organic carbon stock in North America" *by* S. Liu et al.

Anonymous Referee #3

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In this article, the authors present a new dataset of soil properties in North America on the basis of several existing datasets. I agree that reliable datasets of land surface properties are required for model researchers working on simulations of biophysical, hydrological, and biogeochemical processes. This study developed a moderate resolution (i.e., quarter degree mesh) dataset (UNASM) of representative soil properties such as sand/silt/clay fractions and bulk density using the HWSD 1.1, STATSGO2, SLCs, and NCSCD.

Even not scientifically insightful, developing a new dataset like the UNASM is a fundamental progress for many model researchers. However, I have several caveats on

this study. First, the criteria of data selection and handling were not clearly described in the manuscript. Specifically, a new version of the Harmonized World Soil Database (i.e., HWSD1.2) was released from the IIASA last year, but the authors used an older version (i.e., HWSD1.1). In the new version, additional data of bulk density were included. Second, spatial resolution of the UNASM dataset seems insufficient. I agree that quarter degree (about 25 km) is fairly fine for global-scale simulations, but it is clear that this dataset is not applicable to most landscape to regional simulations. In other words, the HWSD with 1-km resolution seems to be better in this regard. Third, combination of different datasets may produce artificial discrepancies in the data. For example, in Figures 3 and 4, I found a clear gap at the boundary between Alaska and Canada, i.e. the boundary between STATSGO2 and HWSD1.1. For users, such kind of artificial gaps are undesirable, because it makes interpretation of simulation results confusing.

Overall, this is a data-description study, and then I recommend submitting other specific technical journals (e.g., Geoscientific Model Development). Otherwise, this manuscript needs major revision after modifying data selection and adding discussion on uncertainties in the dataset.

Page 15179 Line 5 to 10 Did you make comparison between SLC V2.2 and V3.2 for agricultural soils?

Page 15182 Line 10 The priority order (STATSGO2 > SLC 3.2 > SLC 2.2 > HWSD1.1) seems arbitrary. Can you show some validation results?

Page 15182 Line 14 to 16 The fractions of source datasets are cell-number based. I guess that area-based values are more appropriate, because high-latitude cells occupy smaller areas.

Page 15186 Line 1 to 3 This statement "The difference map, . . . (Fig. 3)" is not necessary.

Page 15190 Line 6 to 10 These statements "Post et al. (1982) . . ." and "Quideau et al. (2001a,b) . . ." are not a result of this study and then should be moved to Discussion.

Page 15192 Line 25 Do you mean "SOCC" instead of "SOCM"?

Page 15197 Line 2 Several important soil properties (e.g., rooting depth, hydraulic conductivity, thermal capacity, texture class, nutrient content, etc.) are not included in UNASM dataset. I recommend discussing future possible refinement of the dataset by including additional properties into the data.

Page 15209 Figure 5 Can you include a curve of the original (i.e., not NCSCD-combined) UNASM data? This may clarify how the NCSCD data improved the dataset.

Page 15209 Figure 7 This figure can be merged with Table 3.

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