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Preliminary results of a helium / tritium monitoring of a shallow crystalline rock aquifer in Brittany : influence of pumping for drinking water supply.

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Drinking water is a key concern in Brittany, an agricultural area where intensive pig farming leads to nitrate diffuse pollution of surface and groundwaters. In the framework of a regionally funded project dedicated to a better understanding of the biogeochemical processes occurring in shallow aquifers in crystalline rocks, we take part to the helium/tritium monitoring of several sites in Brittany. One aspect of the project is to compare tritium/helium and CFC dating for young waters in such heterogeneous sites.

We present here the preliminary results of our on-going survey of the Vau Rezé site, 10km north of Rennes: besides 2 pumping equipments set up for drinking water supply, 4 piezometers were built to sample the altered schists and 3 other wells were drilled in the deeper part of the site. Although the investigated area is small (less than 0.1km^2) and all the wells were drilled in the same geological formation, the geochemical results show a high spatial variability resulting of initial groundwater chemistry acquisition and mixing mechanisms [1]. Another interesting feature of this site is its pumping history: in 2001, nitrate concentration in the shallow pumped well (modified spring) exceeded the drinking water safety limit; pumping stopped and resumed only in April 2004, once the drilling of a new deep well was achieved. Our study began at that time and we show how this anthropogenic pumping strongly affects the water He concentration and the mixing processes in some parts of the site.

References

[1] Ayraud V, Aquilina L, Pauwels H, Labasque T, Pierson-Wickmann A-C, Aquilina A-M and Gallat G. Physical, biogeochemical and isotopic processes related to heterogeneity of a shallow crystalline rock aquifer. Biogeochemistry (2006) 81:331-347.

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