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Reconstruction of lake-level fluctuations in Lake Issyk-Kul(Kyrgyzstan)throughgeomorphological en seismostratigraphic analysis of deltas

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In 2002, Naudts (M.Sc. thesis, UGent) succeeded in reconstructing a Late-Cenozoic relative lake-level curve for Lake Issyk-Kul by using partially and fully buried delta deposits in the eastern part of the lake as proxies for lake level. His data consisted of dense grids of high-resolution reflection seismic profiles that were acquired in 1997 and 2001.

The aim of the present study was to evaluate the possible impact of tectonics on this relative lake-level curve. To this end, a second relative lake-level curve was to be derived –using the same strategy and the same seismic data set– but this time based on partially and fully buried delta deposits in the western part of the lake. Comparison of both curves was thought to allow filtering out any tectonic component and to gain a better understanding of the possible causes of lake-level fluctuations in Lake Issyk-Kul.

The first step in the seismic interpretation was the establishment of a robust seismic sequence stratigraphy by subdividing the sedimentary infill in seven depositional sequences separated by sequence boundaries. Isochrone maps were constructed to interpret the paleomorphology of the sequence boundaries (e.g., channels, delta fronts) and isochronopach maps, combined with seismic-facies interpretations, to interpret depocentres and the exact location and extent of progradational delta lobes. In the next step, the absolute depth (below present lake surface) was measured of the offlap breaks in each of these progradational delta lobes. This depth represents paleo-wavebase and thus approaches paleo lake-level. Based on these interpretations, a new relative lake-level curve was constructed. This record shows a succession of 8 distinct lake-level stages with levels between 504 and 155 m below present lake level.

Comparison of both relative lake-level curves (i.e., based on the depth of the eastern deltas and the western deltas) shows that the general trends in both records are comparable, both for what concerns the succession of rises and drops in lake level, and for the exact depth of the level for individual stages. However, the records also exhibit some dissimilarities. Some lake-level stages appear to be missing from the eastern lake-level curve. This could be due to a number of factors: e.g., temporary diversion (possibly tectonically controlled) of one of the delta-building tributaries, temporary changes in sediment yield at one of the delta-building tributaries, or simply incomplete seismic coverage resulting in “non-detection” of one of the delta lobes.

For what concerns the cause of the lake-level fluctuations, we can exclude intra-basin tectonic activity (e.g., uplift, subsidence), since the seismic data show no evidence at all of tectonic deformation in the eastern or in the western part of the lake. The most likely cause of the Late Cenozoic lake-level fluctuations in Lake Issyk-Kul is therefore climate change. Further investigation will reveal more of the climatic causes of the lake level fluctuations.

Geochemistry and distribution of platinum group elements in the impact structures of Bosumtwi (Ghana, Pleistocene) and Gardnos (Norway, boundary Proterozoic-Paleozoic).

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1. Goal

The aim of this study was to identify the projectile, in other words the kind of meteorite, responsible for the formation of the Gardnos (Norway; 500-650 Ma old) and the Bosumtwi (Ghana; 1.07 Ma old) craters. This identification can be accomplished by determining the geochemical signatures left behind by the meteorite in the lithologies of these impact structures. Characterization of the impactors provides information on the frequency and on the origin of the different planetary bodies (asteroids, comets) that have crossed the Earth’s orbit through geological times.

The Gardnos structure, which is relatively easily accessible in the field, was sampled for impact melt material. The Bosumtwi crater on the other hand was drilled in the Summer and Autumn of 2004 by the *International Continental Scientific Drilling Project (ICDP)* [*http://dc110.gfz-potsdam.de/sites/bosumtwi*]. This study focuses on the samples of cores LB-07A and LB-08A, drilled near the centre of the crater. The siderophile platinum group elements (PGEs) Os, Ir, Ru, Pt, Rh and Pd are exceptionally fit for the identification of the projectile type, as a result of the high concentrations in which they occur in most of the meteorites, compared to their limited occurrence in terrestrial crustal rocks. The PGE elemental ratios can be used to link the studied impact structures with their characteristic PGE ‘fingerprints’ to a certain type of meteorites, according to the method described in Tagle & Claeys (2005).

2. Analytical methodology

The determination of the PGEs was accomplished by using a NiS Fire Assay, in combination with ICP-MS (Inductively Coupled Plasma Mass Spectrometry), according to the procedure described by Plessen &