Monitoring of the SO$_2$ emissions from Nyiragongo volcano using UV camera imaging and spectroscopy during 10 days in June 2017

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From 10$^{th}$ to 20$^{th}$ June 2017, we participated to a field campaign on Nyiragongo volcano, North Kivu, DR Congo. Nyiragongo 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). Our field campaign took place within the frame of the RESIST project (Remote Sensing and In Situ Detection and Tracking of Geohazards; http://resist.africanmuseum.be). This project aims to gain a more in-depth understanding of the source mechanisms driving volcanic eruptions in the study area. During this campaign, the specific focus was the monitoring of the lava lake dynamics (both vertical and surface movements), the seismic activity and the gas emission. The study presented here, focuses only on the SO$_2$ monitoring.

During 10 days, SO$_2$ emissions from Nyiragongo were carried out from four sites, along the crater rim and on the southern flank. Data were recorded with one UV SO$_2$ camera, two UV-vis spectrometers and a UV scanning-spectrometer. Differential Optical Absorption Spectroscopy (DOAS) was applied in order to retrieve daily time-series of SO$_2$ amounts (fixed point monitoring, horizontal and vertical plume intersections) from the spectrometers. These estimates are used to calibrate the SO$_2$ camera, and to investigate the effects of dilution and saturation, that affect SO$_2$ retrievals. SO$_2$ time-series and fluxes from the spectrometers were combined with products from the SO$_2$ camera in order to estimate the daytime periodicity, which is related to the dynamics of the Nyiragongo lava lake.