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The 2002-03 effusive activity at Stromboli: study of the development of a complex lava distribution system using a handheld FLIR thermal camera.

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On 28 December 2002 Stromboli Volcano (Aeolian Islands, Italy) experienced a new phase of effusive activity characterised by the emplacement of lava onto the steep slopes of the Sciara del Fuoco (Calvari et al. 2005). Effusion resulted in the emplacement of two lava flow fields, separated in space and time and fed by different vents. The first flow field formed in the middle of the Sciara del Fuoco and was fed by a vent located at 550 m a.s.l.. Activity lasted until 15 February 2003, and resulted in a compound flow field of numerous overlapping 'a'a flow units. The second flow field was emplaced in the upper eastern part of the Sciara del Fuoco and was fed by a main vent located at 670 m a.sl. Activity here lasted until the end of the eruption in July, and formed a thick compound lava shield containing a complex lava tube network. This system was related to other structures such as tumuli and hornitos and fed lava flows until 21 July 2003 (Lodato et al. 2006, BV, in print). Daily handheld Forward Looking InfraRed (FLIR) thermal camera surveys were carried out from a helicopter during the eruption. These allowed us to record: (1) the development of lava channels and tubes, (2) the formation of tumuli and hornitos, (3) the opening and closure of ephemeral vents, and (4) the discrimination of active lava flows extending down the Sciara. Using these data, it was possible to track the evolution of the lava flow field and associated channel-tube system, including the establishment of the main lava tube, expansion of the network resulting from branching of the tube system, and the shut down of the system during July 2003. Thermal measurements also permitted lava tube

mapping and the discrimination of three orders of tumuli (Lodato et al. 2006, BV, in print). The development and stability of these lava flow field structures are the result of the interaction between different parameters including effusion rate and topographic gradient.

Keywords: Stromboli Volcano, Effusive Eruption, Lava Tube System, Tumuli, Thermal Measurements.