



The Isotope Water Balance Approach – 40 Years of Limits and Chances in Modeling Lake Water Budgets

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The isotopic determination of water balance associated characteristics of lakes has been well established since the mid 60ies of the 20th century. In the focus of research were problems dealing with the qualitative and quantitative assessment of groundwater-surface water interactions as well as with estimates of lake water evaporation. In spite of uncertainties concerning the evaluation of evaporation related parameters, many studies could demonstrate reasonable results for the respective questions of research. Nevertheless, there are still several problems to solve; namely the modification of the Craig & Gordon model of the evaporation process (1965) to regions characterized by relative humidities more than 80 % and for instance, how to operate evaporation pans in remote areas? Apart from that, there are some more question marks about establishing an isotope water balance of lakes. What is the best approach to handle seasonal changes in hydrodynamics of lake catchments in Central Europe from isotopic perspective? Particular problems rise, if a lake is fed by different groundwater sources with non-uniform isotope signatures or shows permanent stratification pattern. A recently completed three-year-project founded by the German Research Foundation will be presented to illustrate how to handle several difficulties described above. During this project, three lakes in Lusatia, Germany were investigated in order to evaluate their water budgets on a monthly basis. Therefore, groundwater, lake water, and precipitation were sampled. Additionally, floating evaporation pans at each lake were operated as well as special designed water-vapour-sampling units for collecting monthly average samples of evaporating moisture from the lake surface.