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Experimental detection of upward-going cosmic particles and consequences for correction of density radiography of volcanoes

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Muon tomography measures the flux of cosmic muons crossing geological bodies to determine their density. Three acquisitions with different sights of view were made at la soufrière de Guadeloupe. All of them show important density fluctuations and reveal the volcano phreatic system. The telescopes used to perform these measurements are exposed to noise fluxes with high intensities relative to the tiny flux of interest. We give experimental evidences ofa so far never described source of noise caused by a flux of upward-going particles. Data acquired on La soufrière of Guadeloupe and Mount Etna reveal that upward-going particles are detected only when the rear side of the telescope is exposed to a wide volume of atmosphere located below the altitude of the telescope and with a rock obstruction less than several tens of meters. Biases produced on density muon radiographies by upward-going fluxes are quantified and correction procedures are applied to radiographies of la soufrière.