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Karstwater-ages in an alpine dolomite catchment, Austria: 18O, 3H, 3H/3He, CFC and dye tracer investigations

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According to the European Water frame Directive it is a requirement that surface and groundwater in the EU should be back to quality good conditions by 2015. For the implementation of this goal it is necessary that any measures to improve groundwater quality show an impact within the upcoming 6 years. A prerequisite for any change of groundwater chemistry within this time frame is that the mean residence times of the groundwater bodies are shorter than 6 years.

A dolomite massif at the north front of the Eastern Alps was examined to establish the water cycle in respect of mean residence time (MRT) and recharge area with various isotope systems and tracer chemicals. Besides a previous tracer test for quick water movements during storm events (days) along karstified fracture zones, oxygen-18, deuterium and tritium were analysed over a time period of 15 years to estimate the MRT of the groundwater in this fractured dolomite aquifer. In addition, 3H/3He and CFCs were analysed at two springs covering a young (month) and an old water discharge (∼20y) characteristic for karstwater dynamics.

The oxygen-18 and deuterium measurements fit well in the altitude dependent oxygen shift (0.2 ‰ / 100m) and indicate a water recharge close to the plateau of the dolomite massif at an altitude of 800-900m. A small shift towards higher deuterium excess in the springs compared to the valley precipitation in a nearby station indicate that part of the precipitation evaporates and is included in the mountain rain.