

Monitoring slope instability integrating InSAR, GNSS, Total Station and Levelling: a case study in the Eastern slope of the Mt. Amiata volcanic complex, Italy

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and Daniele Rappuoli³

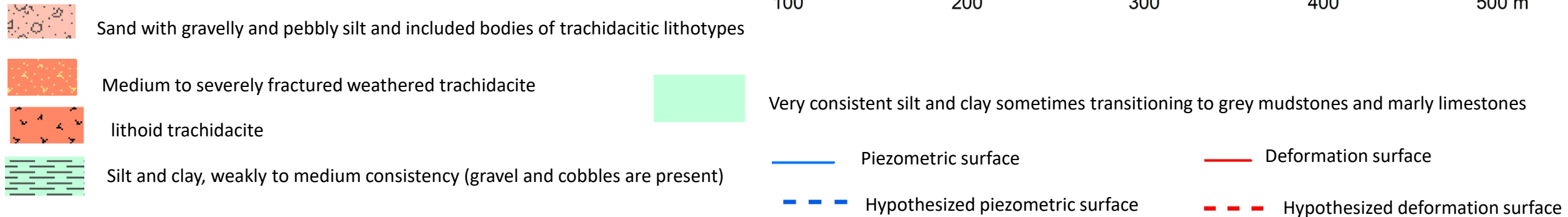
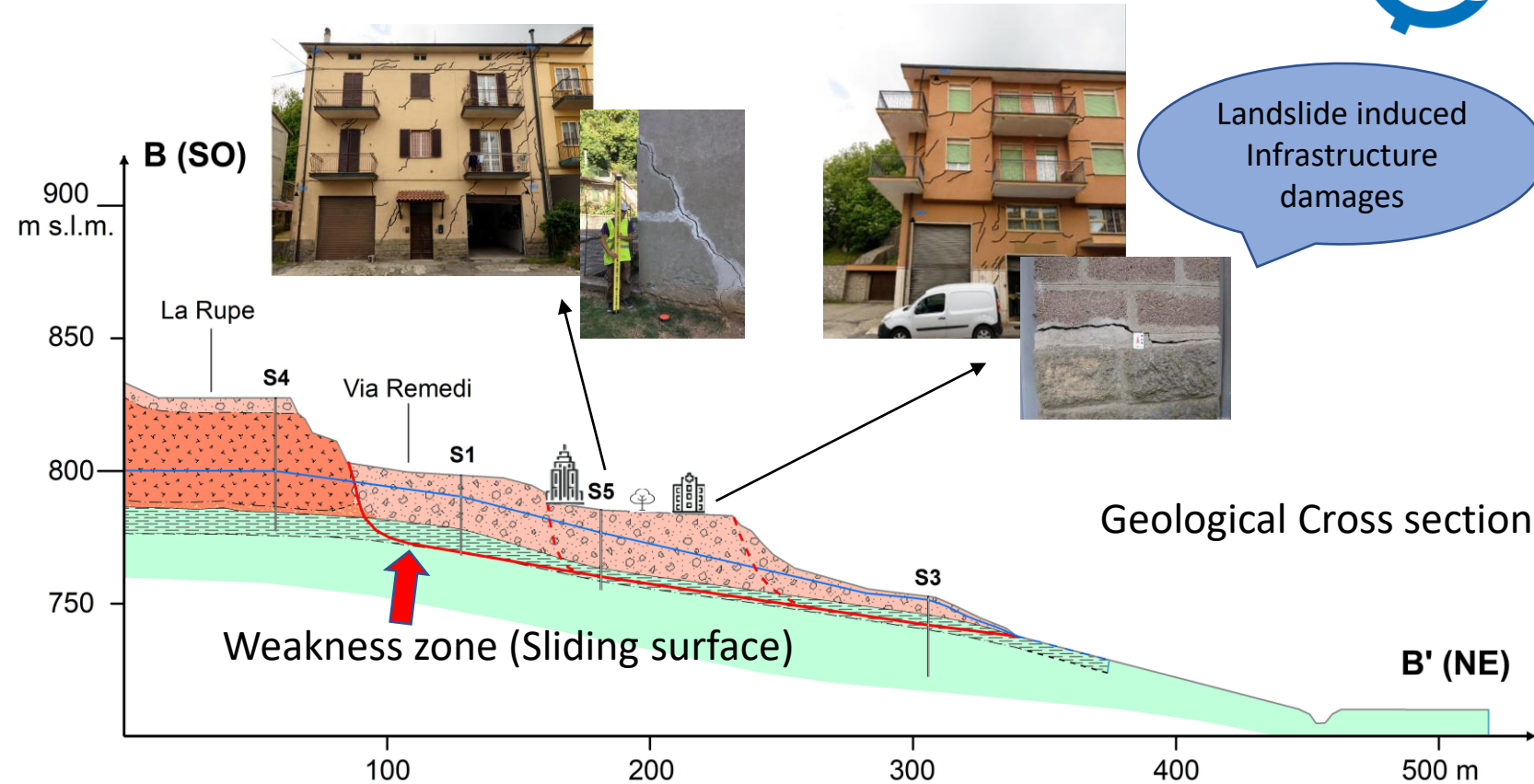
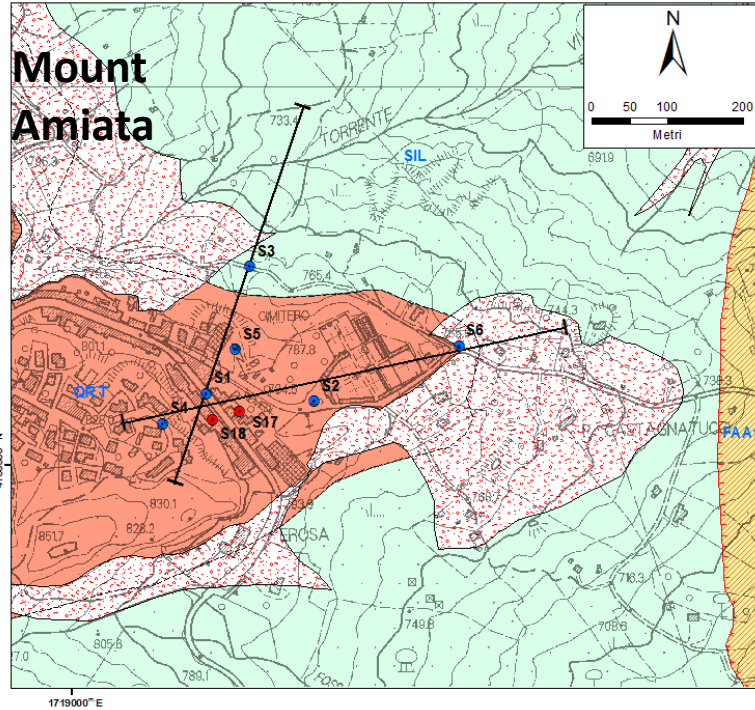
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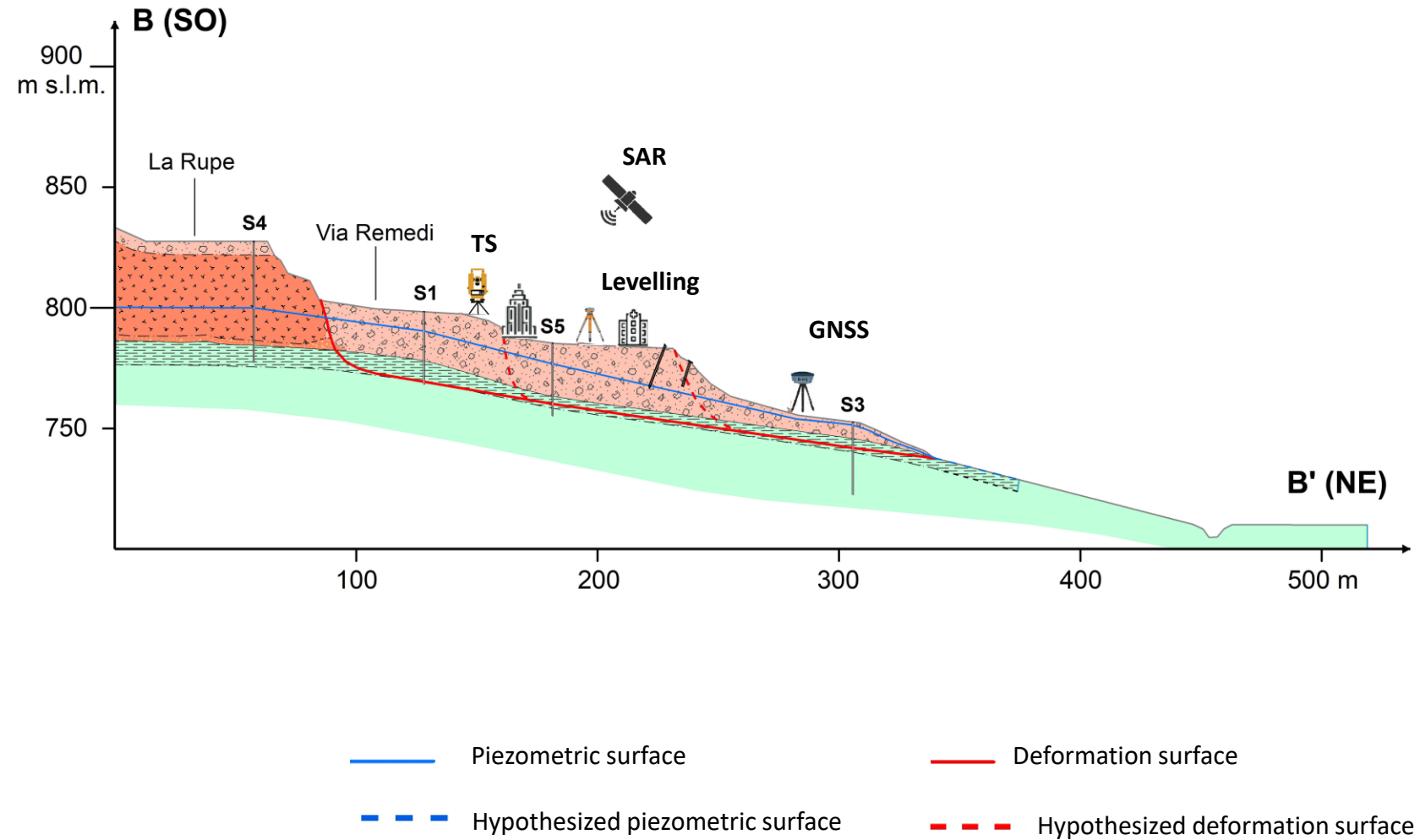
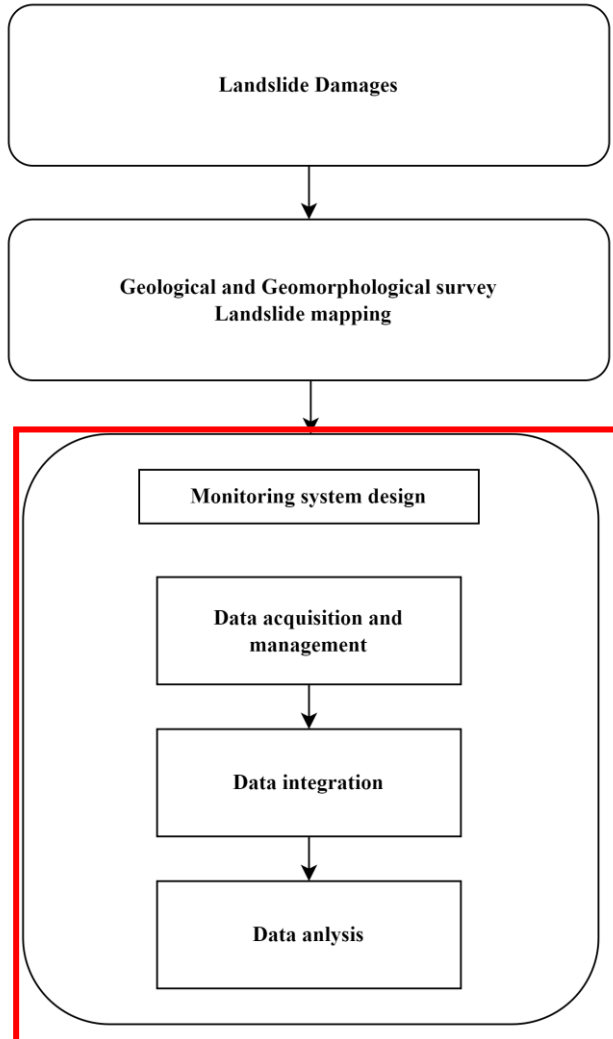
EGU 22 - 12120

NH 3.8

EGU22 23-27 May 2022, Vienna



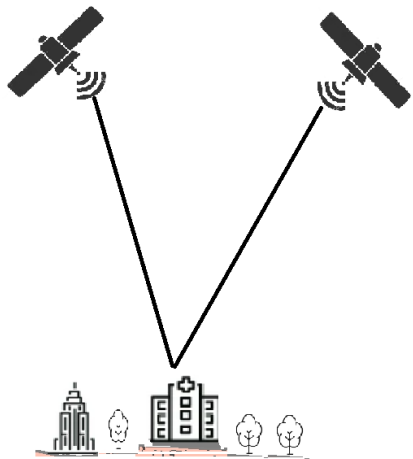




SAR

Sentinel 1A , 1B

Ascending Descending



Data acquisition

2015

2021

Total Station



Robotic Total Station

- Continuous monitoring
- Survey style

Data acquisition

2020

2021

GNSS



- Continuous monitoring
- Survey style

Data acquisition

2020

2021

Levelling



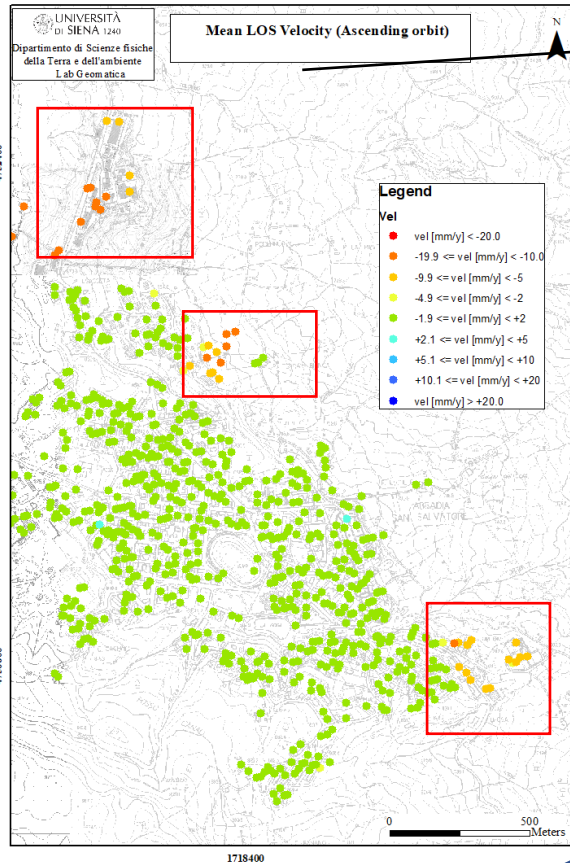
Data acquisition

2020

2021

**Negative (Red colour) movements
away from the sensor**

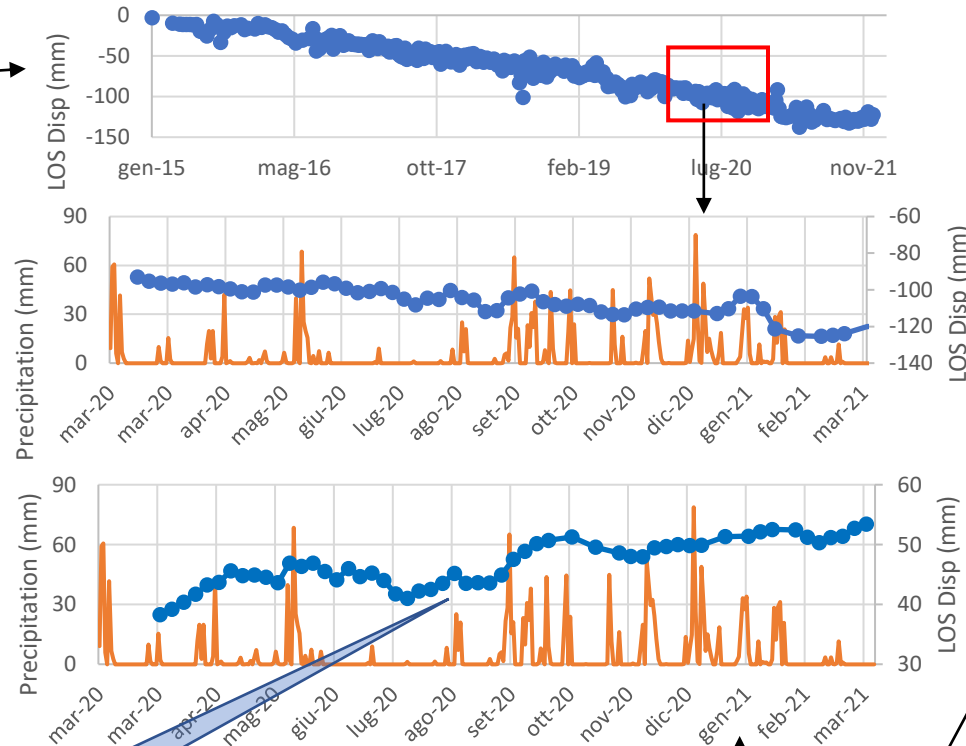
Ascending LOS Mean Velocity Map



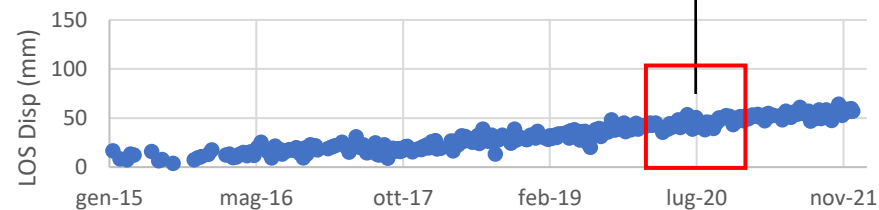
Non linear trend

InSAR

LOS ASC Disp vs Time

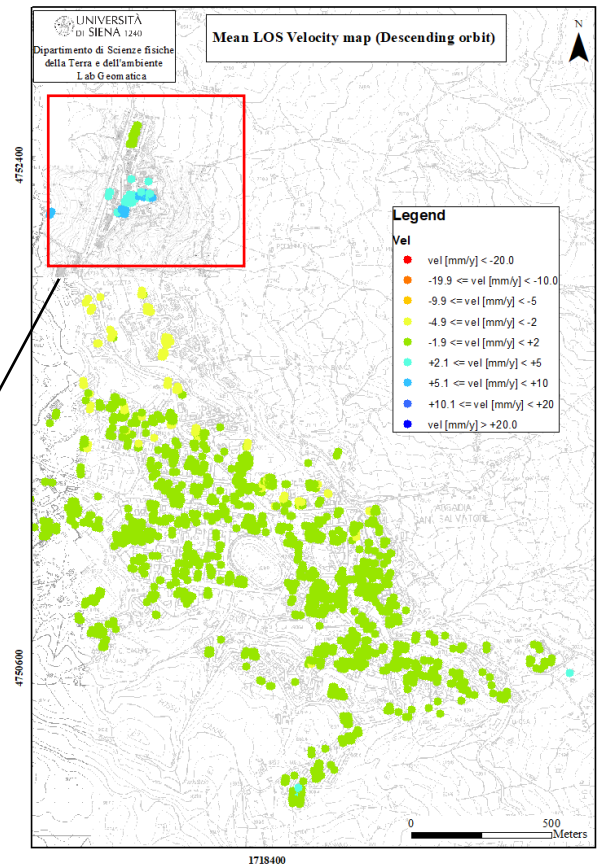


LOS DES Disp vs Time



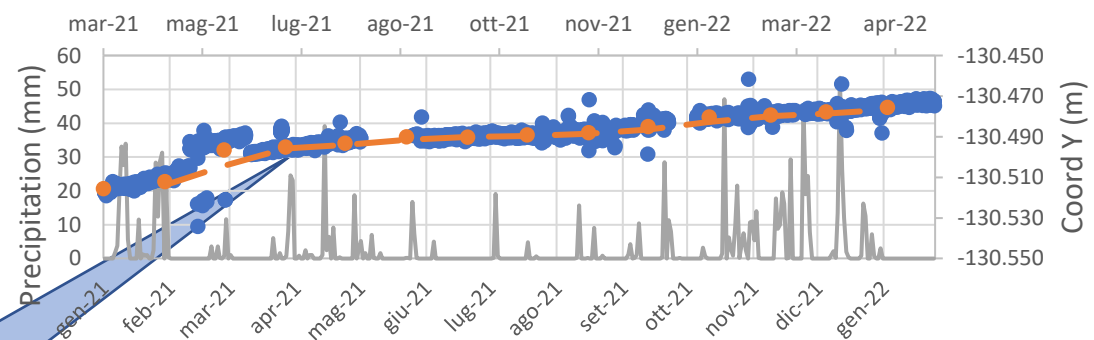
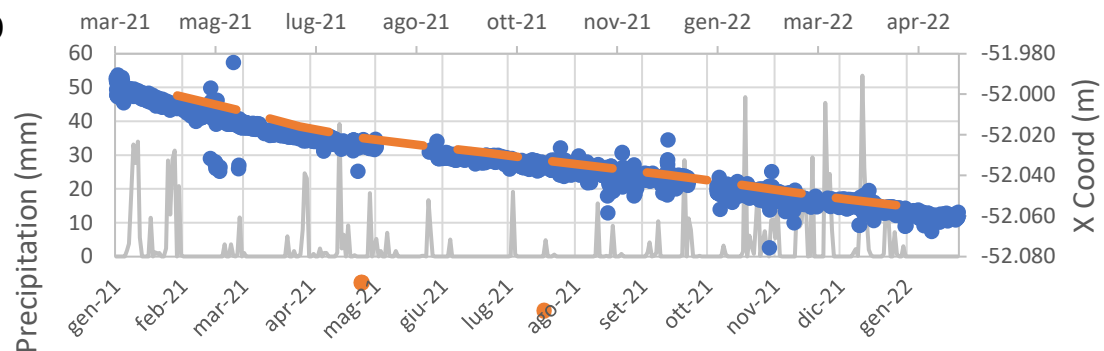
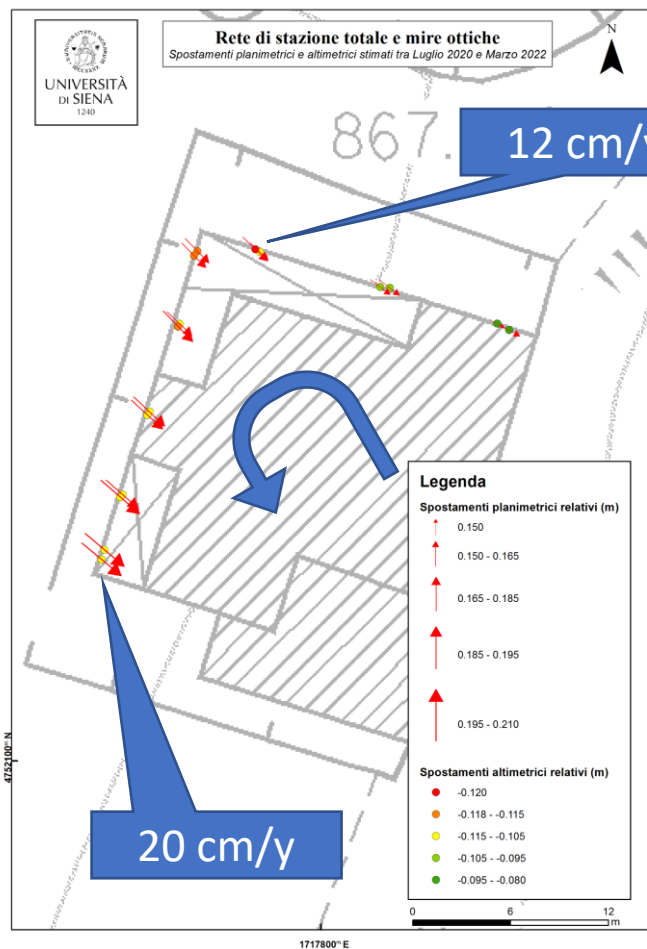
**Positive values (Blue colour)
movements towards the sensor**

Descending LOS Mean Velocity Map

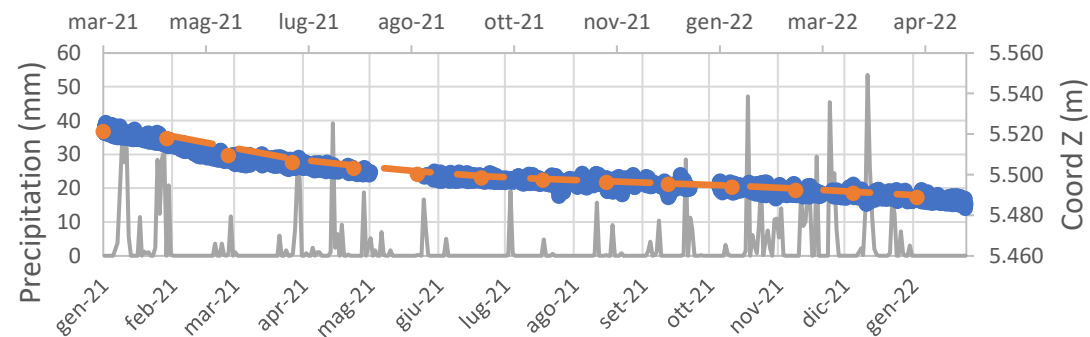


Total Station

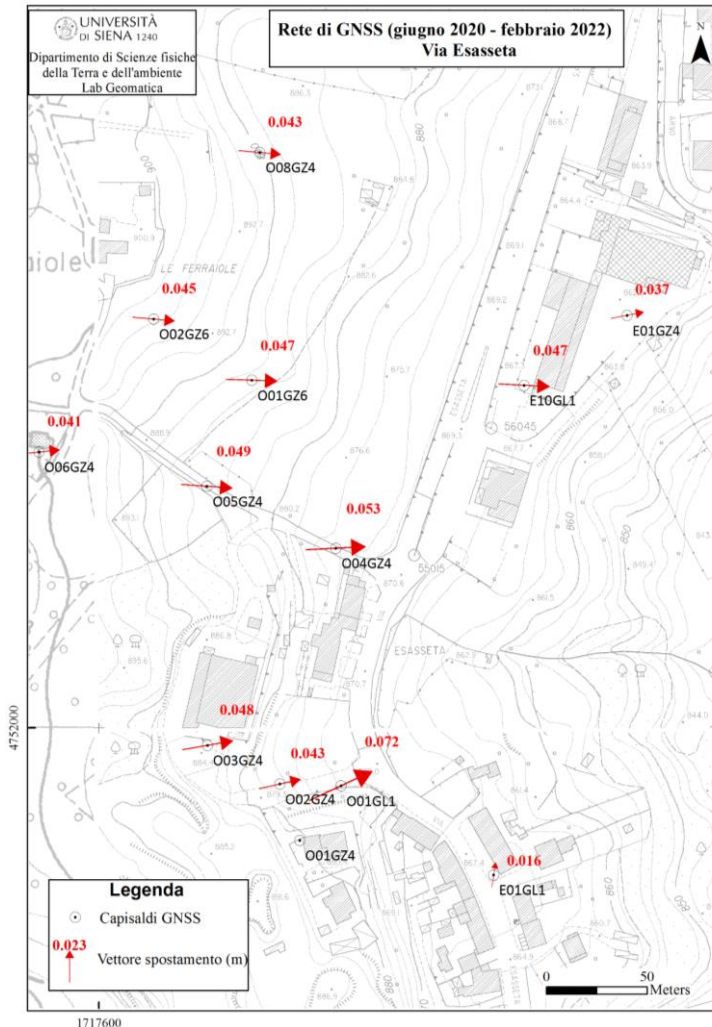
Planimetric and vertical displacement Map



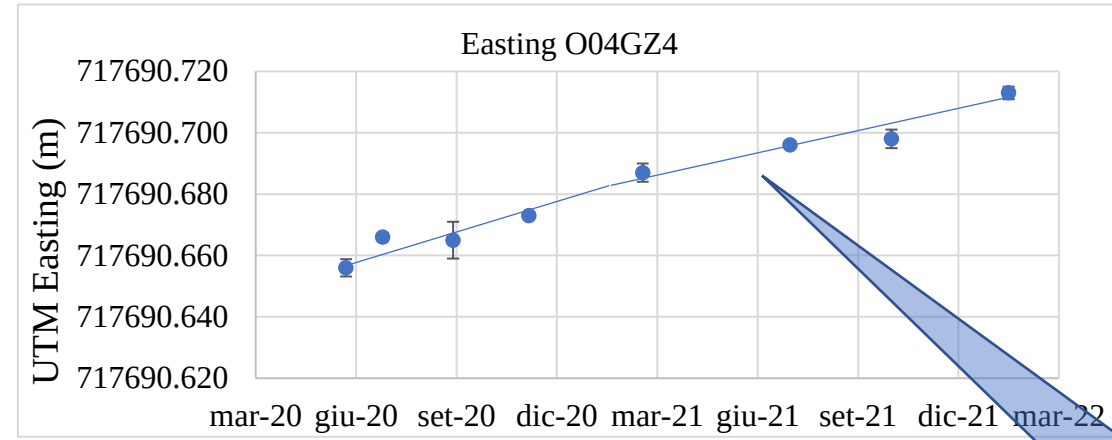
Non linear trend



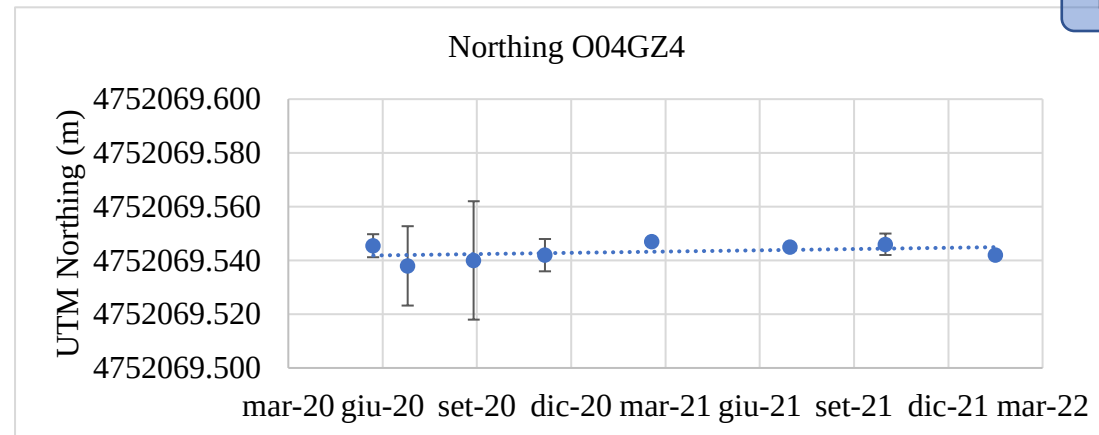
Planimetric displacement Map



GNSS



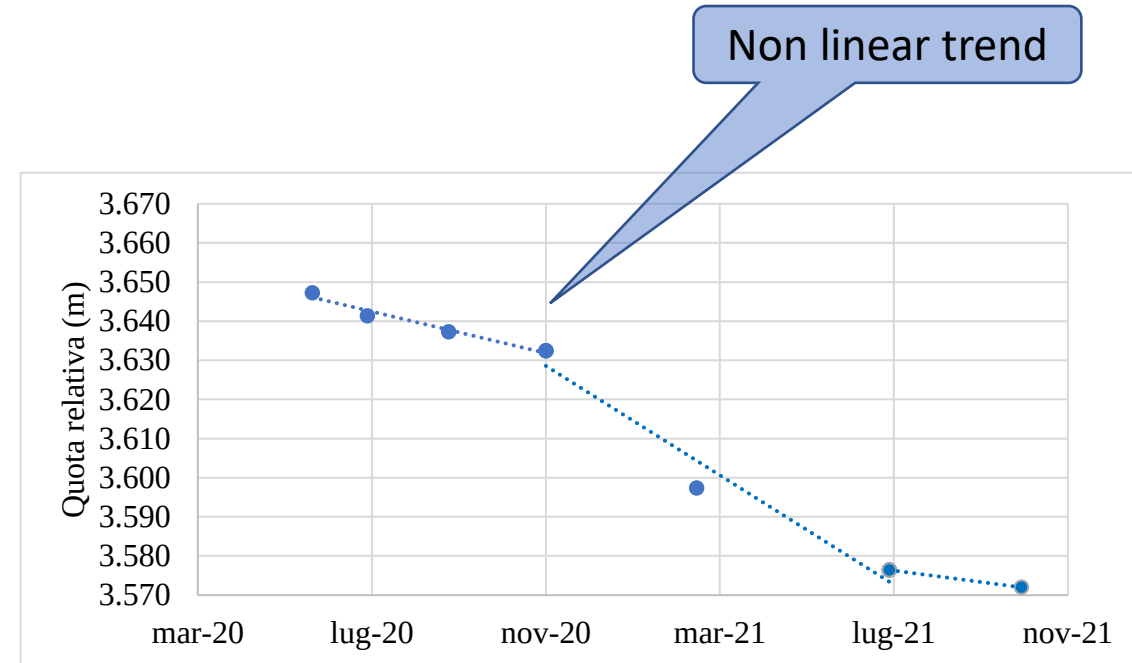
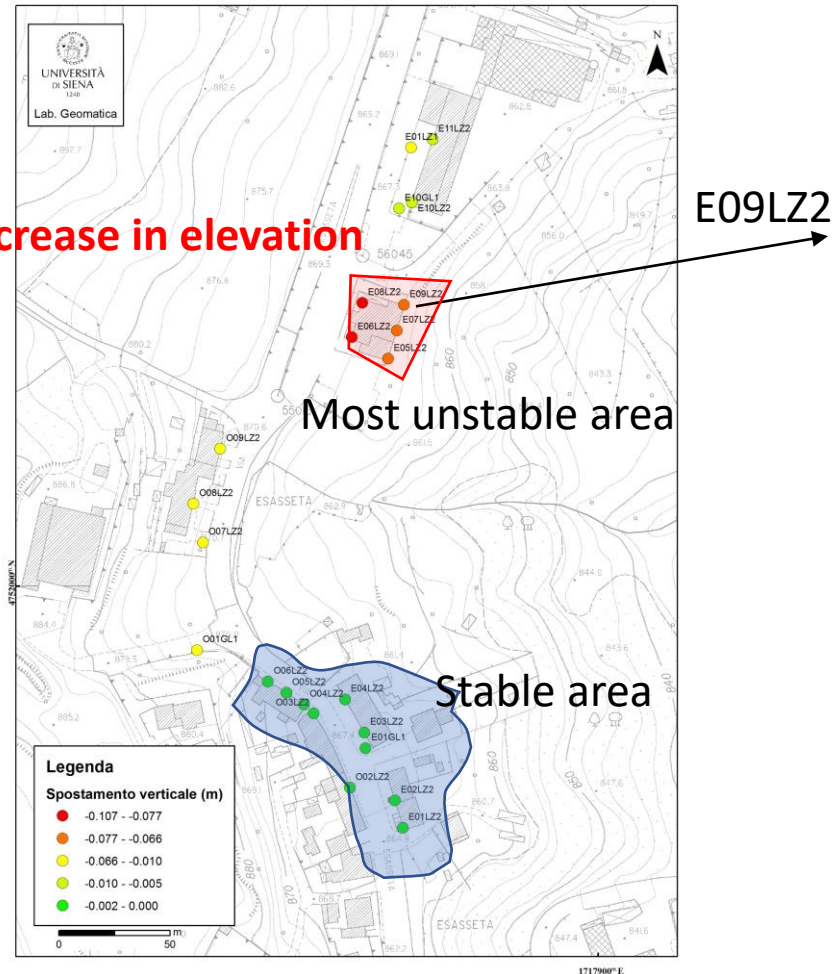
Non linear trend



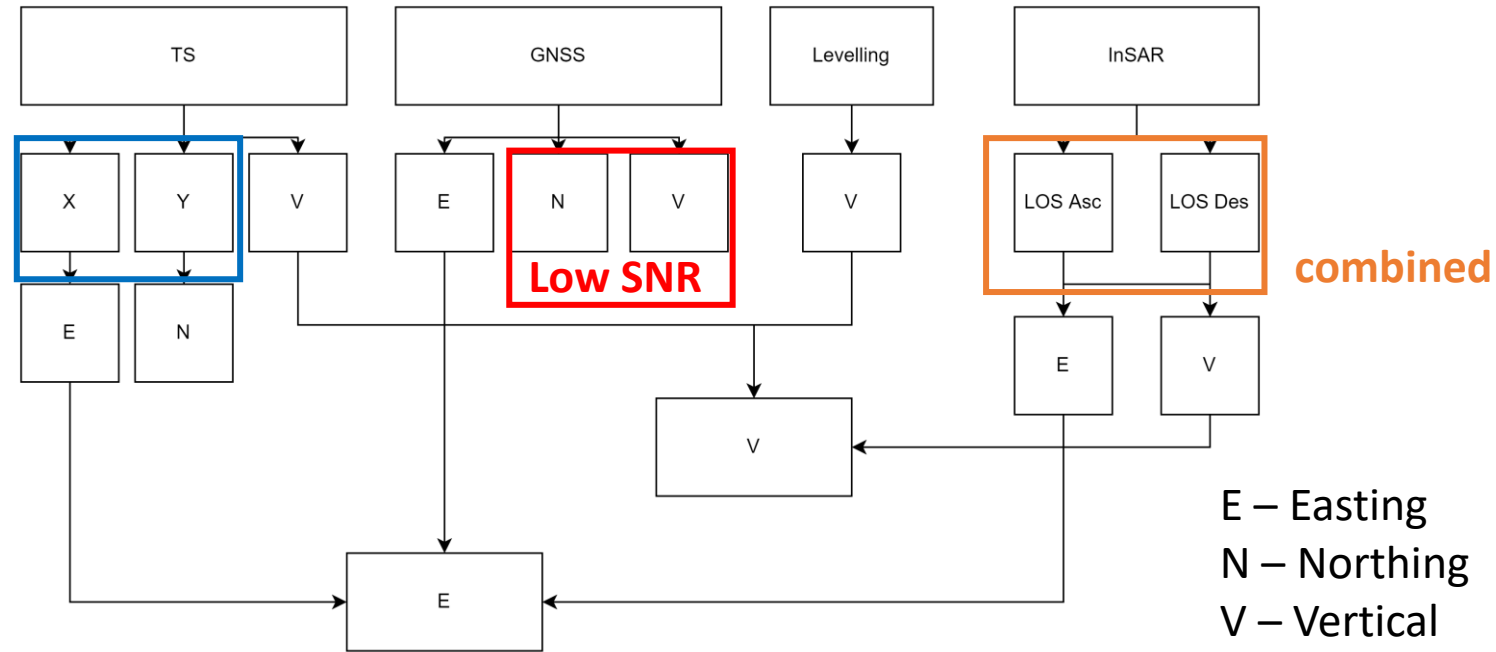
Levelling

Vertical displacement Map

Red colour Decrease in elevation

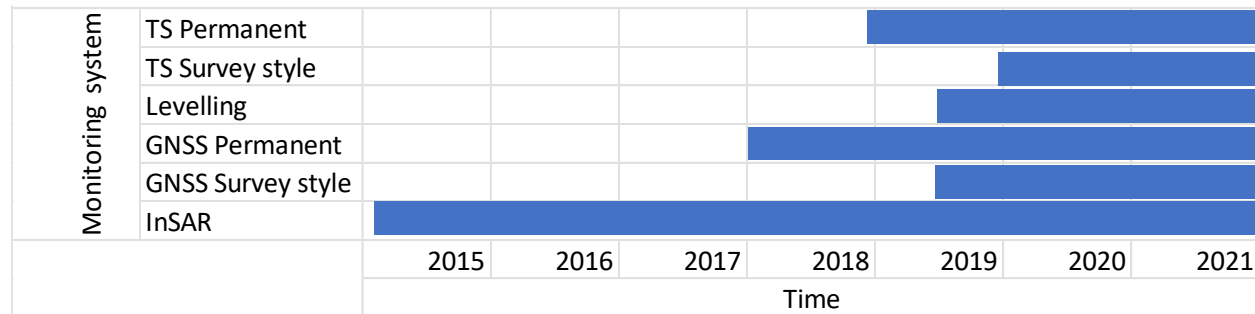


Rotation of axis

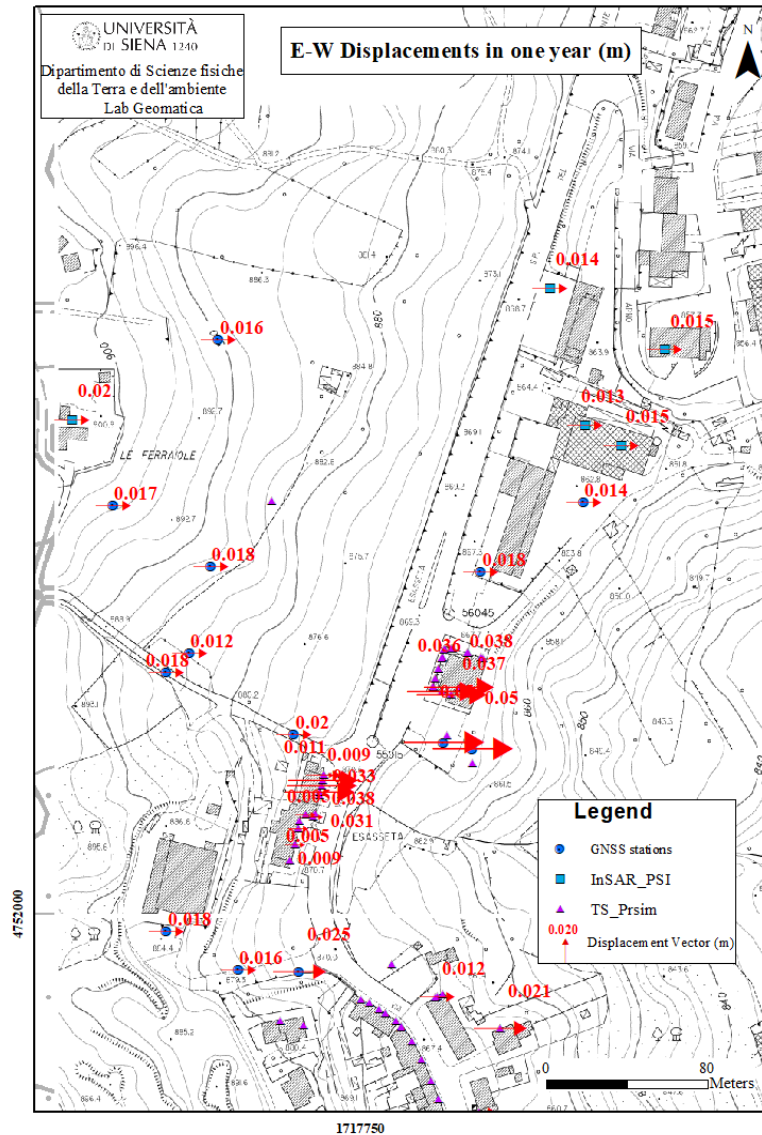


E – Easting
N – Northing
V – Vertical
LOS ASC – Line of Sight Ascending
LOS DSC – Line of Sight Descending

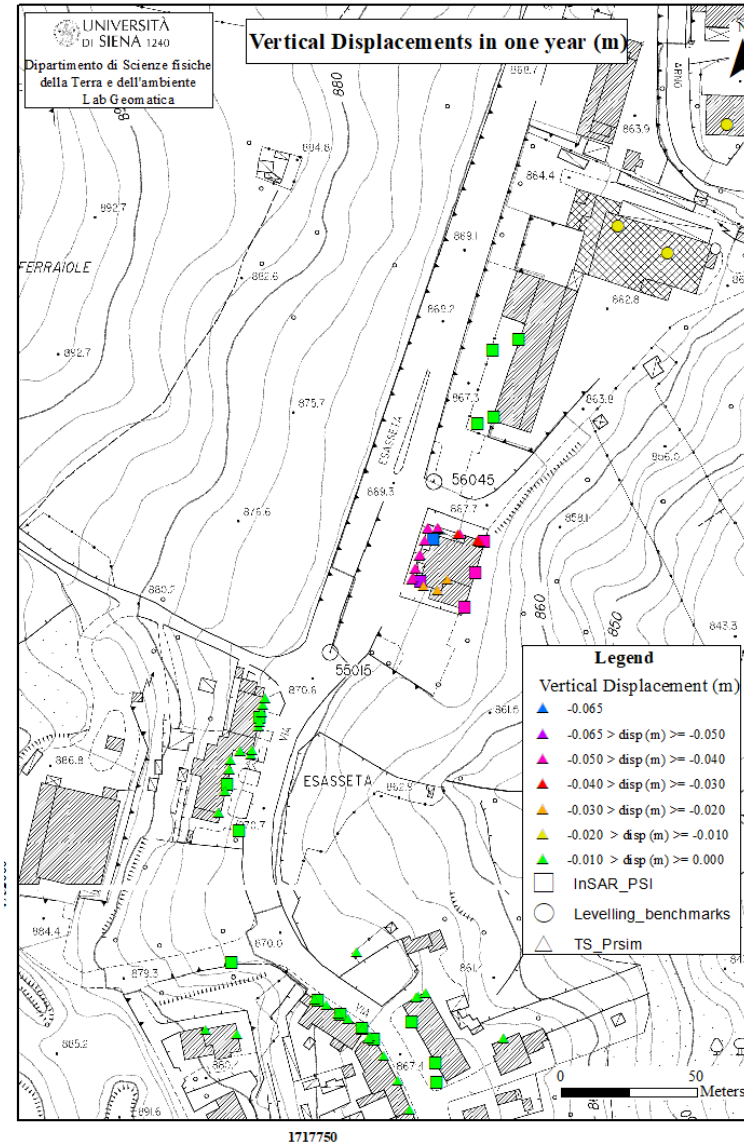
Temporal distribution was considered for integration



E-W Displacements



Vertical Displacements



- The integration of different measuring systems allowed us to recognize a ground displacement field coherent with the occurrence of an active landslide areas moving Eastward.
- Displacement is not uniform in space and time with the central area experiencing maximum displacement of rates
 - ca.5 cm in East and
 - ca. -7 cm Vertical in one year

Thank you!

