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Variations in gas emissions in correlation with lava lake level changes at Nyiragono volcano, DR Congo

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Between 2007 and 2011 four measurement campaigns (June 2007, July 2010, June 2011 and December 2011) were carried out at the crater rim of Nyiragongo volcano (1˚31'S, 29˚15'E, 3470 m.a.s.l.). Nyiragongo volcano is located 15 km north of the million inhabitants strong city of Goma, North Kivu region (DRC) and belongs to the Virunga volcanic chain which is associated with the western branch of the Great Rift Valley. The volcanic activity of Niyragongo is the result caused by the rifting of the Earth's crust where two parts of the African plates are breaking apart. Nyiragongo is considered one of the most active volcanoes in Africa.

The ground - based remote sensing technique - MAX-DOAS (Multi Axis Differential Optical Absorption Spectroscopy) using scattered sunlight and a Multi-gas-instrument have been simultaneously applied during all field trips and among others BrO/SO_2 and CO_2/SO_2 ratios were determined.

At the various field trips we could observe that the lava lake level frequently changes in height (in the order of minutes up to days and also between the years) and also our measured gas ratios showed variations. Higher CO_2/SO_2 and BrO_2/SO_2 levels were generally observed at higher lava lake levels and a decrease of the lava lake was accompanied by a decrease in the BrO/SO_2 as well as CO_2/SO_2 ratio. Ideas to explain the correlation of gas ratios and the lava lake level will be discussed in this presentation and we will especially focus on the June 2011 campaign, because it contains the largest changes, observed during these campaigns.

Gas emission changes in correlation with a change in the lava lake level might help to give insights within the magma plumbing system of Nyiragongo volcano and therefore leading to a better understanding of the volcanic behavior and improving the possibilities of forecasting a future eruption.