



Cities on Volcanoes 9  
November 20-25, 2016  
Puerto Varas, Chile

*'Understanding volcanoes and society: the key for risk mitigation'*



## **Diverse degassing and eruptive processes along the Southern Central American Volcanic Arc: Implications for hazard assessment from gas monitoring (invited)**

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Volcanic gases, Eruption forecasting, Volcanic Hazards, Central America

The Southern Central American Volcanic Arc (SCAVA) hosts some of the world's most persistently active volcanoes and a diverse array of magmatic and hydrothermal systems, providing a natural laboratory for research on volcanic degassing. In this region, population centers are often built on recent volcanic deposits and local economies (e.g. tourism, agriculture) are both dependent on and vulnerable to volcanism. Here, new insights into degassing and eruptive processes observed at volcanoes along the SCAVA will be highlighted. Data will be presented from diverse volcanic activity, including explosive vulcanian eruptions, persistent open-system degassing, hydrothermal degassing, and phreatic eruptions. Gas monitoring (using Multi-GAS, DOAS, direct sampling, plume sampling, etc) has shown to be particularly powerful at not only assessing the state of volcanic activity, but also understanding the driving processes behind volcanic unrest, especially when combined with geophysical datasets. In some well-studied cases (e.g. Poás and Turrialba volcanoes) high-frequency gas monitoring has demonstrated clear precursory signals to volcanic eruptions. However, enormous challenges remain in developing volcanic gas monitoring as a rigorous and reliable method for eruption forecasting. Technologies continue to advance and diversify rapidly, yet it remains exceedingly challenging to produce consistent, continuous, and robust gas data in real-time and maintain networks in some of the most extreme environments on Earth.