

2つの周期がある間欠泉:El Cobreloa El Cobreloa: A geyser with two distinct eruption styles

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We performed field measurements at a geyser nicknamed “El Cobreloa”, located in the El Tatio Geyser Field, Northern Andes, Chile. The El Cobreloa geyser has two distinct eruption styles: minor eruptions, and more energetic and long-lived major eruptions. Minor eruptions splash hot water intermittently over an approximately 4 minute time period. A major eruption begins with an eruption style similar to minor eruptions, but then transitions to a voluminous water-dominated eruption, and finally ends with energetic steam discharge that continues for approximately 1 hour. We calculated eruption intervals by visual observations, acoustic measurements, and ground temperature measurements. All measurements consistently show that each eruption style has a regular interval: 4 hours and 40 minutes for major eruptions, and approximately 14 minutes for minor eruptions. We develop a model, in which the geyser reservoir, connected to the surface by a conduit, is recharged by the deep, hot aquifer. More deeply derived magmatic fluids provide the enthalpy to heat the reservoir. Boiling in the reservoir releases steam and hot water to the overlying conduit causing minor eruptions, and heating the water in the conduit. When the conduit becomes warm enough, the water in the conduit is able to boil, leading to a steam-dominated eruption that empties the conduit. The conduit is then recharged by the shallow, colder aquifer, and the eruption cycle begins anew. El Cobreloa provides insight into how small eruptions prepare the geyser system for large eruptions.

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