

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

Anonymous Referee #2

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Overall Quality of the Paper

Sauerbrey et al. present this very nice paper in Climate of the Past Discussions that provides a detailed description and chronology of mass flow deposits in the 3.6 million year core record from Lake El’gygytgyn. I’ve followed the progress of this project and have seen several of the recently published papers from the Lake E drilling project and this current paper gives a context for the paleoclimate record with details on the complete sedimentation history in the basin. The authors provide a good background section and then give detailed description of the five mass movement deposits types

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that occur in the pilot and longer drill cores. In this section the details of the sedimentology of each of the MDD types are defined by a graphic with high resolution core scan photographs, and magnetic susceptibility and GRAPE density determined from Geotek MSCL analysis. The text provides a detailed description for each of the MDD facies. This section is a valuable contribution in a general sense, providing paleoclimatologists who are working with marine and lacustrine sediment cores with a protocol for assessing the amount and role of mass flow deposits in the sedimentary records. The remainder of the paper details the occurrence of the various facies through the Pliocene and Pleistocene in terms of their percentage of occurrence through time in terms of numbers of events and thickness in the overall sediment record.

Specific Comments: p. 472 How do lake level changes influence sedimentation pattern? On the one hand, raising lake level, as you’ve indicated in the text opens up channels that are occasionally blocked and allow sediment transport to the lake. On the other hand, during low stands, rivers and waves can rework coarser grained shoreline deposits. I would suspect that direct correlation involving determination of terrace age and core level would be needed to properly assess this question. Although it’s obvious from previous papers (esp. Melles et al., 2012 in Science) that the Holocene record is short, can you at least state what’s going on in the current interglacial as far as MMD’s? In the more near-shore cores, where there is a higher sedimentation rate, is there more evidence that is not apparent in more distal sites? In the text it’s mentioned that the recurrence interval for MMD’s is something like 11.7k in the late Pleistocene but not sure there is mention of the Holocene. The paper is overall excellent but it mostly finishes with a list of the numbers and thickness and thickness percentages through time without addressing potential causes. What triggers the movement of the sediment? Is the region sensitive and the sediment in the basin responsive to earthquakes? Is the main cause of the flows an instability of the sediment pile along the lake shelf-floor transition? If so, do these periods relate to periods of higher sedimentation during warmer periods? Can this be determined or are the sedimentation rates based on the current age model too coarse to address this question?

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Technical corrections 1. I would suggest using the word while instead of whilst where it appears in the text and figure captions. 2. I also suggest using overlying rather than overlaying. 3. P. 471 line 21-22 insert "during the snow-free summer season" 4. P. 472 line 4 Perhaps "highlands" is a more appropriate word choice for 50m to 450m "mountains". 5. P. 472 line 29 I suggest using "number of inlet streams" than "amount of inlet streams" 6. P. 473 line 5 Replace "It is concentrated" with "Sediment transport is concentrated..." 7. P. 473 line 25 replace "It is characterized..." by "Facies B is characterized..." 8. P. 477 line 5 Relace "even tough..." with "Even though..." 9. P. 477 Line 21 Delete comma after areas 10. P.478 line 26 insert bent instead of bended 11. P. 481, line 15, comma after the word advance, 12. P. 486 line 12. Is this supposed to be "warm to exceptionally warm"? 13. P. 489 line 6 I would suggest "greater water depths" rather than higher water depths. All the figures are appropriate and in good shape. In the captions, the words whilst, overlaying and bended can be replaced with while, overlying and bent respectively. The only other comment that in its original size., Figure 8 is impossible to read. In a pdf online you need to zoom to 300% and then it's good. If this works for the journal then it's ok!

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