Spatial and temporal variability of the soil-gas radon emission in the geothermal Caldera of Acoculco, Puebla (Mexico): A prospection of the promissory hot-dry rock system.

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In geothermal exploration, most studies on radon are used for the identification of geological structures, fluid flow paths, and areas of anomalous high heat flow. A comprehensive programme of radon (^{222}Rn) measurements in gas emissions for almost 2 years of geochemical monitoring was carried in the promissory geothermal zone of Acoculco, Puebla (Mexico). This geothermal zone has been preliminary proposed as a potential hot dry rock geothermal system.

The Acoculco caldera complex and its surrounding hydrothermal system are associated to the evolution of the superposition of calderic structures. The absence of thermal springs and the presence of extended areas with argilic alteration seem to indicate that the hydrothermal system is not currently active. However, gas superficial emissions and high temperatures measured in two exploratory wells (T>300°C), suggest the existence of an active hidden geothermal system [1]. For the measurements of ^{222}Rn, a Pylon's AB6A portable monitor equipped with a 600A active lucas type cell detector was used. The 600A detectors are active scintillation cells which were used to measure the alpha-particles production.

Spatial and temporal geochemical results in monitoring the soil-gas radon emission in the Acoculco caldera show that this geochemical tool can be reliable used for the geothermal exploration of hidden systems to determine the presence of the possible geological structures that connect the geothermal reservoir with the manifestations at the surface of the system.

[1] L. Peiffer, R. Bernard-Romero, A. Mazot, Y.A. Taran, M. Guevara, E. Santoyo (2014) Fluid geochemistry and soil gas fluxes (CO_2-CH_4-H_2S) at a promissory Hot Dry Rock Geothermal System: the Acoculco caldera, Mexico. Journal of Volcanology and Geothermal Research, 284: 122–137.

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