

## ***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 #1**

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This article demonstrated the advantages of the author’s group developed soil dataset UNASM, of which target-users are ecological modeling researchers, merged with several datasets. In general, such dataset papers were hard to publish as original paper, however recent research needs enhance the importance of integrated and useful dataset by the combination of several patches of experimental variables. Especially, numerical modeling studies requests accelerate the generation of useful dataset, thus this article works is suitable for publish in biogeosciences in the point of view of citation.

Even though the importance of the dataset to describe soil characteristics, the reviewer feels as major problems as listed below, so that the reviewer’s recommendation for this

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article is major revision. The reviewer hopes to improve the dataset quality truly useful for numerical modelers by revising processes.

1. Data selection problem (3.2 Stage II): As already pointed out in this article, HWSD itself is merged global dataset. Thus the authors have to go back the quality of original dataset harmonized in HWSD. Without the consideration of original dataset of HWSD in target region, simplified selection rule adopt in this study, STATSGO2 > SLC 3.2 > SLC 2.2 > HWSD 1.1 is not easily acceptable for most of readers. Simplified selection seems to stand on the viewpoint as that: STATSGO2 and SLC were published from government's authorized organizations, thus its quality was best. However, to publish original scientific paper, it is need a kind of scientific logic, evidences and/or reasons to adopt, only "authorized organization published dataset" is not sufficient. At least, the reviewer request more careful description about the reason why selection order was decided with the standpoint of science. If possible, inter-comparison among three original datasets (HWSD versus STATSGO2, SLC 3.2) with in-situ experimental evidences will be carried out, and then selection order will be decided. Such process makes clear the logic within the article.

2. Downscaling methodology's problem (3.1. Stage I): Original STATSGO2, SLC 3.2, SLC 2.2 is consists of vector dataset, thus in principle, raster conversion in the spatial resolution of 30 arc-second as same gridded size of HWSD. Finer scale raster data generations enable to make additional information for "sub-grid heterogeneous", when downscaling 0.25-degree gridded scale. Sub-grid heterogeneous information is represented as, for example, variance of bulk density, pH etc., and useful for sensible analysis of numerical modeling. As the authors mentioned in "discussion", one determinate 0.25 gridded information looks like as a limited factor, thus the generation of sub-grid related variables is one of overcoming approach. In addition, a simplified downscaling approach in Stage I seem to affect on the narrow histogram in bulk density of UNASM (Fig. 2, with comparison of HWSD 1.1). So the reviewer requests the logical and careful reconsideration for downscale methodology.

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3. Is UNASM truly stood for ecological modeler's requests? In introduction of this article, "none of comprehensive soil dataset available" was emphasized. If so, at least it should be noted what kind of elements or variables are required in the field of ecological numerical modeling studies, based on the previous investigation reviews. However such detailed descriptions were not available in this article. In addition, the reviewer is not belong to the field of ecology, but water-related parameters such as porosity and/or available water storage capacity (AWC) is truly needed, at least, for hydrological modeling (for the estimation of volumetric water content within the soil). To read this article carefully, the reviewer cannot find descriptions related for water. Thus the reviewer's question arise "Is UNASM truly stand for numerical modeling users?" The reviewer strongly recommended to make a kind of look-up table of which represents the relationship between UNASM generated parameters and numerical modeling requested parameters. To make such table, systematic review of numerical modeling works more.

If possible, with revised processes of the article, please update the background dataset of HWSD form version 1.1 to latest version of 1.21 (dated 07 March 2012).

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