



Continuous monitoring of fault-controlled CO₂ degassing in the Los Humeros Volcanic Complex, Mexico

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Over the last few decades, monitoring of soil CO₂ efflux has been widely used in different scientific disciplines like volcanic and seismic hazard assessment, carbon capture and sequestration, geothermal well integrity, and others. We installed a comprehensive LICOR LI-8150 monitoring system on the Los Humeros normal fault, one of the major structures in the geothermal production field. Over a five-months period, seven accumulation chambers measured CO₂ efflux every hour in combination with an on-site meteorological station recording air temperature, air humidity, barometric pressure, precipitation, wind speed, and wind direction. Seismic activity was recorded simultaneously by a seismic array of 42 stations distributed across the volcanic complex, which identified both, high frequency, volcano tectonic (>10 Hz) and low frequency, long-period events (1-8 Hz). Furthermore, monthly geothermal production and re-injection data are available. Our study aims to (1) characterize significant temporal variations of soil CO₂ efflux, (2) assess the effect of environmental parameters, (3) analyze the possible influence of natural seismicity and geothermal exploitation (production/re-injection) on CO₂ degassing rates. The latter aspect plays an important role to better understand the hydraulic connection and communication between subsurface and surface along structural discontinuities in the volcanic-geothermal system.