

***Interactive comment on “Mass movement deposits in the 3.6 Ma sediment record of Lake El’gygytyn, Far East Russian Arctic: classification, distribution and preliminary interpretation” by M. A. Sauerbrey et al.***

**Anonymous Referee #1**

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This paper described mass movement deposits in Lake El’gygytyn. The different facies are well described, the interpretation is sound, but the paper is too descriptive and is missing some creativity to make it a great paper. As such, I recommend the moderate to major revision described below to improve the paper considerably by pushing it to another level. My main point is that while the paper present interesting and sound transport mechanisms and deposits, it currently lacks the determination of the trigger mechanisms (changes in sedimentation rates, lake level fluctuations, etc.) of the different units. Discussing the trigger mechanisms of the different events would make it

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a much stronger and valuable paper, not to mention that an impressive paleoclimatic dataset is being developed as part of this project. For example, the authors could try to find links with changes in climate, sedimentation rates, lake level fluctuations, permafrost thawing?, etc. – all the possible agents affecting slope stability. Such links would also complement the other papers in the special issue. Below are a few ideas as a starting point:

1) Make some statistics. For example, look at the frequency of the various events vs. time, thickness of the various events vs. time, etc.. Treat the events as a type (turbidite, debris flow, etc.) or as a whole. Look at the papers by Blumberg et al. (2008) or Maslin et al. (2004) for example.

2) Make graphs of downcore variations (and/or some frequency graphs) vs. age for the whole period and/or for the different periods discussed in the text and compare these graphs with:

-changes in sedimentation rates -a proxy of precipitation -a proxy of temperature -a proxy of permafrost thawing ? -a proxy of lake level changes -the Northern Hemisphere 18O record -etc.

With such a beautiful paleoclimatic record at their disposition, I think it is really worth looking into. . .

Reference cited:

Blumberg, S. et al. 2008. Turbiditic trench deposits at the South-Chilean active margin: A Pleistocene–Holocene record of climate and tectonics. *Earth and Planetary Science Letters* 268, 526–539.

Maslin, M. et al. 2004. Linking continental-slope failures and climate change: Testing the clathrate gun hypothesis. *Geology* 32, 53–56.

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