

## ***Interactive comment on “Multivariate statistic and time series analyses of grain-size data in Quaternary sediments of Lake El’gygytgyn, NE Russia” by A. Francke et al.***

### **Anonymous Referee #2**

Received and published: 4 March 2013

This article represents a unique and comprehensive data set. The authors argue that statistical analyses on the grain size data (over 1000 samples!) support climate interpretations similar to results presented in other studies based on other proxies. Overall I am impressed with the work, and believe with minor revisions this article fits within this journal’s scope. A stronger connection to the sedimentary/landscape processes needs to be demonstrated, either through evidence from the study or relating to the literature. In several instances processes and interpretations need more in-depth discussion beyond giving other references. It would be helpful to the reader if the authors explained the connection, without the reader having to look up other papers. Finally, tuning the sediment proxies with insolation and the global marine isotope stack and

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then concluding that the sediment proxies demonstrate cycles typical of orbital forcing seems circular (I know this is commonly done), but perhaps the authors can further explain why this is a valid interpretation.

Specific Comments: p220 Line 18 - do you mean modifying rather than modelling? p224 Lines 5-17, and fig 3 - show an example for all three facies, plots should have the same axis in order to be comparable. The differences are not that 'remarkable' 70.5% vs 71%? and 23.5% vs 28.5%. To me this data is critical for the interpretations made later and at present I am left wanting more data and details. p224 Line 10 - It isn't clear to me what is meant by typical and which type is being referred to p225-6 beginning of section 5.1 - The statement that the grain-size data imply a strong climate dependency is over-stated. The authors have not adequately addressed long-term sediment supply in the region and the potential for low-frequency trends in sediment supply to impact their interpretation. P226 Line 5-8 - Can this trend be quantified? Elaborate on the connection between grain size and productivity. What is the magnitude of the correspondence. From a process point of view this connection isn't clear. p226 Line 16 - explain 'parts of the sediment are re-distributed' I am assuming this is referring to grain size distribution? p226 Line 17 - Explain triggers p226 Lines 18-19 - What/where is the evidence that modern sedimentation persisted through previous inter-glacials? p226 Line 24 - What is meant by 'significantly'? Are there statistical significance values attributed to this? p228 Line 2 - What role does sediment supply play? p230 Line 25 - supposed is a curious word choice

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