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Reply on Comments of Anonymous Referee #1

We thank anonymous referee 1 for her/his constructive comments and value the feedback on the manuscript. That will help us to improve the manuscript and we will revise the manuscript with respect to these comments.

General comments:
For a future user of the method there still remains the question about the local variability of the sediment formation in the lake.

We agree that the sediment formation is an important aspect. The sensors delineate layers, without any information about the sediment formation. Cores sampled across the open water (pelagic zone), the reed, and the open water areas are further analysed according to their mineralogical composition (will be published). First information is provided in the texture given in Fig. 4.

Apparently there have been probed only 2 locations in the pelagic zone and they showed large differences in the mud layer characteristics. Therefore a comment would
be useful how useful the method can be for establishing a digital elevation model (DEM) for a lake of 315 km^2 and which spatial resolution would be needed to supplement other methods of DEM-generation.

Across all ecotopes in total about 5727 CSPS measurements at 552 sites were performed and 78 cores were sampled. At the open water (pelagic zone) 712 measurements at 63 sites showed certain trends in the sediment compositions. At the open water out of that two representative CSPS profiles from both extremes were chosen as examples in the paper to discuss the striking differences in a shallow vs distinct mud layer with an underlying compacted vs less compacted lakebed sediment layer.
The method was used to supplement echo sounding. The CSPS measurements were located at ten test areas of different mud accumulation, distributed over the lake area, to account the distortion of acoustic signals from echo sounding. In other words the CSPS measurement sites had been predefined by the initial echo sounding data-analysis and therefore support DEM-generation. At the shore line only the CSPS provided data for the DEM generation. About 2103 CSPS measurements were taken at the shore.
Echo sounding data and about 5727 CSPS point measurements together are used to generate a DEM.

Further on it would be interesting to compare the data derived from the reported measurement campaigns with older data and earlier versions of the digital elevation model – have there been significant changes?
This would also be interesting to compare with the existing maps of dominant current patterns in the lake.
Did the mud layer development corroborate earlier findings on currents in the lake?

The evaluation of mud layer development is one of the overall goals of the whole project of the first comprehensive geodetic survey of the Neusiedler See and Hansag Channel. To achieve this, first we have to delineate the mud layer and lake bed. As a

first step we focused on the data collection and analyses aiming on the layer delineation. The obtained results and most important findings are presented in the proposed paper. Based on the collected results of our single point measurements along with echo sounding data a digital elevation model (DEM) will be generated as next project step. A holistic and scientifically answer on changing mud accumulation or patterns can be based on this concise data.

It should be explained how the water content of the open water and the “Braunwasser” could be so low (Table 3: 0.80-0.91 m3 m-3). Although the water of the studied lake is characterized by a high amount of suspended solids and accompanying turbidity, an amount of 20 % seems extremely high. Did the authors compare these data with gravimetric determinations of dry matter content of the water?

The water contents for all locations are calculated by the calibration function with mud. With other words, mud water content was the focus. However in “Braunwasser” we observed due to a high electrical conductivity a significant lower dielectric permittivity than 80. As a consequence of the low EPSR, the sensor reading in water is approximately 10 to 15% lower than 100%. The values in Table. 3 could be adjusted accordingly, but in water the detection of the lutocline was the priority and the decrease of water content water to mud was always significant. Following, the amount of suspended solids is lower accordingly.
It was not our intention to determine the suspended sediment concentration in the open water, because the sensor is not a suitable tool for suspended sediment detection.

In technical terms, a mud should have at least 85 % water content to be pumped. The data in Table 3 would mean that the water both in the pelagic zone and in the reed would be so solidified that common pumps would hardly be able to cope with this material.

In our case, the Hydra Probe sensor was calibrated in the labor for different mud types from the lake. The calibration procedure, described in Kogelbauer et al. (2013), differs from randomly conducted procedures for soils. The directly measured dielectric permittivity was related to a known volumetric water and gravimetric content of the mud. For that reason it can be assumed that the indirectly given volumetric water content for the mud is correct. The particle density was determined for random samples of different mud types and showed negligible variance. Thus it can be assumed that a certain calibrated volumetric water content can be directly related to the amount of suspended sediments. However, it does not imply the consistency and rheological behaviour due to mineralogy and organic content.
Moreover in Preisinger (Chapter 12; in Löffler 1979) a gravimetric water content for “soft mud” (>60 % per weight) and for “mud” (water content 30-60 % per weight) was stated.
From our sampled cores, we also know that they are not of liquid consistency anymore.

Specific comments:

P 12630, L 20: : : :”coloides”: : :. do you mean colloids?
Yes, it is colloids.

P 12630, L 27: there are five main classes for reed differentiation mentioned but later on (page 12631) you speak only about classes III, IV and V.

In Schmidt and Csaplovics (2010) five main reed types with several subtypes have been differentiated, the representative CSPS profiles shown and discussed in the paper only cover the later mentioned classes II, IV and V. Classes I and II covers young and vital reed and seaward growing young reed with traces of harvesters or ice and drift damage, respectively.

P 12638, L 14: : : :"average": : :. (typo)
Thank you – it will be corrected in the revised version.

P 12642, L14: Can you explain how the electrical conductivity "dampens" the water content?
The water content is indirectly determined from the measured dielectric permittivity by transfer function. With increasing electrical conductivity the influence of the imaginary part of the dielectric permittivity increases too (User's Manual 92915; Stevens® Water Monitoring System, Inc., 2007), leading to a lower water content result.

P 12642, L27: : : :"declined": : : (typo)
Thank you – it will be corrected in the revised version.

P 12656: Figure 6 – the graphs are rather small and difficult to read. Larger graphs would be more reader-friendly
It will be modified in the final version in agreement with the editor.