

Interactive comment on “Surface kinematics of periglacial sorted circles using Structure-from-Motion technology” by A. Käab et al.

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General Comments.

I strongly favor publications because this paper introduces a powerful new approach for efficiently making a multitude of high-resolution measurements of detailed topography and surface displacements in 3D. The technique is used to examine the micro-relief and surface displacements of 3-4 m sorted circles over a three-year period, but it could equally well be utilized for smaller and larger features.

Their large data set, which represents orders of magnitude more individual measurements than ever acquired before, reveal unforeseen spatial complexities in surface

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displacements and in patterns of surface elevation change over the three years. What these represent for the longer term for the dynamics of active sorted circles, and what causes these significant changes over a few years are open questions. They can be addressed through additional photographic surveys on both shorter and longer time scales, respectively, to document the large changes that occur during individual warm seasons, and to define the longterm changes. Additional, ground data on the subsurface spatial variation in soil texture, soil thermal evolution (including active layer depth variation), moisture conditions, and heaving & settling would be needed to shed light on the causes of the observed changes.

Notes for authors (in addition to those inserted in Ms).

- Clarify what is known in an absolute sense about the changes in elevation and horizontal position averaged over your study domain over the three years. This is discussed in detail, but the technicalities are less important than your conclusions, which need to be articulated as clearly as possible. Whether there is absolute subsidence is important in relation to your discussion of the active layer getting deeper. Interestingly, I don't know of any soil temperature data showing this but documenting overall subsidence would argue strongly for deeper thaw of ice rich permafrost. Absolute motion to the N-NE, on the other hand, would not be surprising in view of the overall slope of your study area (down toward the stream and lake).

- Can you infer anything significant about the growth of the circles (increase in diameters of the inner domain and outer ridges) and a corresponding systematic decrease in the intervening areas.

- Refer to Washburn's paper that show displacements increase radially in the fines, but that increase cannot continue otherwise circles would be growing at cms/yr, which would make it very unlikely to find discrete circles like yours that have yet to coalesce.

- Provide more information about the surface and terrain characteristics, including proximity of a body of water, of the Janssonhaugen site of the ground temperature

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data presented.

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/7/C3387/2014/tcd-7-C3387-2014-supplement.zip>

Interactive comment on The Cryosphere Discuss., 7, 6043, 2013.

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