



Nyiragongo and Nyamulagira volcanoes SO₂-rich plume: a human health impact on North Kivu population?

Caroline Michellier (1), Michèle Dramaix (2), Jeanpy Wilondja (3), Matthieu Yalire (3), Jean Bosco Kahindo (4), and François Kervyn (1)

(1) Geology department, Royal Museum of Central Africa, Belgium, (2) School of Public Health, Université Libre de Bruxelles, Belgium, (3) Goma Volcano Observatory, Republic Democratic of Congo, (4) CEMUBAC, Université Libre de Bruxelles, Belgium

Located in the east of the Democratic Republic of Congo (DRC), Nyiragongo and Nyamulagira volcanoes are among the most active of the continent.

Nyiragongo (last eruption in January 2002) hosts a sub-permanent lava lake that produces a SO₂-rich plume. Its neighbor Nyamulagira makes major contributions to these emissions during its frequent eruptive periods (~2-3 years; last occurred in November 2011). An evaluation of the permanent volcanic plume impact on the population health has not been undertaken to date. It is the objective of this study conducted at two different scales.

- 1999-2010 data were extracted from the Health Information System (HIS). Through temporal and spatial analyses (Poisson regression), acute respiratory infection (ARI) cases routinely registered in health centres located under the plume were studied. No strong relationship of the ARI cases number was identified neither with distance to volcanoes, nor with eruptive months. ARI were also statistically compared (cross correlation) to SO₂ concentrations (ground level) measured by using Multi-Axis Differential Optical Absorption Spectroscopic (MAX-DOAS) sensors located around Nyiragongo volcano. Correlation between ARI cases number and SO₂ concentration values appears to be statistically positive and significant. These last results encouraged us to both study more deeply the health data collected during the 2011 Nyamulagira eruption and to undertake a large scale study.

- Following the last Nyamulagira eruption, a field survey was conducted in March 2012. The objective was to collect general population's specific health information. At the same time, passive SO₂ filters were distributed throughout the surveyed area. Statistical analyses highlight new correlations between respiratory infection criteria and SO₂ ground concentrations. Other impacts, linked either to health or to agriculture, can also be underlined through our results, as well as through field observations.

This on-going study aims at determining the magnitude and geographical extent of the impact of volcanic plumes on the population health. This should contributes to define the appropriate sanitation recommendations and lead to effective volcanic impact reduction on human health.