

Overbank sediments as a tool to reconstruct the pollution history of river catchments

During inundation of a floodplain, suspended sediments are disposed on land. Throughout time, a sequence of fine-grained sediment layers is accumulating on the riverbank, each layer representing a single flood event. In theory, the uppermost sediment layer consist of the most recently deposited sediment, while the bottom layer of an overbank sediment profile is composed of older sediments. As a consequence, the geochemical signature found in the sequence of these layers represents the evolution of geochemical characteristics of river sediments through time.

Sampling of overbank sediments at depth, in combination with information on sedimentological history and age of samples may even allow to reconstruct the pollution history of the river basin. Overbank sediment profiles taken downstream from mining or melting places in the Harz mountains (Germany, Matschullat et al. 1997) and along the Geul river (Belgium, Swennen et al., 1994) yielded detailed signatures of human activities in the respective drainage basins. Overbank sediments may also be interesting from an archaeological point of view. The geochemical and mineralogical analysis of sedimentary profiles of the Ouse River (UK) gave evidence that contamination by lead mining began in the Roman period (Hudson-Edwards et al., 1999). Analogously, dating of cores originating from the Rio Tinto alluvial plain indicated that mining of sulfide deposits go back to 3000 years BP (Davis et al., 2000). From an environmental point of view the use of overbank sediments is interesting because background concentrations found in overbank sediments are an essential reference point to evaluate the pollution status of soils and sediments.

In this paper possibilities and limitations of the use of overbank sediments to reconstruct the environmental history of river catchments are illustrated and discussed.

References

- Davis R.A., Welty A.T, Borrego J., Morales J.A., Pendon J.G., Ryan J.G. (2000). Rio Tinto estuary (Spain) : 5000 years of pollution. *Environmental Geology* 39 (10) : 1107-1116.
- Hudson-Edwards, K.A., Macklin, M.G., Finlayson, R., Passmore, D.G. (1999). Mediaeval lead pollution in the river Ouse at York, England. *Journal of Archaeological Science* 26 : 809-819.
- Matschullat J., Ellminger F., Agdemir N., Cramer S., Liessman W., Niehoff N. (1997). Overbank sediment profiles-evidence of early mining and melting activities in the Harz mountains, Germany. *Applied Geochemistry* 12; 105-114.
- Swennen R., Van Keer I., De Vos W. (1994). Heavy metal contamination in overbank sediments of the Geul river (East Belgium): Its relation to former Pb-Zn mining activities. *Env. Geol.* 24: 12-21.