



Long-term observations of SO₂ gas emission rates from Nyiragongo volcano (RD Congo) during 2004-2009

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Mount Nyiragongo (3470 m a.s.l.) is an active stratovolcano of mafic composition located in the Virunga Mountains in the Democratic Republic of the Congo. It is considered as one of the most dangerous volcanoes in the world due to generation of voluminous and highly fluidized lava flows during historical eruptions and the proximity to densely inhabited areas. Nyiragongo volcano is also a source of prodigious gaseous emissions to the atmosphere during periods of both eruptive and non-eruptive activity. Documented records of the style, speciation, and magnitude of degassing from this volcano exist in the literature since three decades ago. These studies are mostly based on observations made during sporadic field campaigns or by satellite-borne sensors, owing to logistical constraints imposed by volcanic and political unrest.

With the aim of strengthen the gas monitoring capabilities of Nyiragongo volcano, an automatic scanning spectroscopic (DOAS) system was installed in March 2004 in the Rusayo seismic station, 10 km from the volcano crater. This instrument is powered by solar panels and linked by radio telemetry to the Goma Volcanological Observatory. Combined with plume velocity data, this instrument provides near-to-real-time SO₂ fluxes with a typical temporal resolution of 10 minutes during sunlight hours. In 2005 the instrument was upgraded and incorporated as part of the Network for Observation of Volcanic and Atmospheric Change (NOVAC). Since 2005 three additional instruments has been installed, at 10 – 14 km distance W – SW of the crater, as part of the NOVAC project.

We present the results of the measurements performed at Nyiragongo during the period March 2004-October 2009. Wind data has been obtained from the Weather Research and Forecasting (WRF) model based on data from the U.S. National Oceanic and Atmospheric Administration (NOAA) to account for the effect of local topography. A statistical analysis of the results and its relation with other volcanological observations is presented. This study emphasizes the importance of long-term and continuous gas monitoring to better understand the human and environmental effects of the persistent activity of this volcano.