

Seismic series in Torreperogil and Sabiote area (province of Jaén, SE Spain): Hydrogeochemical study

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The recent seismic series in Torreperogil and Sabiote in the Guadalquivir Basin (province of Jaen, SE Spain) leads us to study this area with the main aim of analysing the influence of earthquakes in the hydrogeological properties of aquifers in the area, in order to characterize how these processes may affect the movement of groundwater. We have sampled a total of 22 groundwater sites in the fault zone of Torreperogil-Sabiote in a preliminary research. Major elements, traces and isotopes (¹⁸O and D) have been analysed. Groundwaters from Torreperogil aquifers have a low to moderate (615-1859 mS/cm) electrical conductivity (EC). On the other hand, Sabiote waters are more mineralized, showing higher than 1147 mS/cm conductivity, except the Corregidora spring waters (points 1 and 2), are significantly less saline. The pH in these groundwater samples is mostly basic, but two aquifers points with slightly acidic (deep boreholes 16 and 17) values were found. Waters with this acidic character show the highest temperature at these points (>45°C), which far exceeds the limit of hydrothermal (19°C). Cool waters characterize other samples.

Regarding the boron content, abnormally high contents appear in more than half of the samples. The normal concentration in groundwater is <0.2 mg/l, whereas in this fault zone is usually above 0.25 mg/l most, with the highest concentrations in this element (from 0.58 to 0,78 mg/l) in the case of samples 17 and 16 respectively.

Piper diagrams show three different families of waters: (i) a group of 12 groundwaters with facies Ca-Mg-SO₄-Cl; (ii) a set of 7 water samples with facies Ca-Mg-HCO₃; (iii) a group of 2 samples with Na-SO₄-Cl facies, corresponding to the most acidic waters, with higher temperature and presence of high contents of boron, indicating a possible deep source linked to this fault zone.

¹⁸O and δH contents are between -5.87 and -7.38 ‰ and -40.12 and -46.12 ‰, respectively. This could indicate a probably origin of the recharge linked to Atlantic precipitation.