

Interactive comment on “Climate trends in northern Ontario and Quebec from borehole temperature profiles” by C. Pickler et al.

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Received and published: 29 June 2016

This is a brief comment on 'Climate trends in northern Ontario and Quebec from borehole temperature profiles' by Pickler et al.

The authors incorrectly state that their sample sites are all located within the sporadic (10-50% of the land surface) to extensive discontinuous zones (50-90% of the land surface). In nearly every case the sampled sites are located within the isolated patches permafrost zone (<10% of land surface) according to maps produced by Heginbottom et al (1995), Payette (2001) and recent spatial numerical modelling of permafrost distribution for Labrador-Ungava (Way and Lewkowicz, 2016). Considering the more realistic permafrost extent, there is no discrepancy between the borehole observations and existing permafrost maps. A further point on a similar subject is that the temper-

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ature sampling methodology here is at too coarse a resolution (depth) to detect thin permafrost bodies if they were to exist. In the southern end of the discontinuous zone you would be more likely to find thinner permafrost bodies therefore this is a serious limitation of the study.

The article also does not present any indication of the land cover types encountered in the study area and correspondingly, does not consider how permafrost is distributed across the landscape (e.g. Shur and Jorgenson, 2007; Jorgenson et al., 2010). In northern Ontario and Québec, permafrost is largely absent from forested areas at the southern end of the discontinuous zones where snow accumulates while concurrently being present on wind exposed mountaintops (Brown, 1979; Ives, 1979; Allard and Séguin, 1987; Granberg, 1989; Ou et al. 2016a,b; Way and Lewkowicz, 2016). Ignoring these critical variables makes it untenable to draw large-scale conclusions on permafrost from the provided data.

In general, I believe that the discussion of permafrost in this article should be removed in its entirety as the methodology, discussion and interpretations presented are not appropriate for the analysis of permafrost distribution and history. Finally, the lack of consideration of the literature on permafrost in western Québec and northern Ontario must be addressed.

References Allard, M. and Séguin, M. K.: Le pergélisol au Québec nordique: bilan et perspectives, *Géographie physique et Quaternaire*, 41(1), 141, doi:10.7202/032671ar, 1987.

Brown, R. J.: Permafrost distribution in the southern part of the discontinuous zone in Quebec and Labrador, *Géographie physique et Quaternaire*, 33(3-4), 279-289, 1979.

Granberg, H. B.: Permafrost mapping at Schefferville, Québec, *Physical Geography*, 10(3), 249-269, 1989.

Heginbottom, J. A., Dubreuil, M.-A. and Harker, P. A.: Canada – Permafrost, [online]

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Available from: <http://geogratias.gc.ca/api/en/nrcan-rncan/ess-sst/d1e2048b-ccff-5852-aaa5-b861bd55c367.html>, 1995.

Ives, J. D.: A proposed history of permafrost development in Labrador-Ungava, *Géographie physique et Quaternaire*, 33(3–4), 233–244, doi:10.7202/1000360ar, 1979.

Ou, C., LaRocque, A., Leblon, B., Zhang, Y., Webster, K. and McLaughlin, J.: Modelling and mapping permafrost at high spatial resolution using Landsat and Radarsat-2 images in Northern Ontario, Canada: Part 2 – regional mapping, *International Journal of Remote Sensing*, 1–29, doi:10.1080/01431161.2016.1151574, 2016.

Ou, C., Leblon, B., Zhang, Y., LaRocque, A., Webster, K. and McLaughlin, J.: Modelling and mapping permafrost at high spatial resolution using Landsat and Radarsat images in northern Ontario, Canada: part 1 – model calibration, *International Journal of Remote Sensing*, 1–24, doi:10.1080/01431161.2016.1157642, 2016.

Payette, S.: Les processus et les formes périglaciaires, in *Écologie des tourbières du Québec-Labrador*, pp. 199–239, Les Presses de l'Université Laval, Québec City, Canada., 2001.

Shur, Y. L. and Jorgenson, M. T.: Patterns of permafrost formation and degradation in relation to climate and ecosystems, *Permafrost and Periglacial Processes*, 18(1), 7–19, doi:10.1002/ppp.582, 2007.

Jorgenson, M. T., Romanovsky, V., Harden, J., Shur, Y., O'Donnell, J., Schuur, E. A. G., Kanevskiy, M. and Marchenko, S.: Resilience and vulnerability of permafrost to climate change, *Canadian Journal of Forest Research*, 40(7), 1219–1236, doi:10.1139/X10-060, 2010.

Way, R. G. and Lewkowicz, A. G.: Investigations of discontinuous permafrost in coastal Labrador with DC electrical resistivity tomography, in *Proceedings of GéoQuebec: 68th Canadian Geotechnical Conference and 7th Canadian Permafrost Conference*, p. 8, Québec City, Canada., 2015.

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Way, R. G. and Lewkowicz, A. G.: Modelling the spatial distribution of permafrost in Labrador-Ungava using TTOP, *Canadian Journal of Earth Sciences*, doi:10.1139/cjes-2016-0034, 2016.

Interactive comment on *Clim. Past Discuss.*, doi:10.5194/cp-2016-55, 2016.

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