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Poás volcano: Relationships between diffuse vs active CO_2 degassing and long term volcanic activity.

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Active volcanoes exhibit diffuse gas emanations through the ground. Carbon dioxide is one of the most abundant species, in addition to the gases actively released through channelized vents. CO_2 diffuse degassing is not always correlated to volcanic activity but CO_2 diffuse vs active degassing ratios appears to show interesting behavior regarding fluctuations in volcanic activity. CO_2 diffuse degassing data were obtained at Poás volcano (Costa Rica) in 2011 using the accumulation chamber method with the aim of estimating the total diffuse CO_2 budget. This result was compared to active degassing data, as well as to previous CO_2 diffuse degassing data measured between 2000 and 2004, when Poás entered in a stage of enhanced volcanic activity. Results show a dramatic decrease in CO_2 diffuse degassing rate between 2000 and 2011 of more than 500t/d, following an increasing trend in total gas emission and power output between September 1995 and the end of 2001. Thus, the ratio of diffuse to active degassing has dramatically decreased with the increase of volcanic activity and occurrence of phreatic eruption. Two main hypothesis could explain those results: 1) Either the rising of magma to shallower levels allows the gas to be better channelized due to enhanced permeability and conduit opening, or 2) Poás volcano might experience a periodic pattern of hydrothermal sealing/overpressure/eruption that allows the system to shift from a regimen of passive degassing to active degassing.