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Topographic monitoring of the 2007 lava fan in the Sciara thel Fuoco, Stromboli Island (Sicily)

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The 2007 eruption in the Sciara del Fuoco at Stromboli volcano, totally destroyed the topographic monitoring device that was installed along this steep slope to monitor the flank movement after the 2002-2003 crisis. Furthermore, the lava emitted during this last eruption formed a big fan at the NE base of the Sciara del Fuoco, due to the rapid cooling of the lava when entering the sea. To monitor the stability of this lava body emplaced over a very steep slope, 5 new benchmarks were installed in April 2007, crossing the fan approximately along the old coastline. The position of these benchmarks was measured from the robotized Total Station every 20 minutes. Later on, in June 2007, 4 further benchmarks were installed on the lava fan, 2 at higher and 2 at lower altitude with respect the former profile. In addition, a further improvement in the monitoring device was performed by installing a new reference station and optimizing the measurement cycles and strategies. Currently, the 9 benchmarks on the lava fan are surveyed every 10 minutes and clear motion toward the sea, slowly decreasing in time since the first measurements. The motion also decreases from the south-western to the north-easternern part of the fan, where it is buttressed by the northern wall of the Sciara del Fuoco. An Early warning system, based on a robust statistical method (based on the ALICE - Absolutely Local Index of Change of the Environment - index) combined with a fuzzy processing has been developed.