

Interactive comment on “Modern sedimentation patterns in Lake El’gygytgyn, NE Russia, derived from surface sediment and inlet streams samples” by V. Wennrich et al.

Anonymous Referee #1

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* General comments : evaluation of overall quality of the discussion paper. Wennrich and colleagues present a multi-proxy approach combining mineralogical, sedimentological and geochemical analyses realised on surface sediments from El’gygytgyn lake (NE Siberia), surrounding bedrock samples, and major inlet streams to characterize the dominating transport mechanisms and processes, the sources and also post depositional alteration, controlling the modern sedimentation. Authors firstly show two major distribution patterns in the lake with dominant coarse-grained areas (with feldspars) and fine-grained areas (with Quartz) and also a coarser sediment tongue on the center oriented NW-SE that they explained by heavy storm events. Then, using the multi-proxy approach with statistical methods (principal component analysis and

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redundancy analysis), they highlight: i/ a wind-induced two-cell current system triggering the surface-water circulation in lake corresponding to the major driver sediment transport and accumulation processes; ii/ an important input of weathering products of basaltic rocks by South-eastern rivers; iii/ a sorption/Co-precipitation of heavy metals (such as Pb, As, Mo) on Hydroxides and oxides on deep water lake; iiiii/ ongoing low neotectonic activity considered to be responsible for high mercury concentrations in the lake. The abstract provide a concise and complete summary of the paper. The data are intriguing and the interpretations are reasonable. Therefore I suggest the editor to accept this manuscript for final publication. However the paper needs revision for clarity of some points that are mentioned on the specific comments.

* Specific comments : questions/issues 1/ Line 6, page 2017: authors have mentioned the occurrence of recent heavy storms, which results in re-suspension processes. This type of event can rework sediments of surface on several centimeters or meters and then, the paleoreconstitution could be wrong. So, what is the thickness of sediment concerned by this phenomena? Did Stratigraphic analyses reveal some sediments resedimentation? No reference was given to confirm this hypothesis.

2/ Line 6, page 2019: In what way can you explain this contradiction? (processes?)

3/ Line 20, page 2012: Is it possible to evaluate the erosion rate related to cryogenic weathering of permafrost?

4/ Fig 3 : Contrary the volume percentages of silts, sands and clays, there are fewer data on feldspars and quartz proportions in the sediment. Why? How the authors can justify the realization of a map while much data are not represented ? Some points need to be added.

6/ The explanation for high Hg concentrations on the lake is poor and need absolutely to be more developed. Where Hg comes from? Is it anthropogenic? e.g. Is it related to ore-deposits or industries in the region? Is it possible to remobilize an important quantity of Hg only by fault activity? If yes, can you give some reference? You don’t explore

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the possibility that winds can also transport Hg . The explanation for the maximum Hg concentration observed on two sites on the center is far-fetched. Duplicates need to be made.

* Technical corrections : 1/ligne 25 page 2009: Other Works exist on this field like :
- Allen et al., 1999. Rapid environmental changes in southern Europe during the last glacial period, *Nature* 400, 740-743.

- Bartov, et al., 2003. Catastrophic arid episodes in the Eastern Mediterranean linked with the North Atlantic Heinrich events. *Geology* 31 (5), 439–442.

- Hazan et al., 2005. The late Quaternary limnological history of Lake Kinneret (Sea of Galilee), Israel. *Quaternary Research* 63 (1), 60–77.

- Gasse et al., 2011. Hydrological variability in northern Levant over the past 250 ka. *Climate of the Past* 7, 1261-128. Please add them on the Reference paragraph.

2/ Ligne 9, page 2010: Please write 3,58Ma like for the abstract.

3/ ligne 22, page 2017: change NE-SW by NW-SE

Interactive comment on *Clim. Past Discuss.*, 8, 2007, 2012.