SUPPLEMENTARY INFORMATION FOR MANUSCRIPT:

Ground velocity variations describe eruptive and magmatic activities at Mt. Etna: evidences from a decade of InSAR and GNSS data

1. Displacement observed during the 22-28 December 2018 paroxysm.

Subsampled displacement maps for both Sentinel-1 ascending and descending interferograms covering the 22-28 December 2018 period are reported in Figure S1.

2. Precision of InSAR results

Displacement precision is derived from parameters such as coherence and wavelength, providing an estimate (standard deviation value) of the measurement precision. The higher this value the lower the measurement precision. The formula used for the precision calculation is:

$$\sqrt{\frac{1-\gamma^2}{\gamma^2}} \cdot \frac{\lambda}{4\pi}$$

Where γ is the interferometric coherence and λ is the wavelength (Just and Bambler, 1994).

Figure S1

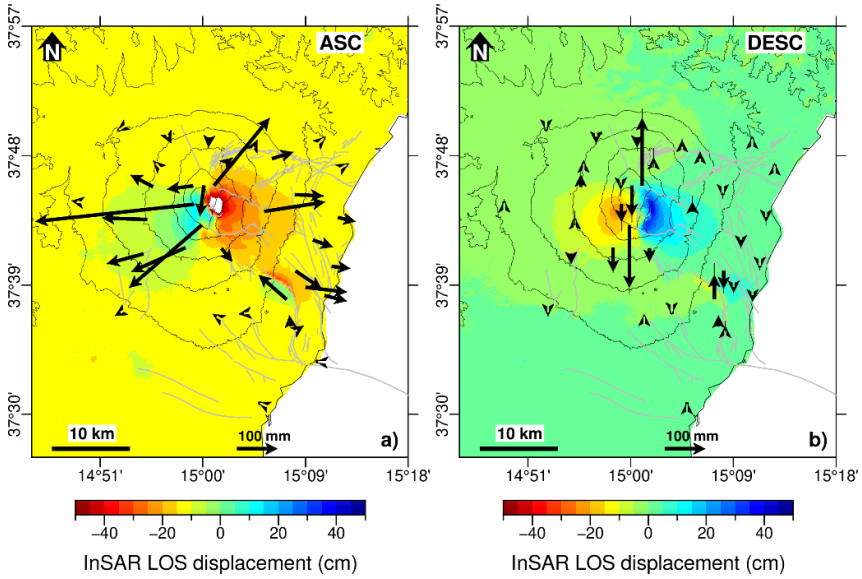

***Figure S1**: Sentinel-1 ascending (a) and descending (b) interferograms covering the 22–28 December 2018 period. The black arrows represent the horizontal (a) and the vertical (b) GNSS displacements measured during the same time interval.*

Figure S2

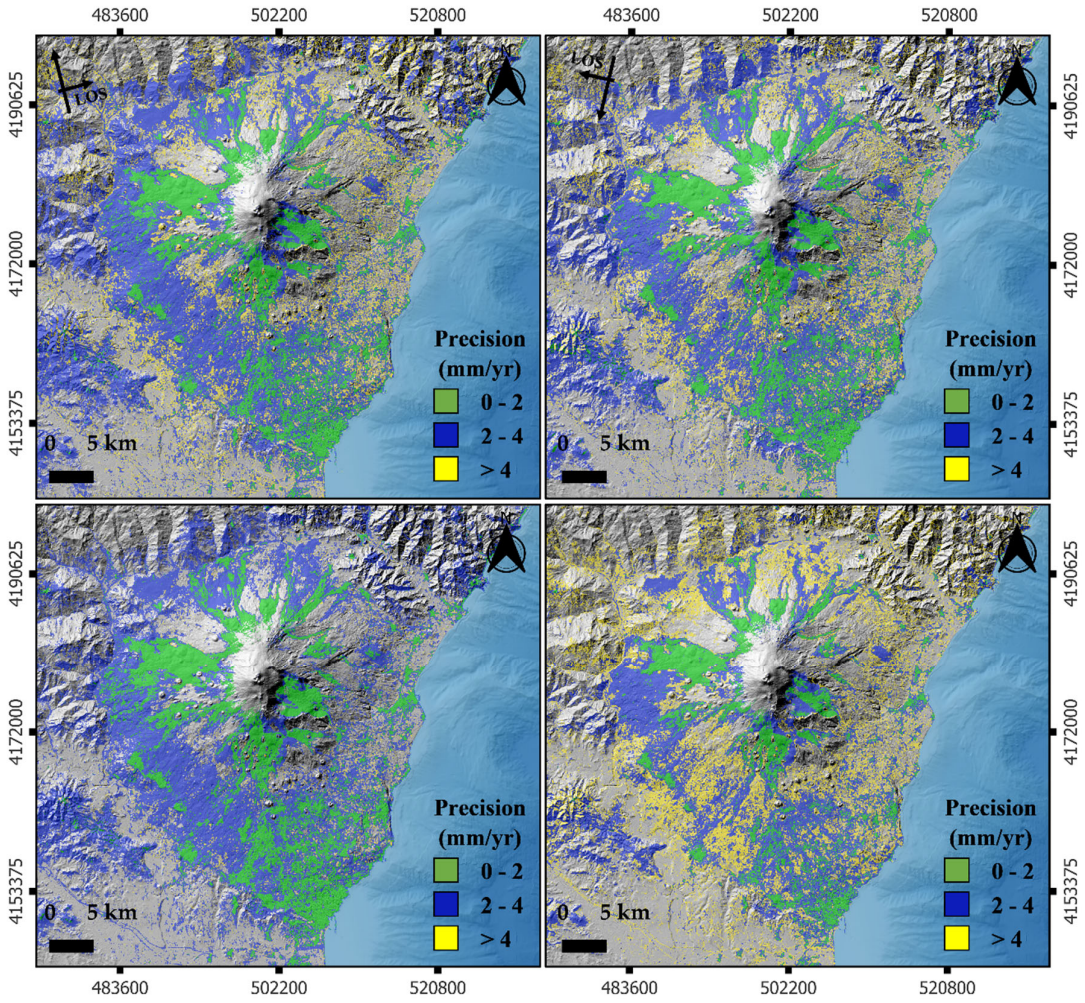

***Figure S2**: Ascending (upper left), descending (upper right), vertical (lower left) and horizontal (lower right) displacement precision maps. These outcomes, which are derived from parameters such as coherence and wavelength using the formula provided in Just and Bambler (1994), offer an estimation of the SAR results error. The higher the precision value, the lower the measurement precision.*

Figure S3

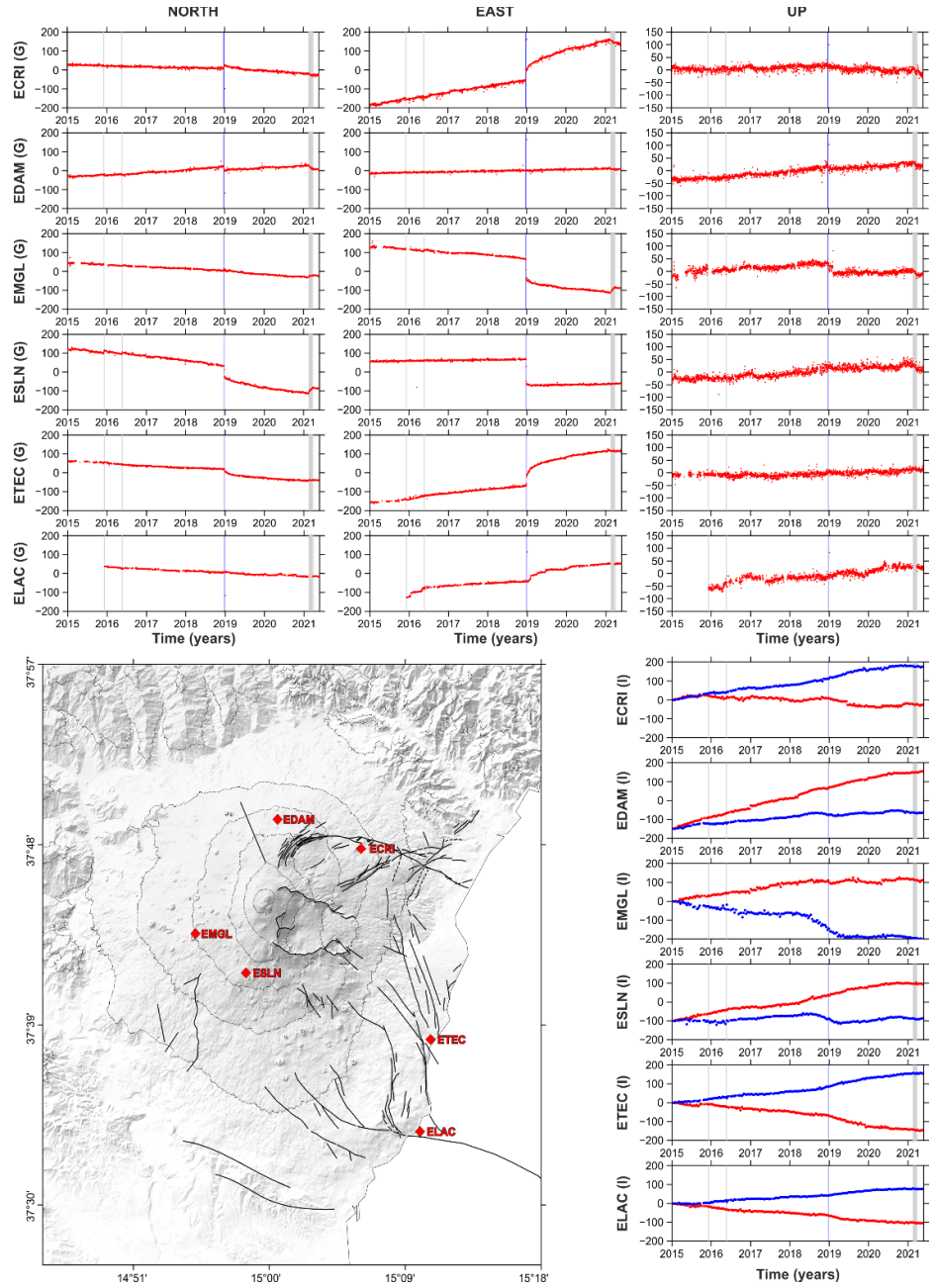

Figure S3*: Example of GNSS and InSAR LOS displacement time-series for some selected stations. On the top: North, East and Up displacement time-series for GNSS (G) stations; on the bottom, to the right: InSAR (I) LOS displacement ascending (red) and descending (blue) time-series for points closer to the GNSS stations. The vertical blue and gray lines mark the shallow intrusions onset and the lava fountain episodes occurred in the analyzed time interval, respectively. On the bottom, to the left: location map of the selected stations/sites.*

References

D. Just and R. Bamler, "Phase statistics of interferograms with applications to synthetic aperture radar," *Appl. Opt*. 33, 4361-4368, 1994.