



Dating young Groundwater in the North China Plain

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Groundwater is the dominant water source for municipal, urban and agricultural use in the densely populated region (≈ 200 Mio people) of the alluvial North China Plain (NCP). With regard to a sustainable management, the growing water demand in this semiarid region becomes more and more problematic. Information about recharge of young groundwater and residence times (water ages) in the western part of the NCP (recharge area) is crucial in this context.

Sampling took place along a ~ 200 km long transect from the Taihang mountains west of the city of Shijiazhuang to the centre of the NCP as part of a noble gas paleoclimate study. Samples were measured for ^3H , ^3He , SF_6 , stable isotopes ^{18}O and D , physical and hydrochemical parameters. Besides the well established ^3H - ^3He -method, that in general gives reliable results, we investigated the applicability of SF_6 as dating tool. Both methods draw on the variable atmospheric input to the hydrosphere within the last ≈ 40 years. Comparable results are therefore expected.

Modelled tracer ages of both methods cover the range of 0–40 years, suggesting that the upper unconfined aquifer is, at least in parts, recently recharged. However, the SF_6 -ages are to a large extent not consistent with the ^3H - ^3He results. Many SF_6 -samples have a distinct excess, most prominently in samples without tritium. Natural sources of SF_6 must be discussed as explanation, which is uncommon for fluvial or alluvial deposits. The applicability of SF_6 as exclusive dating tool for young groundwater in this region must therefore be put into question. Based on the reliable ^3H - ^3He data we interpret the distribution of the apparent tracer ages against the background of extensive irrigation as a result of the recharge possibly influenced by strong groundwater use (depression cones) in the urban area of Shijiazhuang.