



Volume estimation of rockfalls in the Dolomieu Crater of Piton de la Fournaise volcano, La Réunion : Is there a link between eruptions and rockfalls ?

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The summit of the Piton de la Fournaise volcano, La Réunion, is equipped, among others, with a seismic network maintained by the OVPF. This network is well appropriate for the study of seismic signals generated by rockfalls occurring in the Dolomieu crater : the seismic data make it possible to recover the volume of each rockfall. In addition, photogrammetric campaigns are regularly performed. Thus, two campaigns encircle the very active 2015 year, where four eruptions occurred. From the photogrammetric data, we are able to extract Digital Elevation Models before and after the 2015 eruptions, and the difference between these DEMs gives us the total volume of the rockfalls that occurred in between. The good agreement between these results and the volumes and locations calculated from the seismic data following Hibert et al., 2011 shows that our seismologic method is well calibrated. As a result, we can use seismic records to investigate the spatio-temporal evolution of the rockfalls on a period lasting from november 2014 to January 2016. First, we compare the temporal evolution of the rockfall volumes to the occurrence times of eruptions and to the volcano-tectonic activity. We observe a clear increase of the volumes of the rockfalls before the three biggest eruptions. This increase can either be due to a rise in the volcano-tectonic activity or to the deformation of the cone preceding an eruption. To discriminate between these assumptions, we compare our data to the deformation of the volcano recorded by the GNSS network. The change in rockfalls volumes before eruptions is more evident during this time period than during the previously-studied 2007-2011 period, possibly due to the more stable crater edges compared to the years following the 2007 crater collapse. Then, we compare the locations of rockfalls preceding an eruption with the eruption location. Unlike the 2007-2011 observations, we do not note any link between these locations.