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Earth System
Science Data
Discussions

Interactive comment on "The Northern Circumpolar Soil Carbon Database: spatially distributed datasets of soil coverage and soil carbon storage in the northern permafrost regions" *by* G. Hugelius et al.

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We wish to thank the reviewers for positive feedback and constructive criticism which will help us to improve our manuscript.

Below we address those questions raised by the referee J. O'Donnell in a comment published online on the 19th of October.

On the question why this manuscript does not describe the datasets used by Tarnocai et al. (2009) to quantify the 0-300 cm soil organic carbon (SOC) pool, deltaic SOC and

Yedoma SOC:

This manuscript is solely dedicated to describing the Northern Circumpolar Soil Carbon Database (NCSCD). Tarnocai et al. (2009) estimated 0-300 cm, deltaic and Yedoma SOC based on datasets that were/are not included into the NCSCD. The estimated of 0-300 cm SOC was calculated based on average soil coverage data and a limited number of pedons (n= 45). However, because of the very limited database and limited geographical range (limited to the Canada and the Usa River Basin in European Russia only) these data were never used to populate the polygons of the NCSCD. We are currently working to remedy this situation by linking the NCSCD to a larger number of pedons with data in the 100-300 cm depth range, and we hope to submit a short communication describing this addition of data in the near future. Deltaic SOC was estimated based on borehole data from the Mackenzie river delta combined with geospatial analyses of lake coverage, estimates of depth of deltaic deposits and estimates of the extent of major Arctic deltas. Yedoma SOC was calculated based on generalized available information on Yedoma extent, average thickness OC content and bulk density. The NCSCD was not used at all for these latter two estimates (although double counting of SOC pools with the NCSCD was removed).

We would also like to address separately the important question of why we have not included data from individual pedons in this dataset and manuscript:

The NCSCD is a geospatial database and was never intended to contain separate spread-sheet type data of individual pedons. However, we fully acknowledge that such a dataset of individual pedons in a compiled, structured and properly formatted version would be a valuable scientific resource. The individual pedon information that form the basis for 0-30 cm and 0-100 cm SOC storage in the NCSCD come from many different sources. Much of the data comes from open governmental databases (e.g. Canada and Alaska) while other data is the property of individual researchers or research groups. During the compilation of the NCSCD (over a period of several years) the authors acquired permission of use and data to calculate 0-30 cm and 0-100 cm

SOC storage, but the full pedon descriptions that would be needed to present a comprehensive pedon database are not available for publication.

Brief responses to numerous specific comments:

The referee J. O'Donnell helpfully provides detailed commentary on and requests clarification of a number of issues in the method sections of our manuscript. These are all valid and important questions which need to be addressed. Below we give answers in brief, numbered according to the specific comments in the referee comment by J. O'Donnell. A revised manuscript that is updated with in depth answers and clarifications will be submitted to ESSD.

1) A clearer context will be supplied

2) This definition will be added to the text

3) You are correct, the name is a SIPRE corer.

4) On must consider that soil material is displaced into the pipe from the walls of the pipe, which results in an extracted core which is longer than the actual coring depth. The volume calculation for bulk density estimates must include this displaced material.

5) All mineral soil samples containing carbonates were acidified.

6) The term older refers to soil samples collected before 1980.

7) The manual "Soil Sampling and Methods of Analysis" (Canadian Society of Soil Science) recommend a drying temperature of 105° C. However, it has been shown that if the temperature exceeds 85° C it could result in some loss of organic matter (Macfarlane, 1969, Muskeg Engineering Handbook). Therefore, for samples from the Canadian sector, organic soils were dried at 55° C for 2 days. The recommendations of the "Soil Survey Field and Laboratory Methods Manual" (Soil Survey Investigations Report No. 51, ed. by Rebecca Burt, National Soil Survey Center, Natural Resources Conservation Service, U.S. Department of Agriculture, Lincoln, Nebraska,

http://soils.usda.gov/technical/lmm/) is to dry all soils for 12 to 16 hr at 110° C and it is likely that this procedure has been followed for the U.S. sector. Details regarding drying temperatures are unfortunately not available for older samples from the Eurasian sector.

8) This refers to O-horizons in all mineral soils taxa (i.e. all soils except Histosols and the Histel suborder of Gelisols)

9) This refers to gravimetric ice content

10) This should be CF

11) See answer above

12) A more appropriate wording will be adopted

Interactive comment on Earth Syst. Sci. Data Discuss., 5, 707, 2012.