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Interactive comment on "Magnetostratigraphy of sediments from Lake El'gygytgyn ICDP Site 5011-1: paleomagnetic age constraints for the longest paleoclimate record from the continental Arctic" *by* E. M. Haltia and N. R. Nowaczyk

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General comments This is a major paper for the series in Lake El'gygytgyn results as the basic paleomagnetic data from all three long cores is used to establish the chronology of the lake sediments and to determine sedimentation rates down the cores. The importance of these data are already utilized in the tuned chronology paper by Nowaczyk et al, published in this journal earlier this year. A full detailed description of the basic paleomagnetic data is paramount to this and other interpretations. The authors do an excellent job of presenting paleomagnetic and rock magnetic information obtained from the three long cores. They also add considerable information from rock samples previously collected in the catchment area and from stream sediments to provide background information on the lake sediment sources. For the most part the authors do an excellent job of describing the methods and measurements used, and the data obtained from them in this paper, keeping a nice balance between describing the procedures for their colleagues in lake studies, but also realizing this information will be of great interest to the paleomagnetic community as well. Essentially the paper will appeal to two different groups – those currently working with magnetic procedures and methods, and those working with lake cores, particularly Lake El'gygytgyn. Thus, Table 2 describing the various rock magnetic measurements obtained, so very useful to the geologists, although well-understood by the paleomagnetists reading the paper.

Specific comments: I find this paper to be extremely well-written and clear, with many good explanations of methods, results, and interpretations. There are several general comments that I hope will improve the paper, as well as a number of small corrections /suggestions for wording improvement, as listed below. One item that concerns me is the interpretation of the remanence carriers in the lake sediment. The large section dealing with watershed rocks and stream sediments concludes that much of the oxide material reaching the lake consists of low Ti-magnetite grains, MD in size, some with signs of maghemitization, as well as lesser amounts of magnetite, hematite and magnetite-chrome spinels. Although MD Ti-magnetite appears to be the ubiquitous oxide present, there is little evidence of pure MD grains in the Day plot. But what is more questionable is the assumption that the catchment and stream samples represent the oxide carriers in the lake sediments. The authors refer to earlier work by Nowaczyk et al (2007) and recent work by Murdock et al (2013) that strongly suggests the magnetite content (as represented by susceptibility variations) is controlled by climate conditions causing dissolution of the oxides. How does this established fact relate to the magnetic remanence story presented here? Does the dissolution of magnetite in the lake environment not alter any of the rock magnetic properties measured here? Does dissolution, complete or partial, alter the remanence of the lake sediments? Is

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this only a problem in intensity, or could directions be compromised? Discussion of the sedimentation rates is another area that leaves a few questions. The authors spend considerable time discussing the high sedimentation rate seen in the lower part of the core, but little attention is given to the lower and very consistent rate seen within the Pleistocene. Additional discussion of why this rate is so consistent, even during geologic time with considerable climatic variations, would be interesting. As mentioned by the authors, the cores from Lake El'gygytgyn revealed many areas of disturbed sediment (over 300), assumed to be the locations of landslides within the lacustrine environment. A short discussion of how these were treated with respect to the magnetic measurements would be helpful. Were u-channels collected throughout the core – of disturbed and undisturbed material – and data from some segments removed after measurement? Or were the disturbed areas skipped when doing the paleomagnetic sampling? Were the regions long enough to effect sedimentation rates or correlations of the magnetic signal?

Technical corrections: p. 5078, l. 4 – "lake fills partly" – partly fills l. 11 – replace "could" with can l. 20 – omit "mainly" p. 5079, l. 27 – Replace "This objective in prospect" with - With this objective in mind, p. 5081, l. 5 – replace "hitting" with intersecting p. 5086, l. 2 replace "foots" with base p. 5087, l. 16-19 – Sentence beginning "however< MAD values. . .." Is confusing and I don't follow the logic. Do you mean to say samples with multiple components do have higher MAD values? p. 5088, l. 25 – Replace sentence beginning "With an unfortunate. . .." With: Unfortunately a core break occurs at 122m in core 1A as polarity shirts from normal to reversed. p. 5089, l. 11-13 –Overusing "more" – try to reword p. 5090, l. 1 – move "in catchment rocks" from end of sentence up to first line after polished sections p. 5092, l. 4 – replace "withhold" with hold p. 5097, l. 23-25 – Sentence needs another verb? Or use: However, due to the presence. . ..; also change "suggests" to suggest

Figure 1 would be more complete with a location inset; especially useful as this paper will be used by some separate from the rest of the articles.

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Figure 7 has arrows in “Ores” view of part c – not mentioned in the caption.

Figure 11 – Caption, 2nd to last line – add - to the – after plot, so it reads “. . .plot to the right from the theoretical mixing. . ..”

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