



Ground-based stereo-photogrammetric monitoring of the active crater of Piton de la Fournaise, La Réunion Island

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The Piton de la Fournaise on La Réunion Island is a typical example of active volcano where constructive and destructive phenomena can be observed simultaneously. The UNDERVOLC project (funded by ANR, the French National Science Foundation) aims at monitoring these constructive and destructive phenomena as they occur with different geophysical investigation captors. This contribution is focused on the stereo-photogrammetric system installed on the edge of the active crater called Dolomieu. The system is made of a pair of automatically triggered digital reflex cameras connected to a local download unit and a radio communication system to transmit the data down to the Volcano Observatory in near real time. After installation in October 2009, the system was fully operational from 28 December 2009 until 5 April 2010. That means that nearly 1000 synchronous stereo pairs were shot automatically during day time. This presentation will discuss the constraints and equipment developments made for monitoring an unstable active volcano exposed to cyclones and present preliminary results from the eruption that occurred between January 2 and 12 2010 along the internal flank of Dolomieu crater. Thanks to day-time hourly acquisition of stereo pairs, magma volume could be computed from Digital Surface Model differences to derive magma flow. During the 10 days of the eruption, about 1.5 Mm^3 of magma were poured on the flanks and floor of the crater. Magma flow reached $11.9 \text{ m}^3/\text{s}$ at the beginning of the eruption between January 2 and 3, followed by a period of relative quiescence with $1.1 \text{ m}^3/\text{s}$ between January 3 and 4, then $6.0 \text{ m}^3/\text{s}$ between January 4 and 5, and finally an average of $0.05 \text{ m}^3/\text{s}$ between January 5 and 12.