

# ***Interactive comment on “An extended history of high-amplitude lake-level changes in tectonically active Lake Issyk-Kul (Kyrgyzstan), as revealed by high-resolution seismic reflection data” by A. C. Gebhardt et al.***

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Dear reviewers,

many thanks for your highly valuable comments! I notice that all three reviewers share the main concerns and suggestions for revision. I therefore sum these up in this first part of my answer. In the second part I will respond to individual comments by the reviewers.

First part:

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Suggestion 1: More seismic profiles All three reviewers suggest to show more seismic profiles, at least one from the eastern and one from the western delta. In turn, some of the current figures can be summed up in one figure. I agree to this point and will add more seismic profiles. In fact, parallel profiles from the eastern delta are very similar to the one shown, but this is valuable information for the reader, too. Profiles from the western delta are comparable but slightly less textbook-style as those from the eastern delta. I will also add a chapter with a description of the seismic profiles as suggested by Reviewer #1. Furthermore, I will also show more detailed views from the seismic profiles, e.g. from the stratigraphic boundaries to show the truncation of the reflectors, and name them correctly as downlaps/onlaps etc. as was suggested by Reviewer #1. I will check for a sequence boundary (or its absence) between 5.1 and 5.2, and for the transition between 2.1 and 2.2 as suggested by Reviewer #2, and change text/interpretation if appropriate. I will furthermore check the clinofolds/deltas for indications of a forced regression system tract, and change the lake-level curve where necessary (Reviewer #1). Yes, all shown sequences and their boundaries do show a gentle basinward dip (Reviewer #2). I will go through all other profiles again and check if this is truly consistent throughout all profiles. I shall discuss this in the revised version of the manuscript. In this paper, however, I will concentrate on the (climatically-induced) lake-level variations and only focus on tectonic/structural features where it is absolutely necessary to (a) understand the profiles or (b) distinguish between tectonically-driven and climatically-induced lake-level variations (Reviewer #3). A second paper is currently prepared by a student that focuses on the tectonic nature, the location of faults, their relative timing, etc. in this lake – this is a full story on itself. I don't think that the full spectrum of tectonic features visible in the lake basin is necessary in this current manuscript to understand the paleoclimate history of the lake, and hence do not want to jeopardize the student's paper.

Suggestion 2: Map with the location of the delta lobes etc./with isopachs/isochrons I was thinking of such a map already for the current version of the manuscript, but was hesitant to compile one. My major concern is that while we can identify delta se-

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quences/delta lobes in many profiles, they are absent in others due to two reasons: Either because they were never deposited, or because they were eroded. A map on the currently visible features will however not differentiate between those that were not deposited and those that were deposited but later eroded. A map will thus underestimate the true extent. This is also true for a map of thickness of the sequences. I think this is best visualized in current Figs. 5b and 6b: Using the current thickness of the sequences would definitely underestimate the true and initial thickness of these sequences. I will nevertheless add a map to the revised version of the manuscript to show the general extent of the delta sequences. I agree that this will enhance the understanding of the reader about the spatial extent of these features significantly. At the same time, I will also add a paragraph where I discuss my concerns on this issue.

Additionally, I will definitely add an overview map showing the geographical location of the lake, geographical names used in the manuscript, and add scales, color bars, etc. to the figures where appropriate/missing.

Second part:

Reviewer #1: I will add an outlook paragraph on the importance to date the delta sequences, and hence to date the paleoclimate record. The lake is still one of the drilling targets of ICDP which I agree should be mentioned in the manuscript. I will go through all smaller comments to specific lines in the manuscript, thanks for this very detailed work!

Reviewer #2: I will change the discussion on deltas 1.1 to 1.6 and add a detailed view of this part of the seismic line. On what concerns the subaerially exposed terraces: Unfortunately we do not have own data but can only use what is published so far. I will try to clarify this better in the text and re-think my own interpretation and concerns on this matter. Thanks for all the smaller comments that I will include in the revised version of this manuscript. I did not know that the Anselmetti et al. 2006 was updated by Hodell et al. in 2008 – I will definitely change this. On what concerns the terminology

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“halfgraben”: My co-author Ed Sobel is carrying out tectonic work in this region. He did not agree with the term halfgraben for the lake basin that I used in a former version of this manuscript.

Reviewer #3: I will more carefully check the referencing of the figures and I will add detailed views on crucial parts of the profiles. Correlation between the delta sequences and the layering visible on the lake floor is unfortunately impossible due to the steep flanks where layers are too thin to be correctly traced. To our current knowledge the alternation between low and high amplitudes in the central part of the lake is due to frequent turbidites (which may or may not be reflecting transgressional and regressional periods). Your suggestion of adding a schematic diagram from East to West showing the formation of deltas throughout the lake formation, and including the former lake levels is highly appreciated. I think this would really improve the understanding of the lake's evolution. Thanks! Also your suggestion to abbreviate e.g. the seismic facies types to SF and Sequence to S and to add names for the Sequence boundaries will be included in the revised version of the manuscript. All smaller comments will be checked and used to improve the manuscript.

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