

5.2 Radon (^{222}Rn) outgassing in San Juan volcanic tubes during the Cumbre Vieja eruption 2021, and preliminary values in the new volcanic tubes

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Abstract

During the eruption at Cumbre Vieja ridge (La Palma, Canary Islands, 2021) a radon (^{222}Rn) detector (CORENTIUM Pro alpha particles counter) was emplaced inside the “Las Palomas” lava tube (San Juan eruption, 1949). In addition, a CO_2 meter logger was emplaced to determine relationships between the 2021 eruption and radon plus CO_2 inner fluxes. There is a geostructural relationship between the 1949 and 2021 eruptions, probably connected by a previous fault, shown the volcanic vents’ alignment trending NW-SE. In October 2021, the radon and CO_2 loggers were moved to the upper part of the lava tube, in the San Juan volcanic vent (Llano del Banco hollow dyke). Once the eruption ended (in early 2022) both loggers were placed in one newly formed lava tube, and data will be collected in February 2023. Preliminary results show daily average radon values ranging between 2 - 9 Bq/m^3 , although sporadic peaks of about 270 and 650 Bq/m^3 were recorded related to volcano-tectonic earthquakes and volcanic intensity. In general, basaltic eruptions of alkaline affinity show low radon values due to the low concentration in the magma body of uranium and related chemical elements (Th, Ra, etc.). Geochemical analysis of emitted lavas shows a U concentration of about 1 to 5 ppm ($\mu\text{g/g}$) and Th 9.5 ppm. Summer values of Rn increased up to 3 KBq/m^3 , related to the climate conditions instead of volcanic activity.

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