

Ē

Depth (

Deep and shallow lakes in a coupled-reservoir system exhibit differential release mechanisms for seasonal and long-term phosphorus release

Water depth (m)

Karel As¹, Anna Pudelko¹, Melanie Münch², Gabriele Trommer³, Thilo Behrends², Stefan Peiffer¹ 1: University of Bayreuth, 2: Utrecht University, 3: Wasserwirtschaftsamt Ansbach AN VIT

The importance of lake sediments in regulating the phosphorus cycle has been recognized since the early 40's. Regulation is based on the phosphorus binding form in the sediment. Binding forms of P are numerous, for instance, it can be present associated with metal hydroxides, as a part of apatite or bound to organic molecules. During seasonal anoxia and increased temperatures these phosphorus pools could be rereleased, with iron being especially sensitive to reductive dissolution. Sequential extraction techniques try to quantify these operationally different pools in order to assess what mechanisms operate in the burial of P as well as it's seasonal rerelease.



Fig 1. Methodological framework The main methods employed in this work are sequential extraction and sediment incubation. Around 10 cores were taken from each reservoir and incubated anoxically. Release of PO_4 , NH_4 and Fe-ions were monitored and help to establish sediment activity and release mechanism

-TR 📣

Sequential extraction was used to observe mineral transformations involving P. By this method we can uncov which fractions contribute to Pburial and which are rereleas

In this project we investigated the mechanisms of rerelease both by sediment incubation and sequential extractions (Fig. 1). As a main tool in sediment incubation we looked at the correlation of phosphorus release with iron and ammonium. As a field work site we investigated the Franconian Lake District (Fig. 2). This is a reservoir system consisting of both shallow and deep lakes that are part of the same catchment. The morphology of these lakes is however very different and this could result in different release mechanisms.

Field site

The Franconian Lake District are a series of reservoirs consisting of the hypertrophic, shallow Altmühlsee, the eutrophic, deep Kleiner Brombachsee and the main reservoir is the mesotrophic and deep Grosser Brombachsee. The reservoir is in an agriculturally-intensive region with high external phosphorus inputs. The Altmühlsee serves as a pre-sedimentation basin in which 70% of the incoming phosphorus settles.

