UFZ-Seminar „Water and Environment“

HELMHOLTZ ZENTRUM FÜR UMWELTFORSCHUNG UFZ

18. December 2017, 3 p.m.

Seminar Room 1, Brückstr. 3a, Magdeburg

Stephan Hilgert

Institute for Water and River Basin Management, Department of Aquatic Environmental Engineering, Karlsruhe Institute of Technology (KIT), Germany

will give a talk on:

From point to spatial information - Investigations of freshwater reservoirs using hydro acoustic methods and potential implications for the reservoir management

Hydropower generation and the supply of drinking water as well as water for irrigation represent the most important purposes of reservoirs. However, the construction of reservoirs leads to severe disruptions of riverine ecosystems. Transported material is trapped in front of the dams and accumulates as sediment in the impoundment. The sediment in the reservoirs plays a major role in the context of eutrophication, greenhouse gas production and loss of storage volume. Changing morphology, hydrodynamic conditions and reservoir operation as well as wide-ranging characteristics of the catchment area may lead to reservoir-specific sediment characteristics. The often very large surface area of the reservoirs will make it impossible to obtain sufficient sediment information for a reliable spatial interpolation. Therefore, the application of modern techniques for sediment detection and classification are needed.

We combined two echo sounding setups (EA 400: linear 200 kHz, 38 kHz and SES 2000 compact: parametric sub-bottom profiler 100 kHz, 6 kHz), in order to obtain detailed acoustic sediment information. The acoustic data was processed and assessed for the following purposes:

- Sediment mass detection
- Gas void detection
- Sediment classification

For all three parameters specific ground truthing data was collected using a gravity corer, of a dynamic penetrometer and freeze cores. Altogether, five reservoirs in Germany and Brazil were investigated.

It could be shown that hydro acoustic data can be highly valuable for the lifetime assessment, the sediment management, carbon budget calculation and greenhouse gas emission estimations as well as general reservoir operation strategies.