

Analysis of groundwater level historical data to detect climate change impact in France

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The level of groundwater bodies depends for many of them on the infiltration of meteoric water and will therefore be necessarily impacted by climate change if it causes a change in the infiltration system (intensity, period). To assess and monitor the impact of this change, a dedicated groundwater monitoring network is necessary. As this impact is currently unclear, the implementation of such a network involves an analysis of existing groundwater level data series. The study was based on modified Mann-Kendall and Pettitt tests from groundwater level data and a comparison of trends between groundwater level data and climate data (precipitation, temperature, potential evapotranspiration). Trend detection tests were carried out on 377 piezometers of the French national groundwater quantitative monitoring network for which we had a data series of at least 25 years. In the end, 70 have a significant trend, 44 down and 26 up. Piezometers showing significant trend mostly concern aquifers with predominant annual hydrologic cycle. But most of aquifers in France have longer hydrologic cycles and statistical tests do not permit to distinguish between climatic and anthropogenic influence. The conclusion of this study is that we cannot demonstrate a significant impact of climate change on groundwater levels but it reinforces the need to set up a monitoring network dedicated to the impact of climate change on groundwater. In order to set up that network, about 40 aquifers were selected with following criteria : unconfined aquifer, recharge likely to be impacted by climate change, aquifer weakly impacted by withdrawals. For each selected aquifer, a monitoring well or a spring was selected, based on a number of criteria and in particular the fact that the well is inside an unconfined aquifer which is not influenced by pumping. They will constitute a new groundwater monitoring network to cover monitoring of climate change