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# High resolution DEM from Tandem-X interferometry: an accurate tool to characterize volcanic activity

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Tandem-X mission was launched by the German agency (DLR) in June 2010. It is a new generation high resolution SAR sensor mainly dedicated to topographic applications. For the purpose of our researches focused on the study of the volcano-tectonic activity in the Kivu Rift area, a set of Tandem-X bistatic radar images were used to produce a high resolution InSAR DEM of the Virunga Volcanic Province (VVP). The VVP is part of the Western branch of the African rift, situated at the boundary between D.R. Congo, Rwanda and Uganda. It has two highly active volcanoes, Nyiragongo and Nyamulagira. A first task concerns the quantitative assessment of the vertical accuracy that can be achieved with these new data. The new DEMs are compared to other space borne datasets (SRTM, ASTER) but also to field measurements given by differential GPS. Multi-temporal radar acquisitions allow us to produce several DEM of the same area. This appeared to be very useful in the context of an active volcanic context where new geomorphological features (faults, fissures, volcanic cones and lava flows) appear continuously through time. For example, since the year 2000, time of the SRTM acquisition, we had one eruption at Nyiragongo (2002) and six eruptions at Nyamulagira (2001, 2002, 2004, 2006, 2010 and 2011) which all induce large changes in the landscape with the emplacement of new lava fields and scoria cones. From our repetitive Tandem-X DEM production, we have a tool to identify and also quantify in term of size and volume all the topographic changes relative to this past volcanic activity. These parameters are high value information to improve the understanding of the Virunga volcanoes; the accurate estimation of erupted volume and knowledge of structural features associated to past eruptions are key parameters to understand the volcanic system, to ameliorate the hazard assessment, and finally contribute to risk mitigation in a densely populated area.