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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Characterization of sediment layer composition in a shallow lake: from open water zones to reed belt areas" *by* I. Kogelbauer and W. Loiskandl

Anonymous Referee #1

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This paper presents a study of the applicability of soil physical sensors for characterizing lake sediment characteristics. The special challenge of this study was the measurement of the thickness of a soft layer of mud above the consolidated lake bed. On the one hand the lake is characterized by very low water depths, complicating the accessibility even in the pelagic zone, on the other hand more than 50 % of the lake area consists of a reed belt where the rhizomes have to be distinguished from the mud layer. The combination of a capacitive sensor and a cone penetrometer has proven successfully its ability to record lake bed characteristics under circumstances where acoustic methods have to be supplemented by non-acoustic methods. Though the

shallowness of the studied lake, consisting nearly exclusively of epilimnion, is an unusual situation for a lake of this size, this paper gives valuable advice how an ingenious sensor combination allows for a detailed description of the sediment layers.

General comments: The paper is generally well written and informs the reader about the potential of physical sensors to contribute to the creation of a digital elevation model separately for the mud surface and the lake bed. For a future user of the method there still remains the question about the local variability of the sediment formation in the lake. 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. Furtheron 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? 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? 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.

Specific comments: P 12630, L 20: . . ."coloides". . .. do you mean 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. P 12638, L 14: . . ."average". . .. (typo) P 12642, L14: Can you explain how the electrical conductivity "dampens" the

water content? P 12642, L27: . . .”declined”. . . (typo) P 12656: Figure 6 – the graphs are rather small and difficult to read. Larger graphs would be more reader-friendly

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