Reply to Referee #2

In his very positive review, G. Van der Velde criticizes few aspects of the paper, which will be addressed in a point-by-point reply below:

(1) The reviewer correctly mentioned the spreading of *Dreisssena rostriformis bugensis* in Western Europe and provided references (Matthews et al., 2014; Bij de Vaate et al., 2013). We will include these data in the final version of the MS. We should note, however, that we, among others, cited the *Dreissena r. bugenis* paper of Heiler et al. (2013), the data of whom are included in the review paper of Bij de Vaate et al. (2013).

(2) Like reviewer 1, G. Van der Velde discussed that data and interpretations are based on a single core. We refer here to our first reply: *As stated in the MS, the characteristic succession of dreissenid coquinas can be observed across a large area of the clay pit area, documenting that the observed pattern is not purely local. Harzhauser and Mandic (2004, Fig. 4) showed that coeval mass-occurrence-layers of dreissenids are documented from the entire shelf of Lake Pannon (e.g. Hungary, Serbia, Slovenia). These occurrences document that the core-record is an expression of a wide-spread phenomenon. In the new version of the MS we will strengthen this point and will add references.*
Based on the homogeneity of the faunas, coquina-types and sediments across the huge area of Lake Pannon during the investigated time slice, it seems rather unlikely that we observed a purely local phenomenon.

(3) The reviewer asked for lake-depth estimates. As in many paleo-lake studies this is a tricky question. Based on the relative position of the paleo-shoreline and unpublished seismic data, a depth of few tens of meters is most likely. In any case, the deposition was below the wave base, which is estimated for Lake Pannon to have ranged around 10-15 m by Korpás-Hódi (1983). Therefore, the paleo-depth of the studied section ranged most likely between 20-80 meters. A more precise and serious estimate is not possible by data available up to date. We will add a comment on that.

(4) "*A drop in atmospheric pressure can cause lack of oxygen*" – we fully agree that such wind-related processes will have a major impact on the mixing of the lake water and we consider this the most important factor responsible for the observed pattern. We do not see any

evidence that low windiness was coinciding with accumulation of organic material (see below point 5).

(5) "*Are there periods related to organic matter*" – TOC-data are available only for the lower 150 cm of the core (samples 1540-1390) and were published in Kern et al. (2013). The values are rather low ranging between 0.56-1.19% and the fluctuations are not very large.

These values are distinctly below those of typical stress environments over-enriched in organic loading with values above 3.5-3.9% (e.g. Hyland et al., 2005; Magni et al., 2008). Moreover, there is no correlation of higher values with low coquina densities or population collapse. Similarly, layers with very dense coquinas do not coincide with exceptionally low TOC values. Therefore it seems rather unlikely that suspended organic particles were deposited in such high amount that gills of bivalves were clocked as discussed by the reviewer. Furthermore the open-lake depositional settings within a more than 200,000 km² large Lake Pannon would certainly buffer eutrophication, restricting it to isolated marginal settings corresponding to current Mediterranean lagoons (Magni et al., 2008). We will add a sentence on that in the discussion.

(6) "*perhaps also the water table fluctuated*": Significant lake level changes during investigated time interval can be excluded based on the dinoflagellates record, which is typical for "offshore" settings of Lake Pannon with constantly high amounts of *Impagidinium* (c. 20-40%) (Kern et al. 2013). As shown in other studies on Lake Pannon, such water table changes are very clearly reflected by shifts in the dinoflagellates assemblages (Harzhauser et al., 2008; Kern et al. 2012b). We will add information on that.

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