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Climate of the Past Discussions

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 #3

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General comments The manuscript addresses a very interesting and important theme. It describes mass flow deposits, their classification and occurrence during the amazingly, 3.6 Ma long, continuous record of El'gygytgyn. Disastrous events, triggered by earthquakes, such as historic devastating quakes within the Hellenic Arc or the 2011-Tohoku tremor offshore Sendai ask for a better understanding on formation, geometry and systematics of mass flow deposits. This paper could contribute well to fill these gaps in knowledge. It is clearly organized and most of the figures are understand-

ingly plotted and needed. Nevertheless, the ms needs modifications and adjustments to improve its significance and readability. In its present form the paper is too 'texty' and descriptive. Introduction of tables would enhance readability and understandability. The somewhat lengthy description and classification of litho-types seem to be valid just in proximity to the coring sites. There is little discussion on the development of individual MMDs from a proximal to their distal location. This would improve the plain description of MMDs, with a generic interpretation of a proximal debrite, progressing into a distal turbidite. The descriptive text and the conceptual model of fig 7 should in more details elaborate on the erosional power (and re-deposition of sediments) of different MMs within the lake. The recently published paper of Talling et al. 2012 could be a perfect base for the interpretation/classification of depo-types of turbulent density flows. Pros and cons of complete and incomplete Bouma-cycles should be used in the ms for a less general interpretation of El'gygytgyn MMDs and their comparison to BOUMA-sequences. A major shortcoming of the ms is the absence of results of grain size measurements. Although magnetic susceptibility and GRAPE density of the different litho-types are adequately presented in well drawn figures, a comprehensive classification would need specific data on grain sizes. Figure 8 cannot be read and should be deleted. âĂČ Detailed comments p. 467 shorten title to 'Mass movement deposits in the 3.6 Ma sediment record of Lake El'gygygygyn' p. 469 line 9; add reference on flat basin plain deposits: Sturm & Matter 1978 line 14; MMD may also be used for correlation of different cores within a basin line 19; add reference on flood-/slide-induced deposits: Blass et al. 2005 line 26; exchange 'widely' by 'generally' line 29; Brigham-Grette et al. 2013? or 2012? as in reference list p. 470 lines 20-29; avoid introduction of an additional term ('densite'), which is not used anymore p. 471 line 18; '. . .wide and broad. . .'⇐what?? line 22; what is '. . .widely narrow and shallow. . .'? p. 472 line 27; '. . .and aeolian transport as well as by gravitative. . .' p. 473 lines 15ff; clarify understanding by using a table for facies description and percentages line 27; Brigham-Grette et al. 2013? or 2012? as in reference list p. 477 lines 3ff; show evidence for the complete BOUMA-cycle Ta to Te; mostly Tc and Td are missing in

lake sediments; see Sturm & Matter 1978 p. 481 line 10-11; rephrase ‘Debris flows are the coarsest sediments. . .’ line 20; Strachan 2008 not in ref.list p. 483 lines 20ff; use table to show percentages of MM-events p. 484 line 13; coarser sediments during warmer climate are caused by higher sand content? or by diatom scales? line 20; use capitals p. 485 line 3; use capitals p. 486 line 12; complement sentence ‘. . .warm to exceptionally ??? climate phases. . .’ lines 22ff; use table to show percentages of MM-events p. 487 line 18; use capitals p. 488 line 15; use capitals p. 489 line 6; ‘higher relief of catchment’? ‘greater water depth’? ⇐rephrase p. 490 line 1; ‘Deposits of MME have frequently reached the coring site. . .’ ⇐rephrase p. 491 lines 1-2; delete obvious statement; or formulate specific questions, which should be investigatedâĂČ References Belyi 2001 not in txt add Blass et al. (p. 469); A. Blass, F.S. Anselmetti, M. Grosjean and M. Sturm. The last 1300 years of environmental history recorded in the sediments of Lake Sils (Engadine, Switzerland), Eclogae geol. Helv. 98 (2005) 319–332. Bøe et al. 2004 not in txt Brigham-Grette et al. 2005 not in txt Brigham-Grette et al. 2012 or 2013 (see txt) Kopsch 2005 not n txt Nowaczyk et al. 2007 not in txt Schwamborn et al. 2012 or 2013 (see txt) add Strachan 2008 to reference list (p. 481); L. J. STRACHAN. Flow transformations in slumps: a case study from the Waitemata Basin, New Zealand. Volume 55, Issue 5, pages 1311–1332, 2008 add Sturm & Matter 1978 to reference list (pp. 469, 477); Sturm, M. and A. Matter (1978). "Turbidites and Varves in Lake Brienz (Switzerland); deposition of clastic detritus by density currents." Int.Assoc.Sedimentol.Spec.Publ. 2: 147-168. add Talling et al. 2012 to reference list (p.); PETER J. TALLING, DOUGLAS G. MASSON, ESTHER J. SUMNER and GIUSEPPE MALGESINI Subaqueous sediment density flows: Depositional processes and deposit types. Sedimentology (2012) 59, 1937–2003

Figures Fig. 4; in txt replace ‘co-genetic’ by ‘co-generic’ Fig. 8; delete figure, as details of cannot be read

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