



Villarrica volcano, Chile; an integrated monitoring experiment.

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Thermal radiance, infrasonic, seismic and SO₂ concentration of the gas plume were obtained from Villarrica crater between 12 and 20 December 2002. In particular, high-resolution time series SO₂ data acquired by FLYSPEC (mini UV-spectrometer) demonstrated the wide variation of activity in this very dynamic system. Activity during the experiment alternated from background degassing, explosion-absent periods during which only gentle lava lake overturn occurred, to periods where degassing occurred predominantly by vigorous gas puffing or discrete explosive events. Such alternating between more passive and active phases of degassing are characteristic at Villarrica and considered to relate to the pulsatory mode of conduit circulation. Gas puffing (45-80s intervals) and small explosive events generated clear signals that correlated well across the multi-parameter dataset. Both the infrared radiometers and the Flyspec proved capable of detecting characteristic signals associated with gas puffing, spattering, gas piston events, and strombolian eruptions. Alternations between the passive and active phases of degassing that occur on a 30-120 min time-scale are reflected across the datasets. Gas concentration variations associated with the alternating activity can help to constrain conduit processes such as determining whether it is gas flux or only degassing mode that is changing. These observations corroborate inferences made about the character of seismic signals obtained routinely by the Observatorio Volcanológico de los Andes del Sur (OVDAS). The results of this experiment thus have an important implication for retrospective interpretation of a long baseline dataset that extends back until 1983.