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SLIDER - SLope Instability, DEformation and the Role of fluid's at Mt. Etna

The eastern flank of Mt. Etna volcano poses a significant threat of a tsunamigenic landslide to the local population: at centimeter/year rates it is creeping and collapsing eastward into the Strait of Messina. But the geometry and depth of the sliding surface are yet poorly understood, with multiple conflicting models proposed over the years.
We analyze satellite-geodetic time-series from radar interferometry (InSAR) and accurate positioning systems (GNSS) of the past five years to create a 3D surface deformation field of the volcano. Our approach aims to isolate the pure instability signal by removing magmatic inflation/deflation, topographic and atmospheric noise, allowing us to trace the actual shape of the sliding mass using resultant displacement vectors. Using structural geology and kinematic modeling of the main fault systems, along with seismicity constraints, we work to define the 3D-geometry of the moving blocks and the depth of the detachment surface. This effort is coupled with understanding how fluids (water, magma) and slow slip events correlate with deformation transients and drive the propagation of instability. This geodetic-based methodology will provide important information to constrain the sliding surface geometry, with direct implications for hazard assessment and ongoing drilling projects aiming to reach the base of the instability.

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