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Native Hydrogen generation in Granitic Geothermal reservoirs of the Upper Rhine Graben

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Over recent years, understanding reactions for natural hydrogen ($H_{2)}$ generation and the prospects of finding natural H_2 occurrences have become of great interest. This is motivated by the important role of H_2 as either an energy vector or a zero-carbon source of energy for the energy transition. In the field of Geothermal Energy, the co-production of georesources and potentially natural H_2 from deep groundwater opened new perspectives for the deep geothermal sector as well. Previous research on the hydrothermal context of the Upper Rhine Graben suggests favorable conditions for natural H_2 generation through the alteration of Fe(II)-rich minerals in the granitic reservoirs [1].
Therefore, the aim of this research is to further explore natural H2 generation associated to water-rock interactions on these geothermal systems. For that, three main aspects will be addressed by laboratory work, geochemical modeling, and surface gas monitoring: i) alteration of Fe(II)-rich minerals in the granite at different temperatures of the reservoir (130 – 200 ºC) and increasing pressures of CO_2; ii) presence of fresh mineral surfaces with potential for Fe(II) oxidation and H_2 generation (using $^6Li/^7Li$ isotopes); iii) occurrence of subsurface H_2 emanations. The context of the Upper Rhine Graben brings an opportunity to better understand natural H_2 generation in granitic geothermal reservoirs and to improve the current knowledge on H_2 generation from water-rock reactions in the context of non-ultramafic rocks.

Références

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