

Interactive comment on “Permafrost-Affected Soils of the Russian Arctic and their Carbon Pools” by S. Zubrzycki et al.

Anonymous Referee #2

Received and published: 24 March 2014

General comments: This paper presents organic content data from permafrost soils of the Russian North. Examples are highlighted from around the Lena Delta. Values are presented defining soil organic matter contents from those soils along with literature values from other northern permafrost soils. A possible positive feedback is discussed in the way that thawing tundra soil in a warming Arctic could release more greenhouse gases, which would boost even greater warming. Knowledge gaps and possible future works are addressed.

The paper is well written, nicely illustrated and likely useful to the growing community of soil and modelling scientists dealing with landscape change in the north. I have realized that there was already a peer review done in the past and I appreciate that some updates have been inserted since then. I recommend the paper for publication

C154

to make it accessible to the growing permafrost community within the earth sciences.

Specific comments: Minor improvements that could be done to the manuscript are as follows. Meanwhile there might be an overlap with the Hugelius papers from 2013a and 2013b, where also organic carbon figures are listed. To overcome this to some extent results from Hugelius et al., 2013a and 2013b should be incorporated into Table 1. This would make the table more useful (e.g. for modellers). By the way, 2013b is a final article now, not a discussion paper anymore.

Apart from the fact that no definite example from earth history is known to me, where soil dynamics have driven climate dynamics, the authors point out that the carbon pool database is “still fraught with great uncertainties at the present time”. This uncertainty should inspire the authors to temper their certain tone in assigning permafrost regions with their distinctive soils an important tipping point. (For example the supposed increased release of climate-relevant trace gases into the atmosphere could be balanced hypothetically by shrub and tree growth at the same time.)

There are many multinational programs at present, which focus on northern soil dynamics. I would find it useful mentioning or discussing them e.g. in chapter 4. Even though the programs themselves may be outdated after some years references to available landmark papers from those programs could be given. I am aware of the following active platforms working on permafrost carbon dynamics, there might be more though (e.g. GRENE-TEA):

Vulnerability of Permafrost Carbon - Research Coordination Network (RCN)
<http://www.biology.ufl.edu/permafrostcarbon/>

DEFROST Scandinavian Research Initiative (<http://www.ncoe-defrost.org/home>)

CRAICC - Cryosphere-atmosphere interactions in a changing Arctic climate - Finish Research (<http://www.atm.helsinki.fi/craicc/>)

CAPP project (<http://www.geowiss.uni-hamburg.de/i-boden/capp/index.html>)

C155

Next-Generation Ecosystem Experiments (NGEE Arctic) (<http://ngee-arctic.ornl.gov/>)

U.S. North American Carbon Program (<http://www.nacarbon.org/nacp/>)

The CryoCARB Project - Long-term Carbon Storage in Cryoturbated Arctic Soils
<http://www.univie.ac.at/cryocarb/the-cryocarb-project/>

Technical corrections:

p. 620, l. 5: delete “most“ p. 620, l. 25: define “special“ p. 629, l. 9: delete “special“

Interactive comment on Solid Earth Discuss., 6, 619, 2014.