

Interactive comment on “Deriving a country-wide soils dataset from the Soil Landscapes of Canada (SLC) database for use in Soil and Water Assessment Tool (SWAT) Simulations” by M. R. C. Cordeiro et al.

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Authors' reply to interactive comment posted by Dr. Masoud Asadzadeh regarding the ESSD Discussion paper “Deriving a country-wide soils dataset from the Soil Landscapes of Canada (SLC) database for use in Soil and Water Assessment Tool (SWAT) Simulations” (essd-2017-66).

Dear Dr. Asadzadeh, We appreciate your comments and suggestions to strengthen the manuscript. Please find below the answers to your comments.

General comments Dr. Asadzadeh: The manuscript explains a great deal of effort that is spent to prepare SWAT-ready soil database in Canada. SWAT is a well-developed hydrological model capable of simulating management activities in agricultural lands and therefore is a very useful tool for analyzing land-use change scenarios. In fact, personally, I prepared a similar dataset for Southern Ontario; therefore, I know the value of the dataset in the larger scale, Canada-wide. Hence, I support the study and the dataset.

Authors: SWAT is a largely used model, as you state. However, the lack of ready-to-use datasets in Canada hinders its application in this country and requires great efforts as the one you describe to use the model in Southern Ontario. The major reason behind the present dataset was to provide users with one of the major inputs for SWAT model (i.e. soils data) and disseminate its adoption in Canada. We have already received compliments from users expressing their appreciation for our efforts in this regard.

Specific comments

I have two main comments that can help improve the usefulness of the dataset and the coherence of the manuscript:

1. Dr. Asadzadeh: The study lacks a comparison between the proposed soil dataset for Canada and the SWAT database for US across the border. Such a comparison will make users aware of the discrepancy between the two datasets and give them a source of reference when modelling bi-national watersheds. Moreover, authors need to discuss the reason for the discrepancy between the two datasets across the border.

Authors: Discrepancies among the national datasets had been identified even before the present analysis was carried out. These discrepancies are due to several reasons. The main one is that the American and Canadian datasets are populated with soils data consistent with their respective national methods and standards. As a result of data and methods differences in many areas across the international border, discontinuity between the datasets will almost always be shown. Other reasons for

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discrepancies between the national datasets pertain to GIS mapping. Discontinuity between the GIS layers of both datasets (using a polygon topology) is possible, which would result in abrupt changes in soil properties at the border between the two countries. Also, soil records not spatially defined within multi-component polygons in the GIS layer compound the issue depending on which component is mapped (multi-component polygons are discussed in the manuscript). Even if methods standardization and GIS discontinuity were not an issue, disagreement between the datasets at the interface between the datasets could be due to differences in accuracy and precision in the measurements leading to parameter uncertainty (a new section in the revised manuscript discusses uncertainty in the present dataset). All these aspects, coupled with the large number of physico-chemical parameters in the datasets and the extent of the boundary between the two countries (i.e., more than 6,000 km), renders the comparison between the databases a very complex and time consuming analysis, which is out of the scope of the present study.

2. Dr. Asadzadeh: Authors need to discuss the uncertainty in the SWAT model structure for bi-national watersheds that use US soil dataset for the US side and the proposed soil dataset for the Canadian side of the watershed.

Authors: We believe that SWAT's model structure uncertainty is not dependent on soil database (i.e., input data) but on the description (i.e., algorithms) used to simulate physical processes in the model. In other words, the model uses the same algorithm in both US and Canadian portions of trans-boundary watersheds. However, model response in trans-boundary watersheds might be different due to input data uncertainty caused by differences in soil data quality and quantity in US and Canadian datasets. The discussion suggested by the reviewer has been added to the revised manuscript in a newly added section dealing with uncertainty.

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2017-66>, 2017.

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