



## **Parameters influencing the location and characteristics of volcanic eruptions in a youthful extensional setting: Insights from the Virunga Volcanic Province, in the Western Branch of the East African Rift System**

Benoît Smets (1,2,3), Nicolas d'Oreye (1,4), Matthieu Kervyn (2), and François Kervyn (3)

(1) European Center for Geodynamics & Seismology, Walferdange, Luxembourg (benoit@ecgs.lu), (2) Department of Geography, Earth System Science, Vrije Universiteit Brussel, Brussels, Belgium, (3) Earth Science Department, Royal Museum for Central Africa, Tervuren, Belgium, (4) Department of Geophysics/Astrophysics, National Museum of Natural History, Walferdange, Luxembourg

The East African Rift System (EARS) is often mentioned as the modern archetype for rifting and continental break-up (Calais et al., 2006, *GSL Special Publication 259*), showing the complex interaction between rift faults, magmatism and pre-existing structures of the basement. Volcanism in the EARS is characterized by very active volcanoes, several of them being among the most active on Earth (Wright et al., 2015, *GRL 42*). Such intense volcanic activity provides useful information to study the relationship between rifting, magmatism and volcanism. This is the case of the Virunga Volcanic Province (VVP) located in the central part of the Western Branch of the EARS, which hosts two of the most active African volcanoes, namely Nyiragongo and Nyamulagira. Despite the intense eruptive activity in the VVP, the spatial distribution of volcanism and its relationship with the extensional setting remain little known. Here we present a study of the interaction between tectonics, magmatism and volcanism at the scale of the Kivu rift section, where the VVP is located, and at the scale of a volcano, by studying the dense historical eruptive activity of Nyamulagira. Both the complex Precambrian basement and magmatism appear to contribute to the development of the Kivu rift. The presence of transfer zones north and south of the Lake Kivu rift basin favoured the development of volcanic provinces at these locations. Rift faults, including reactivated Precambrian structures influenced the location of volcanism within the volcanic provinces and the rift basin. At a more local scale, the historical eruptive activity of Nyamulagira highlights that, once a composite volcano developed, the gravitational stress field induced by edifice loading becomes the main parameter that influence the location, duration and lava volume of eruptions.