

Filling geyser conduits between eruptions, as revealed by acoustic measurements in the El Tatio Geyser Field, Chile

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We performed the acoustic and temperature measurements, correlated with visual observations, at the El Tatio Geyser Field, at an elevation of ca.4300 m in the Northern Chilean Andes. We focused on two geyser systems, named El Jefe and El Cobreloa.

El Jefe Geyser erupts every 2 minutes lasting for 15 seconds. We confirmed that acoustic measurements are useful for monitoring the sequence of eruptions during at night. When eruptions occur, documented by rising temperatures in the conduit, high frequency sound is recorded. Sound may be generated by water droplets landing on the ground surface. Between eruptions, sounds with a characteristic frequency approximately 100 Hz are recorded. This may be originated from the air column resonance within the conduit. During the day time it was windy, and acoustic measurements do not show a correlation with eruption activity. We also confirmed that measurements of ground temperature can detect the flowing hot water associated with eruptions.

We applied these methods to the other target, El Cobreloa Geyser, which erupts in two ways: vigorous major eruptions, and less energetic minor eruptions. We monitor major eruptions measuring ground temperature and minor eruptions acoustically. We found that major eruptions occur at regular intervals of approximately 4 hours and 40 minutes. During the inter eruption period, minor eruptions also occur regularly, with an interval of approximately 13 minutes. The observations suggest that filling of the conduit is a complex process.