

Validating the regional hydrogeological models with stable isotope data in precipitation

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Stable isotopes ^{18}O and ^2H are a conservative tracer in the subsurface flow. The precipitation is the primary input in the groundwater systems, hence there should be a positive regional correlation of the stable isotope values in the groundwater and precipitation. The local recharge peculiarities should modulate the precipitation isotope signal and introduce some noise but not eliminate the correlation completely.

Modelled isotope values in the precipitation (Terzer et al. 2013) were compared to the actually observed values in the groundwater (Babre et al, in print) in the Baltic Artesian Basin, located at the South-East cost of the Baltic Sea. But positive and significant correlation was not found. Two regional hydrogeological models LAMO (Spalvins et al. 2015) and MOSYS (Virbulis et al. 2013) were used to trace the likely recharge area of the considered groundwater samples. A simple particle tracing of the LAMO produced a statistically significant, positive correlation between observed $\delta^{18}\text{O}$ values in the relatively young groundwater (modelled residence time <7500 years) and precipitation at the location of the recharge. More complicated modelling system MOSYS with coarser resolution allowed to simulate the large scale downward depletion of the $\delta^{18}\text{O}$ values in the groundwater.

It is concluded that observed stable isotope values in the groundwater can be compared to the precipitation values in the recharge areas to validate the modelled regional flow patterns.

This research is supported by Latvian National Research Programme EVIDENnT project “Groundwater and climate scenarios”.

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