



FEM-based inversion for heterogeneous fault mechanisms: application at Etna volcano by DInSAR data

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A procedure, based on the Finite Element Method (FEM) for high-resolution geodetic data inversion, was developed to estimate non-uniform slip distribution along the 22 September 2002 M3.7 earthquake rupture occurring only one month before the 2002-03 eruption of Etna volcano. FEM-generated synthetic Green's functions are combined with an inverse algorithm to simulate deformation of the earthquake for a three-dimensional problem domain that takes into account the distribution of material properties of the volcanic edifice. The inversion of DInSAR data shows a complex kinematics of the north-eastern flank of the Etna volcano involving the Pernicana fault system. We detailed the co-seismic shear-rupture mechanism and highlighted a tensile mechanism, never observed before, related to a first attempt of magma intrusion which preceded the following 26 October eruption.