



The 5 April 2003 vulcanian paroxysmal explosion at Stromboli volcano (Italy) from field observations and thermal data

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The 5 April explosion at Stromboli was one of the strongest explosive events of the last century. It occurred while the 2002-03 effusive eruption was still going on. Here we present a reconstruction of the sequence of events based on thermal and visual images collected from helicopter before, during and immediately after the paroxysm. One month before the blast, ash emission and an increase in temperature at the bottom of the summit craters were observed. An increasing amount of juvenile components in the emitted ash during March suggested that magma level within the crater was rising accordingly. Hot degassing vents at the bottom of the summit craters were not persistent, and the craters remained obstructed by talus accumulation until the paroxysm occurred. Three minutes before the blast, we have recorded a significant increase in temperature inside Crater 1, accompanied by a thicker gas plume. 32 seconds before the blast, reddish lithic ash was emitted from Crater 1. The paroxysm produced a vulcanian blast that opened the feeder conduit, obstructed for over three months. The blast was accompanied by a shock wave recorded by the INGV seismic network at 07:13:37 GMT. Explosions with hot, juvenile material started from Crater 1, and after 15 seconds propagated to Crater 3, distant about 100 m. The velocity of ejecta was $\sim 80 \text{ m s}^{-1}$, and increased when the eruptive plumes from both craters merged together during the vulcanian blast phase. An eruptive column expanded 1 km above the top of the volcano, and explosions continued mainly at Crater 3. The paroxysm lasted about 9 minutes, with bombs up to 4 m wide falling on the village of Ginostra, 1.5 km away on the west flank of the island. This event signed the start of the declining phase of the effusive eruption, suggesting that the feeder conduit was coming back to its former steady conditions, with open vents and continuous, mild strombolian activity.