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# Spatial and temporal patterns of radon time series in the volcanic edifice of Tenerife (Canary Islands)

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A radon monitoring array is installed at the volcanic edifice of Tenerife for studying the radon flux as an indicator of geodynamic activity. The steep topography of Tenerife and the existence of a dense network of underground galleries has enabled setting up a 3D network of monitoring stations (located from 200 to 5,000 m horizontal distance and from 1 to 800 meter depth), covering the overall structure of the island at a scale of several tens of kilometres.

Systematic radon signals at different time scales are found at each monitoring site, located in the subsurface of Tenerife: a) Long term seasonal radon variation (SR), with lower values in winter and higher in summer, the amplitude of such variation is different among the locations. b) Large-scale Multi Day (MD) variations, lasting 2-20 days occur at all sites. c) Daily Radon (DR) signals occur locally during certain time intervals, superimposed on the MD signal, the amplitude of the daily variation relative to the MD signal is different at each site.

Radon signals (MD) are temporally correlated, with systematic time lags, over distances from 1 km to around 40 km, i.e. at the scale of the volcanic edifice itself. The synchronicity of the temporal variation in the radon level in the deep subsurface of Tenerife island, indicates that the radon flux is operating to a large scale as one system within the volcanic edifice. Small temperature variations of the geogas are also observed, co-related over large distances, again with a systematic time lag. The temperature rise must be due to warmer air from a lower level, indicating a large scale geogas flow operating within the volcanic edifice. Radon must be carried by the flow-

ing geogas from a source which is probably at a larger distance than the source of higher temperature.

It is supposed that mechanical processes - stress and strain - govern the increased release of radon from the source rock located within a limited distance. The spatial correlation suggests that the timing of mechanical release is communal over large distances. Such synchronized release (and detection) of radon implies that the operative mechanical process is acting at the regional scale. It is suggested that it is of an active geodynamic nature.

The established monitoring array provides an image of high time resolution spatial (3D) changes in the radon flux and demonstrates its validity as a natural laboratory and test bed for the investigation of the radon behaviour as a proxy of geodynamic processes.