

## ***Interactive comment on “Biogeochemical and suspended sediment responses to permafrost degradation in stream banks in Taylor Valley, Antarctica” by M. N. Gooseff et al.***

### **Anonymous Referee #1**

Received and published: 14 October 2015

General Comments: The manuscript by Gooseff et al. characterizes the biogeochemical and sediment responses to permafrost degradation of a small stream in the Taylor Valley, Antarctica. The study is mensurative in nature and as such is not replicated. Even so, the sample unit is characterized on the scale of meters to several km and comparisons of the impacted stream were compared to a reference stream within the same watershed which allows for some inference beyond the study site. The writing is succinct and the methods, results and interpretations are straightforward. There are a few places in the discussion where some support could bolster interpretations by citing other but otherwise is good. The figures are clear and easy to interpret and fit well with the text. Overall, there were few issues with the manuscript in terms of specific

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comments and I have included them in the electronic pdf attachment as well as below. Further, I have included a list of technical/typographical/grammar comments on the electronic supplement.

Specific Comments: Introduction Pg 14775, line 9. The authors suggest that the polar desert receives little to no rain and therefore permafrost degradation has less potential for overland flow. However, depending on the type of thermokarst feature and the resulting disturbance on the landscape, precipitation is not necessarily required to fuel overland flow. In some cases, slip planes can form on the active layer/permafrost boundary (such as active layer detachment) and result in mineral soil/permafrost exposure that results in a daily flow of water derived from thawing permafrost. Results Pg 14779, Line 19. Suggest rewriting this to show changes in morphology that were apparent from the tkarst. There is always agg and degradation but perhaps a little bit more modification to tell reader how much? Can you quantify this from images taken? Were there changes in sediment that were quantified?

Section 4.2 pg 14780, line 21. Agree, however, this comparison does highlight the fact that on greater scales some conservative solutes may go relatively unchanged over longer distances whereas things like nutrients may not cycle more than 50m downstream. I think this is informative. Pg 14782 line 8. First part of paragraph too redundant. Streamline. Discussion Page 14783, line 7. Authors suggest that sediment from steambank erosion may be a significant ecological disturbance but don't think they have quantified this in their study. Even though they use the word "may" this interpretation/suggestion would benefit from references or more support in results. Page 14784 Line 5. One other possibility is the combination of low flow and high flow events ultimately producing the most scour. If low flow events bury algal mats then breakdown of those mats would "ready" them for transport during high flow events? Many taxa are relatively stable and resist scour when healthy. Did you identify any of the algal taxa present. Likely only a few taxa that exists as large mats.

Page 14785, line 20. This comment is linked to previous comment but curious if

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authors have evidence that at low flows the sediment actually clogs up interstitial spaces of sediments and potentially smothers algae. Hard to tell from description and pictures. Conclusions: Page 14786, line 26. Authors suggest that thermokarst is pulse disturbance yet explain it may take years to recover. Do authors have evidence that the channel has stabilized after initial event? In many cases there is an initial event that could be argued as a pulse but then there is channel evolution and multiple smaller mass wasting events that would change this to a press disturbance.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/12/C6519/2015/bgd-12-C6519-2015-supplement.pdf>

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Interactive comment on Biogeosciences Discuss., 12, 14773, 2015.

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