

Interactive comment on “Morphological properties of tunnel valleys of the southern sector of the Laurentide Ice Sheet and implications for their formation” by Stephen J. Livingstone et al.

Anonymous Referee #1

Received and published: 6 April 2016

This paper is an important contribution to the understanding of the regional distribution of tunnel valleys in a Pleistocene ice sheet. The authors have conducted an intensive analysis of tunnel valleys through DEM interpretation and this paper should be published with minor revisions.

My main criticism of the paper is that I believe that they have underestimated the number of tunnel valleys present. It's hard to tell from their figures, but in the Saginaw lobe, where I am doing detailed mapping, I think there are more tunnel valleys than are mapped. Most of them are shallow and short. This may skew the statistics somewhat. I also believe, from just looking at DEMs and maps that they have missed tunnel valleys along the eastern side of the Lake Michigan Lobe through the Valparaiso moraine. I

[Printer-friendly version](#)

[Discussion paper](#)



have not directly mapped them or studied them in the field myself.

In considering the regional distribution, it seems strange that the density of tunnel valleys in the Saginaw lobe is higher than just about any other area. And these are in the center of the lobe, where the authors suggest should have less than the margins. The original margins of the Saginaw lobe have been destroyed by overriding by the LM and Huron-Erie lobes. Do the authors have any comments on the relative abundance of TVs in the Saginaw lobe?

The sections on the origins of tunnel valleys are on the right track, I think. In my area, I have found a strong association between tunnel valleys and kame-like landforms composed of sand and gravel. This supports a supraglacial meltwater source for the short tunnel valleys in this area. The outwash fans are very coarse, which suggests high discharge and perhaps a one-off type of origin. But there is no reason why they couldn't have been active for a longer period of time. Also in my area of the Saginaw lobe, I think that the tunnel valleys and outwash fans represent a change in drainage mode during ice retreat. There is a large drumlin field in which drumlins are partially buried by outwash from the tunnel valleys and I think that the drumlins were formed during advance with a distributed drainage system with high basal pore pressure and the tunnel valleys became active during retreat with a conduit-type drainage mode with overall lower basal pore pressure and higher coupling.

In terms of relatively minor comments, I found it annoying not to know where the detailed DEM images are located. Couldn't boxes for these figures be drawn on Fig. 3? That would help greatly in understanding the regional distribution and properties of these valleys. I was particularly interested in the catastrophic flood valley with the megaripples. I can certainly accept this as a hypothesis but I would like to know if there has been any field work done on these features. Not knowing where it is makes it more difficult to find that out.

There is a discrepancy in figure numbering between the text and figure section. Fig.

12/13 is one, and there may be others. I found a few minor typos and will upload a file with the ones that I noticed.

Overall this is a very good paper. I hope it is published.

Please also note the supplement to this comment:

<http://www.earth-surf-dynam-discuss.net/esurf-2016-12/esurf-2016-12-RC1-supplement.pdf>

Interactive comment on Earth Surf. Dynam. Discuss., doi:10.5194/esurf-2016-12, 2016.

Printer-friendly version

Discussion paper

