



Investigation of cyclic relation between Nyiragongo SO₂ fluxes and its lava lake height

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Nyiragongo volcano, located in North Kivu, DR Congo, is one of the most active volcanoes in Africa. It has the largest lava lake on Earth (~260 m wide) and poses a direct threat to the local population of Goma city (~800,000 inhabitants). Two field acquisitions took place in June 2017 and March 2018, within the frame of the RESIST project (Remote Sensing and In Situ Detection and Tracking of Geohazards; <http://resist.africamuseum.be>). One of the goal of this project is to gain a more in-depth understanding of the source mechanisms driving volcanic eruptions in this region of Africa. During these data acquisitions, one of our specific focus was the monitoring of the lava lake dynamics (both vertical and surface movements), the seismic activity and the gas emission (from satellite and ground-based instrumentation). The study presented here, focuses on the SO₂ estimates (fluxes and indicators) and simultaneous variations of lava lake height.

In June 2017 and March 2018, acquisition from SO₂ instruments was proceeded at the summit of Nyiragongo (6 days) and from Shaheru caldera (3 days). Data were recorded with an SO₂ camera and its integrated UV-visible spectrometer (Envicam3), a UV-vis spectrometer (USB2000+) and a UV scanning-spectrometer (MS-DOAS). Differential Optical Absorption Spectroscopy (DOAS) technique was applied in order to retrieve daily time-series of SO₂ amounts (fixed point monitoring, horizontal and vertical plume intersections) from the spectrometers. These estimates are used to calibrate the SO₂ camera, and to investigate the effects of dilution and saturation, which affect SO₂ retrievals. SO₂ flux time-series from the spectrometers show daytime periodicity, with the same order of magnitude than the SO₂ fluxes from NOVAC station of Rusayo (8 km distant from Nyiragongo). On the 19th of June 2017, the SO₂ camera was recording with a direct field of view of the lava lake (with a space resolution of 20 cm allowing estimations of lava lake height). A first investigation of a cyclic relation between an indicator of the regime of the SO₂ emissions of Nyiragongo and the variation of the height of its lava lake height, is presented.