Hydrogeochemical properties of Gulbahce (Urla-Izmir) Geothermal System, Karaburun Peninsula, western Turkey

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Chemical and isotopic compositions of geothermal spring and cold water around Gulbahce Geothermal field which is located in eastern parts of the Karaburun Peninsula and is about 45 km away from the city of Izmir in the western Turkey, were monitored from 1989 and 2012. The Neogene stratigraphy around the Gülbahçe Geothermal system is represented by a volcano-sedimentary succession, including several sedimentary and volcanic units. These units rest on a basement comprising non-metamorphic and intensely sheared Paleozoic to Mesozoic rocks of the Karaburun Peninsula. An association of N-S and NW-SE trending active faults accommodating deep circulation of hydrothermal fluids of sea water origin are the primary control mechanisms of geothermal systems in this region. The physico-chemical characteristics of the hot springs are: average discharge 0.4-2L/s, surface temperature 31-37°C, pH 6.38-7.57, and electrical conductivity (EC) 34390-58400 µS/cm. The cold spring has a temperature of 14-20°C, pH 6.68-8.25, and EC 223-5320 µS/cm. The hot waters and some cold water springs such as İçmeler Karst spring are Na-Cl type, whereas the other cold water is Ca-HCO_3 type. The isotopic data (oxygen-18, deuterium and tritium) indicate that the thermal waters are formed by local recharge and deep circulation of sea waters. The origin of the other cold groundwater is meteoric waters.

Key words: Geothermal; hydrogeochemistry; isotope; Gulbahce; Turkey