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Preliminary analysis of changes in sulfur dioxide gas emissions and seismicity related to volcanic activity in Guatemala on the period 2014 to 2016

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Ground-based gas monitoring techniques and seismic data can be used to better understand volcanic phenomena, eruptive activity changes and shallow conduit processes occurring within the volcanic system. Three field campaigns (2014-16) were conducted in Guatemala's most active volcanoes (Fuego, Pacaya, and Santiaguito), to acquire sulfur dioxide (SO₂) gas emission data, using a mini-DOAS (2014-16), a FLYSPEC (2015-16), and a UV camera (2016). These ground-based instruments take advantage of SO₂'s selective absorption of UV radiation, to produce SO₂ column amounts that are converted to emission rates. Seismic data provided by the local monitoring agency, INSIVUMEH (Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología), and other collaborators, will be analyzed with the objective of correlating with the SO₂ data, in order to interpret the changes in behavior of the volcanic systems. Volcanic activity in Guatemala has intensified in the last 5 years, with some of the largest volcanic eruptions in the last few decades (e.g., Fuego 2012 and 2015-16, Santiaguito 2014). The eruptive activity at Pacaya volcano is mostly strombolian, while at Fuego it is characterized by strombolian and vulcanian explosive eruptions. Santiaguito's activity is characterized by pelean and vulcanian eruptions, producing ash, block lava flows, pyroclastic flows, and lahars. Preliminary results (mini-DOAS) from 2013 and 2014 indicate that Pacaya was the highest SO₂ emitter, producing on average ~600 tonnes per day (t/d) in 2013, while Fuego produced on average ~330 t/d in 2013-2014.