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Anatomy of Mt. Etna in 1994-2008 through InSAR data

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Volcano instability may occur under different conditions. To understand how a volcano becomes unstable, as well as the relationships to magmatic activity, we study in detail Mt. Etna through InSAR data, from 1994 to 2008. From 1994 to 2000, the volcano inflates with a linear behaviour. The inflation is accompanied by the eastward and westward slip on the E and W flanks, respectively. The proximal portions show higher rates, whereas the distal ones show sectors bounded by faults. From 2000 to 2003, the deformation becomes non-linear, especially on the proximal E and W flanks, showing marked eastward and westward displacements, respectively. This behaviour results from the deformation induced by the emplacement of feeder dikes during the 2001 and 2002-2003 eruptions. From 2003 to 2008, the deformation approaches linearity again, even though the overall pattern continues to be influenced by the emplacement of the dikes from 2001 to 2002. The eastward velocity on the E flank shows a marked asymmetry between the faster sectors to the N and those to the S. In addition, from 1994 to 2008 part of the volcano base shows a consistent trend of uplift. This study reveals that the flanks of Etna have undergone a complex instability resulting from the inflation due to the storage of magma, emplacement of feeder dikes and volcano load.