**Climate
of the Past
Discussions**

Interactive comment on "A 350 kyr record of climate change from Lake El'gygytgyn, Far East Russian Arctic: refining the pattern of climate modes by means of cluster analysis" by U. Frank et al.

Anonymous Referee #1

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General comments

The paper "A 350 ka record of climate change from Lake El'gygytgyn, Far East Russian Arctic: Refining the pattern of climate modes by means of cluster analysis" uses cluster analysis on several parameters from two cores from Lake El'gygytgyn to refine the interpretation of how the lake responds to and records orbital-scale climate variability over the past 350-kyr. The paper is well-written, and demonstrates that cluster analysis reveals similar results between cores, and is consistent with prior interpretations. My primary frustration with the study, was that I had some difficulty identifying what the

primary motivation for the study was, and what were the major advances, or take-home messages, that the authors were trying to communicate. For the most part, the primary conclusions seem to be that a cluster analysis approach to the two cores reveals similar results as prior studies. It's good to address prior research in a new light, but if that is the primary focus, a section of the introduction needs to be dedicated for the motivation for using cluster-analysis as a complementary approach. The new advances in the understanding of the lake, i.e., the identification of transitional clusters, the extension of the record back to 350 kyr, and the anomalous results during stage 9.5 are a bit in the background, and the importance of these discoveries in terms of the larger picture of how Lake El'gygytgyn responds to climate forcing, and moreso, what the results imply about orbital-scale climate variability in the region need to be better developed.

Specific Comments

Section/Line

5110/9 - Delete ", respectively"

5112/21 - Reorder the sentence to read "The magnetic susceptibility was measured on the split halves of the core in 1 mm steps..."

5114/3 - There needs to be a paragraph (or more) dedicated to at least a qualitative description that references the quantitative details of how the "hierarchical agglomerative cluster analysis" works, why it's appropriate for this application, and why it's worth doing. If a primary message of the paper is the consistency of the cluster analysis results with previous work - describing how the analysis works and what new information you might learn from it is critical.

5114/8 - Were the data re-sampled physically, or statistically? If statistically, how? Also if statistically, how might this approach influence the results of the cluster analysis?

5114/21-26 - Because Magnetic susceptibiility, TOC, and BSi (among other) properties

were used to help correlate the two cores, and in the cluster-analysis, there seems to be a bit of circularity in the result that the cluster-analysis is consistent across cores. This needs to be addressed.

5116/8 - Replace "deduced" with "interpreted"

5117/14 - Omit "a" before "snow-covered"

5117/20 - Replace "While" with "Whereas", or other word that doesn't imply time.

5121/ 10 - Replace "stronger" with "more strongly"

5121/all - There seems to be a bit of disconnect between the section describing why the parameters didn't respond appropriately to stage 5e (lines 1-8), and the next paragraph that states that the lake is "very sensible to temperature changes". It seems likely, looking at the data used in the cluster-analysis, that the response is "clipped" at high temperatures (i.e., these parameters lose their sensitivity to temperature at warmer temperatures). Some discussion of this possibility is warranted.

5122/28 - the section after "(a)" needs to be reworded.

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Interactive comment on Clim. Past Discuss., 8, 5109, 2012.