Variability of lake inlet chemistry and its relation to soils

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The pedological analysis of the soil continuum in a catchment can yield substantial insight in flow paths, transport processes and possible linkages between terrestrial and aquatic ecosystems. In an interdisciplinary study (Sommer *et al.*, 1997) we investigated precipitation, lake tributaries and soils of three sandstone-dominated subcatchments of a dystrophic cirque lake of the northern Black Forest during 1989 and 1990. The chemistry of *tributary 1* is characterized by relatively higher *p*H-values, positive alkalinity at baseflow, higher concentrations of Ca, Mg, and K, and lower DOC. It does not fit the chemistry of the very acid, leached, podzolized soils in the catchment (weak linkage). The dominance of baseflow and lower intra-annual variations in discharge and temperature further confirms the conclusion of a dominating vertical flow path of soil water into the regolith and bedrock zone with substantial buffering in that zone (groundwater flow). *Tributary 2* shows the lowest pH-values and the highest concentrations of DOC, Fe, Al, and P, which fits very well the chemistry of the very acid, leached, permanently wet soils of its catchment (strong linkage). The dominance of storm flow water with high intra-annual variations in discharge corresponds with the high soil moisture and prevalent lateral flow path of water in the soil cover (lateral subsurface flow). *Tributary 'mix'* behaves intermediate between tributaries 1 and 2 but is more similar to that of tributary 1. This is due to the dominance of podzolized over reductomorphic soils in the subcatchment. Lateral transport of matter can be inferred from the soil pattern in all catchments, but its relevance for lake inlet chemistry depends on the existence of downslope immobilization zones.

References

Sommer, M., Thies, H.; Kolb, E., Bächle, H. and Stahr, K. (1997) *Water Resources Res.*, **33**, 2129–42.