SURFACE DEFORMATION AND SEISMICITY AT ETNA DURING THE 2002-2003 ERUPTION

The 2001 and 2002-2003 Etna eruptions are studied through surface fracturing and earthquake distribution. The data show that the 2001 eruption resulted from the emplacement of an eccentric (independent from the central conduit) dike, consistent with regional tectonics, and that the 2002-2003 eruption resulted from a major (displacements up to 2 m) flank slip. These events are interpreted as intimately interacting processes, involving regional tectonics, magma accumulation and eruption and flank instability. In this scenario, the collected data suggest that the accumulation of magma in the eccentric system during the 2001 eruption started flank instability. Instability culminated during the 2002-2003 eruption, during a seismic swarm which induced flank-slip; this in turn enhanced the refilling of the eccentric system, as well as the extrusion of residual magma from the central conduit system. This sequence of events points to a long-term feedback mechanism between magmatism and flank instability at Etna, in which shallow magma accumulation starts flank collapse (2001), which in turn enhances induces further eruptions (2002-2003).