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Hydrogeological, hydrogeochemical and isotope geochemical features of geothermal waters of Salavatlı in the continental rift zone of the Büyük Menderes, western Anatolia, Turkey

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The geothermal field of Salavatlı is located in the north of the middle part of the continental rift zone of the Büyük Menderes within the Menderes Massif, western Anatolia, Turkey and consists of Paleozoic metamorphic rocks and Miocene to Pliocene sedimentary rocks. Paleozoic marbles and quartzites form the geothermal water reservoir in the area with 35 production and reinjection wells in a depth up to 3249 m and 5 geothermal power plants in a capacity of 70 MWe. During the present study, we measured in-situ parameters and collected samples at 19 production and reinjection wells for hydrogeochemical and isotope geochemical analyses. The geothermal waters of Salavatlı in meteoric origin can be considered as Na-HCO₃ type water and have reservoir temperatures up to 200 °C. In Salavatlı, the sampled groundwaters and mixed geothermal waters lie along the meteoric water line (MWL) in plot of $\delta^{18}\text{O}$ versus $\delta^2\text{H}$, whereas the high-temperature geothermal waters deviate from the meteoric water line (MWL), suggesting a fluid-rock interaction.

In the drainage area of Salavatlı, the geothermal waters percolate at faults and permeable clastic sediments into the reaction zone of the roof area of a magma chamber, situated at a probable depth of up to 4 km, where meteoric fluids are heated by the cooling magmatic belt and ascend to the surface due to their lower density caused by convection cells. Besides, some subvolcanic rocks from Middle Miocene to recent in age occurred in the continental rift zones of the Menderes Massif.

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