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Sulfur dioxide OMI retrievals combined with seismic network data reveals magma migration at active volcanoes in North Kivu region

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The Kivu region is a densely populated area hosting two very active volcanoes, Nyiragongo and Nyamulagira, which require continuous surveillance using the widest means of observation as possible.
This study presents a 12-year dataset of satellite observations of SO_2 over North Kivu from the OMI instrument. Short- and long-term changes in volcanic SO_2 emissions are investigated and satellite data oversampling is used to discriminate the volcanic sources for the full OMI mission. As the same SO_2 retrieval algorithm will be applied operationally to the forthcoming TROPOMI instrument (onboard the ESA Sentinel-5 Precursor platform), the observational time series will expand in the future, with enhanced quality.
For the years 2014-2016, the satellite SO_2 dataset is combined with seismic observations from a 11-stations network that operated continuously during that period. The variations of seismic activity and SO_2 degassing display a high-level of consistency and we present a multidisciplinary tracking approach by combining the two types of observational data. This methodology allows for a robust discrimination of magma migration into and out of the shallow plumbing system, improving our ability to interpret signs of volcanic unrest on a daily time scale.