UNIVERSITÀ DEGLI STUDI FIRENZE

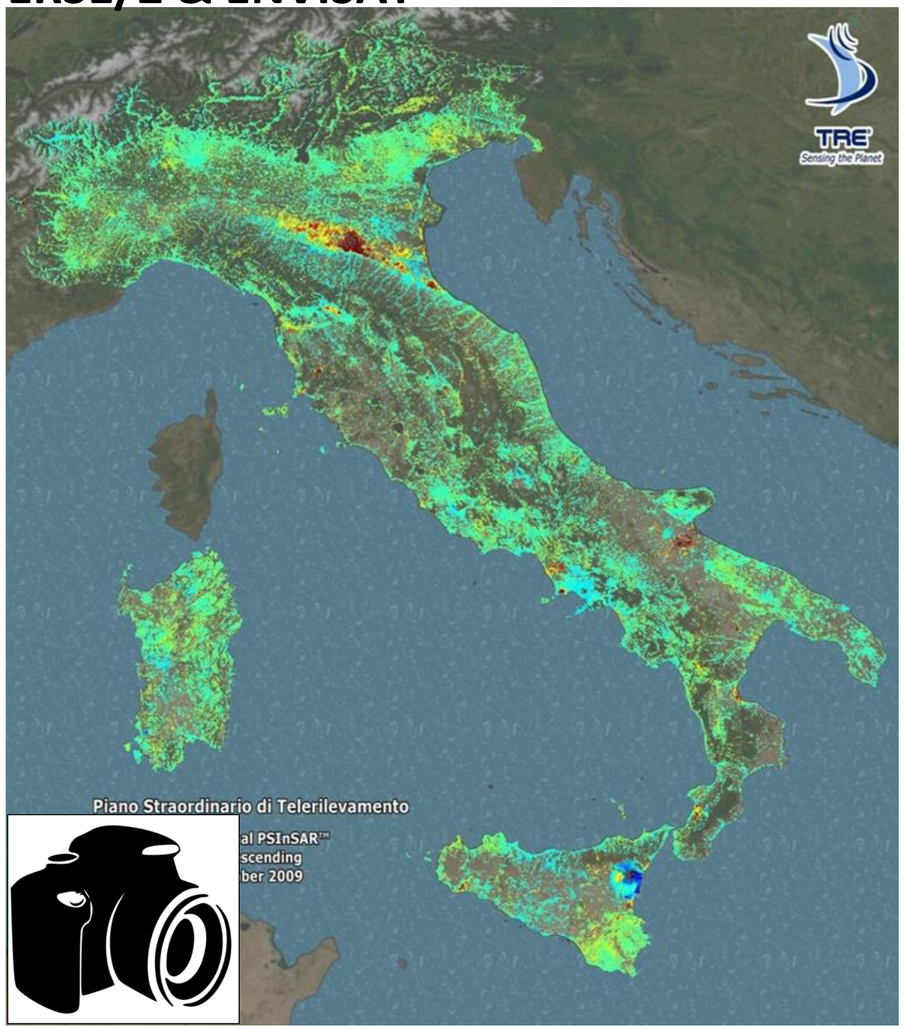
CENTRO PROTEZIONE CIVILE

Considerations on regional continuous Sentinel-1 monitoring services over three different regions

Del Soldato M., Confuorto P., Festa D., Bianchini S. & Raspini F.

From "picture" to "movie"

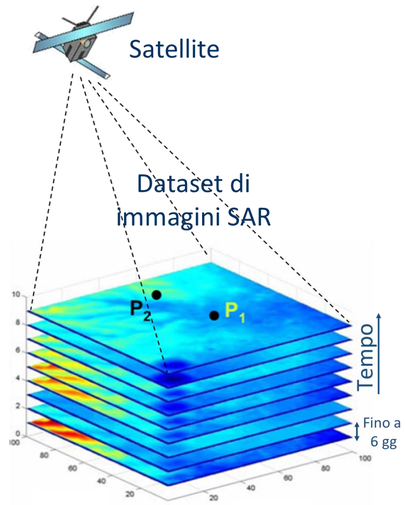
Costellazioni
ERS1/2 & ENVISAT

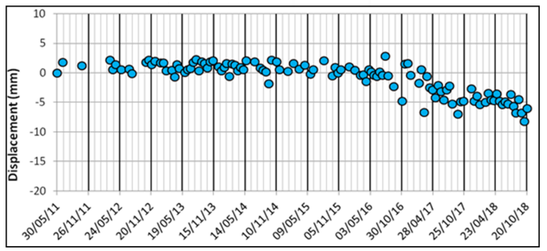


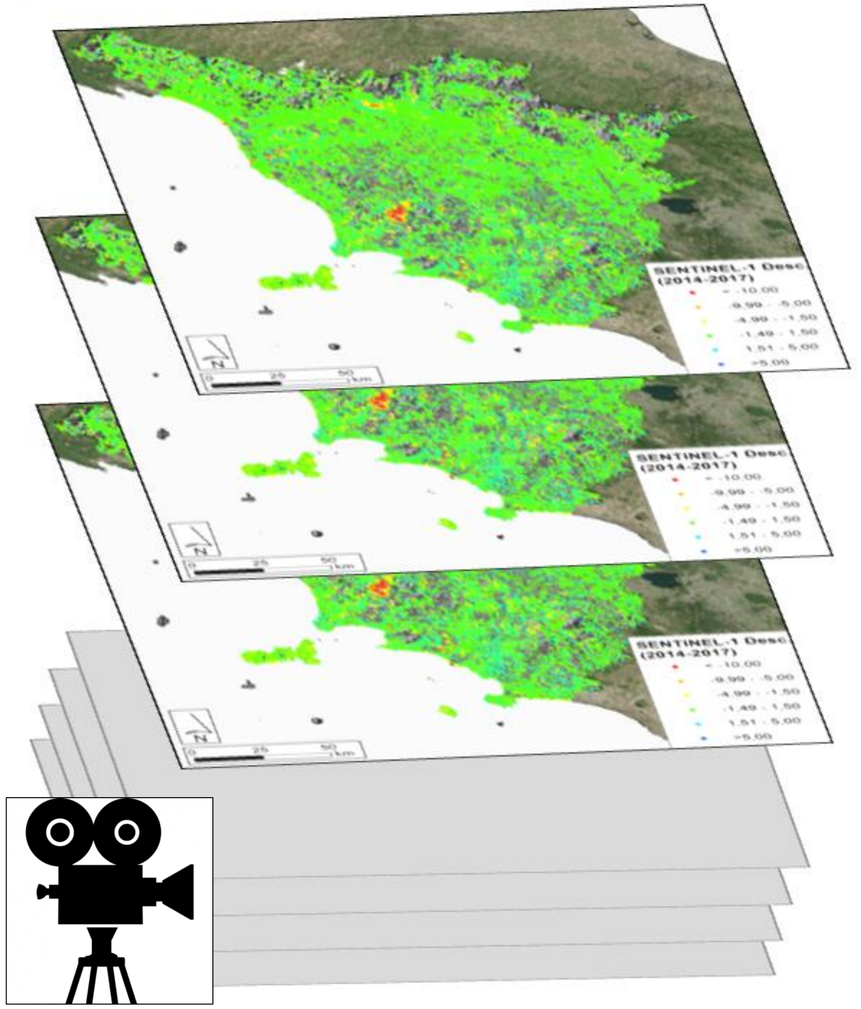
Tempo di rivisitazione: 35 giorni

From "picture"

to "movie"



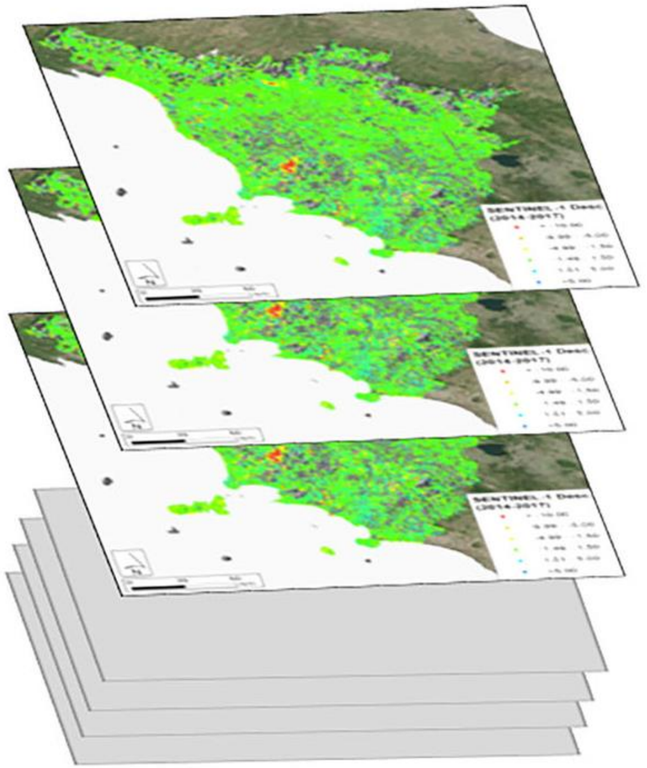




Tempo di rivisitazione: 6/12 giorni

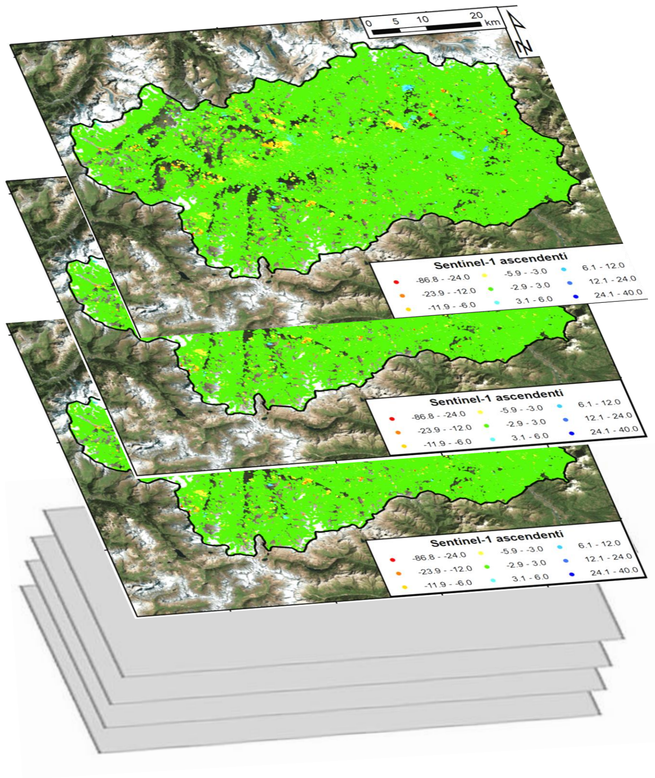
Continuous monitoring

Tuscany Region (central Italy)



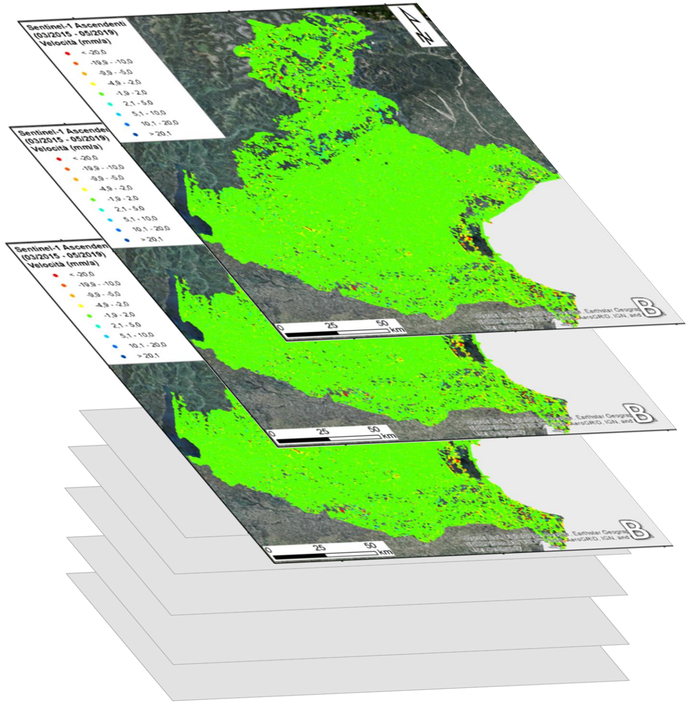
≈ 2.000.000 punti PS

Valle d'Aosta Region (North-West Italy)



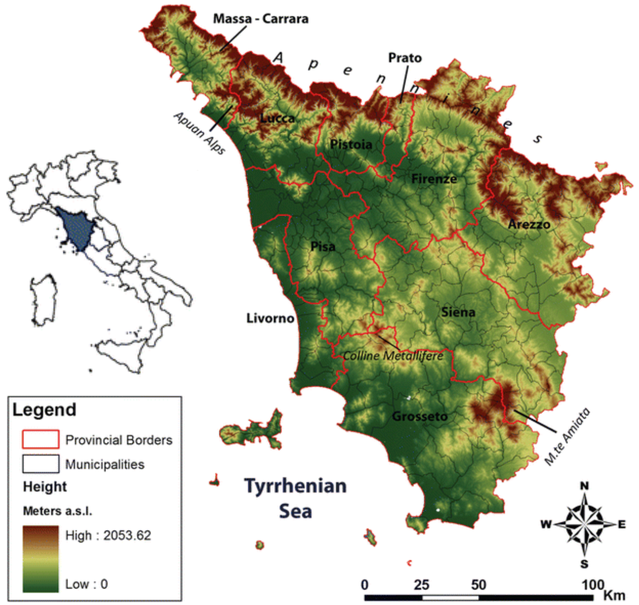
≈ 700.000 punti PS

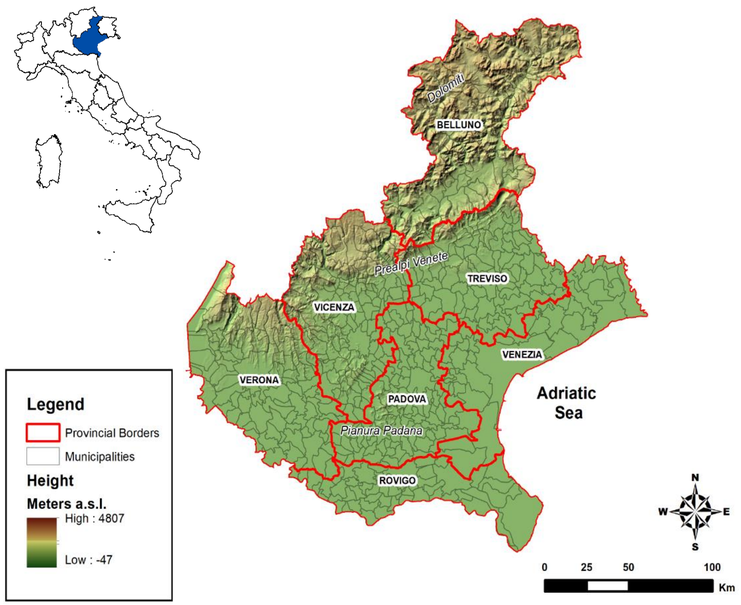
Veneto Region (North-East Italy)

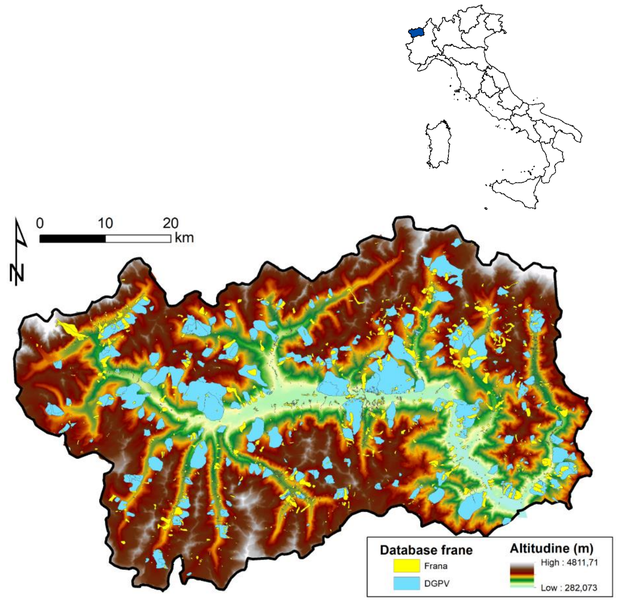


≈ 3.000.000 punti PS

Monitored areas features





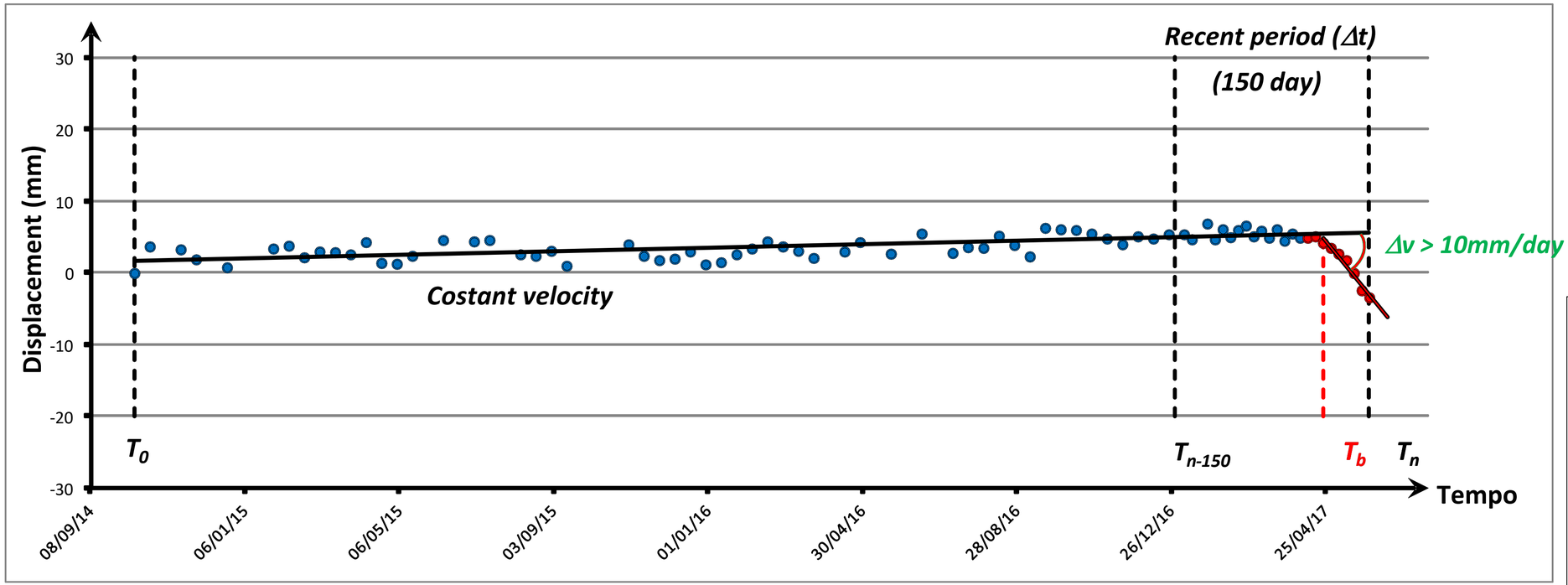


Complex landslides and big earth flows

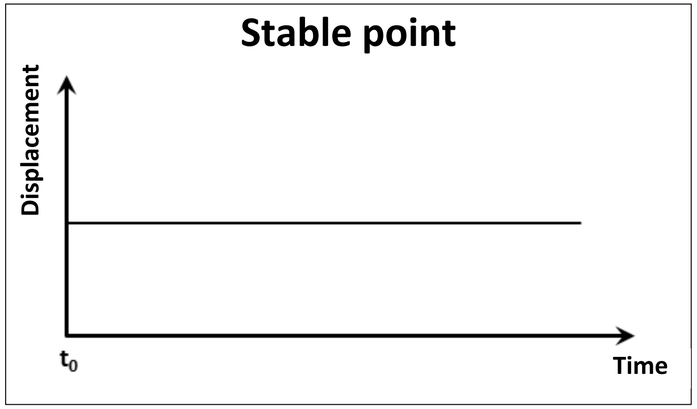
Complex landslides and big debris flows

Complex landslide, rock slide and DSGSD

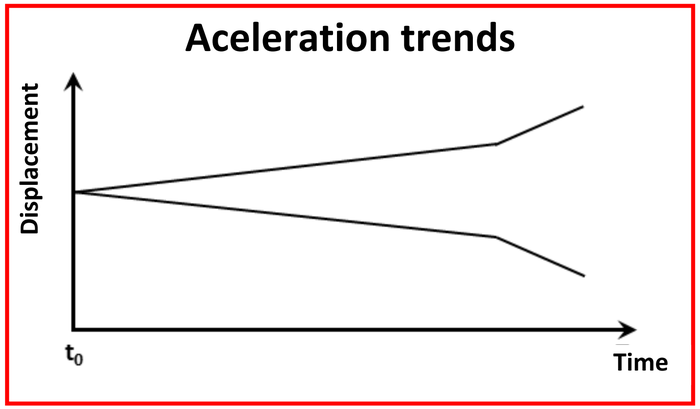
Anomalies - trend variation changes

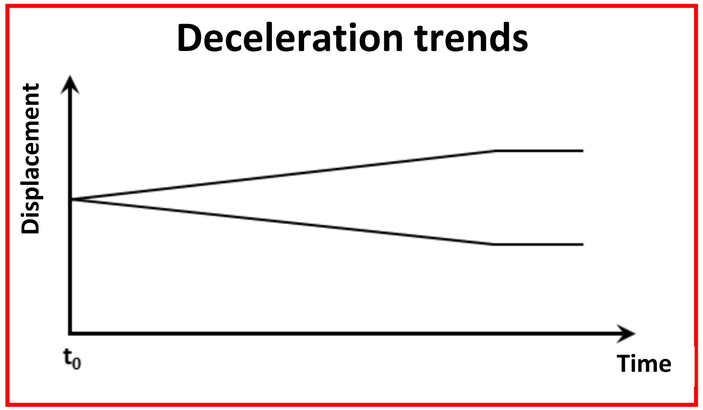


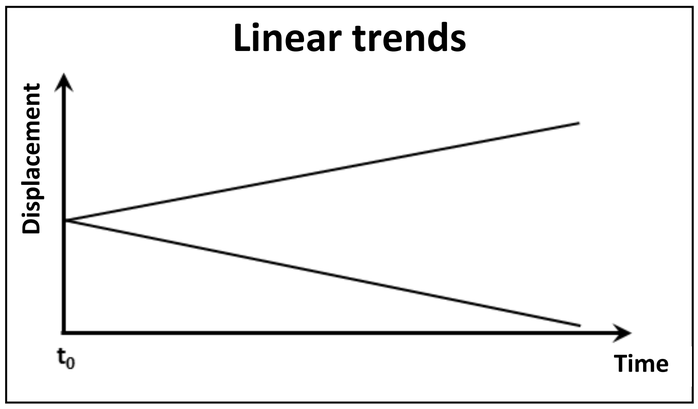
NO trend variation



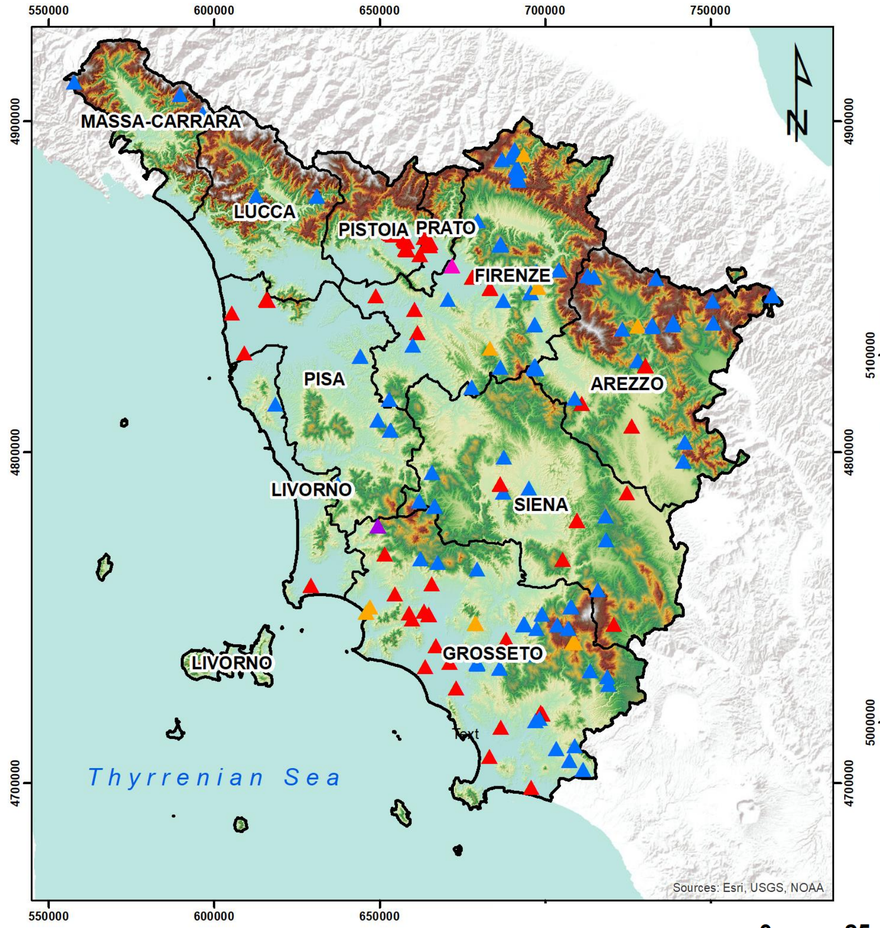
Trend variation

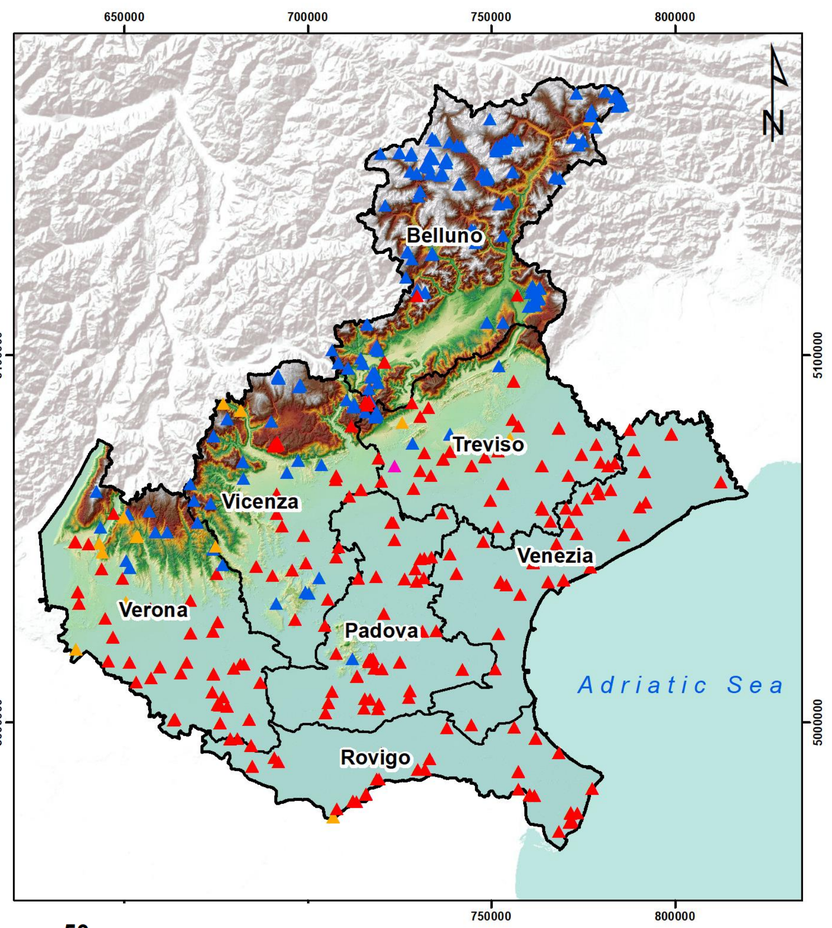


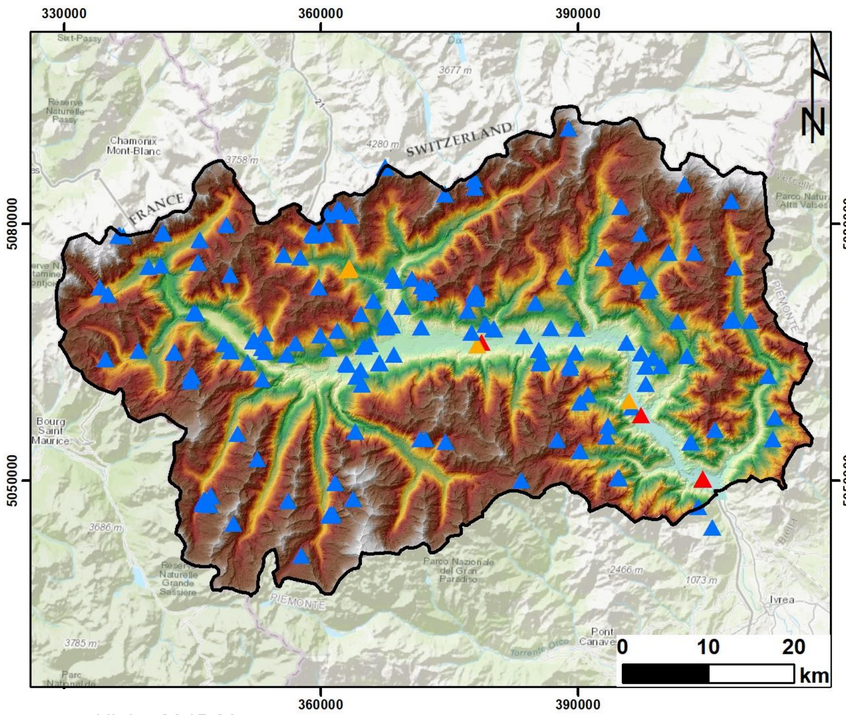




Anomalies spatial distribution







High : 2045,2

LLow : 0

0 25 50 km

High : 3334

LLow : 0

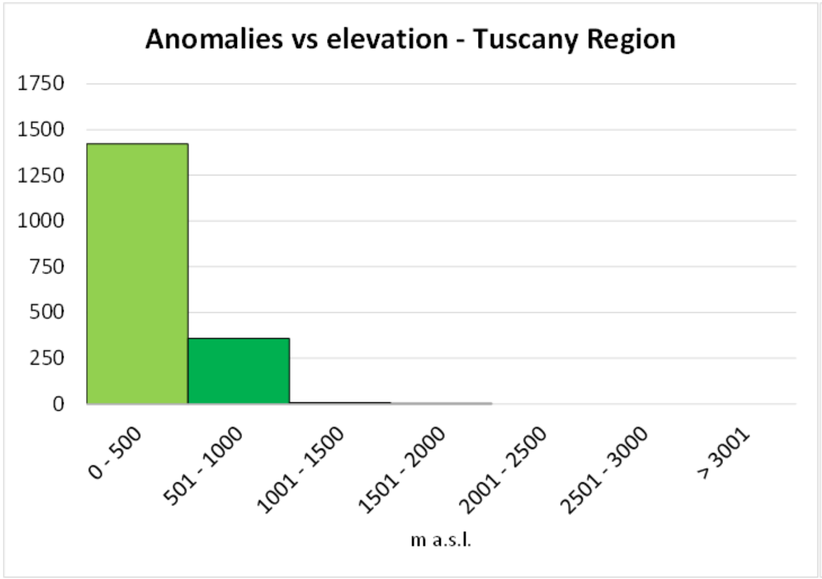
High : 2045,23

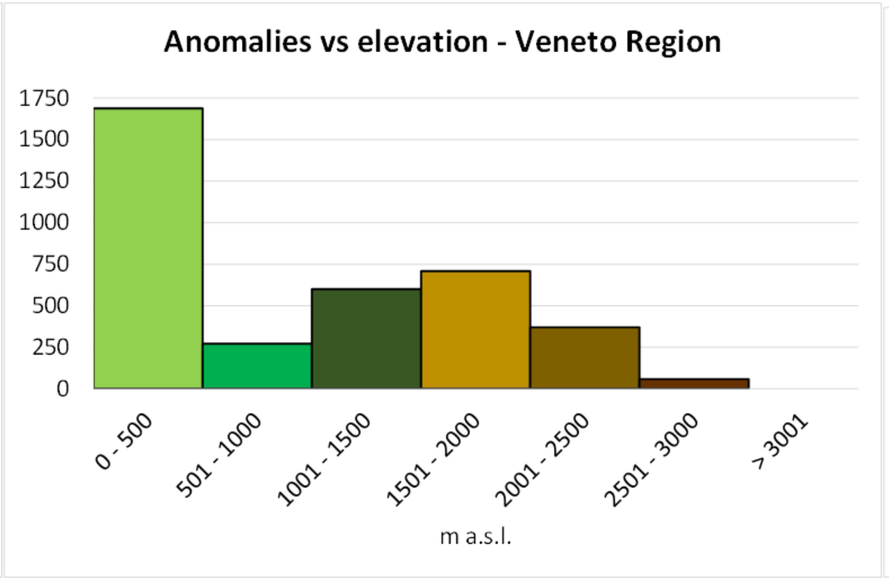
Low : 0

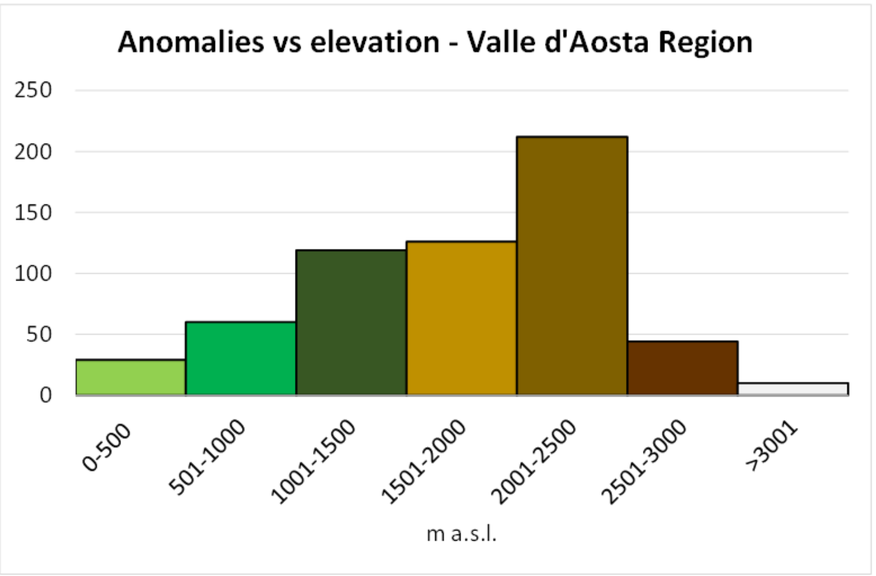
Temporal span of the anomalies

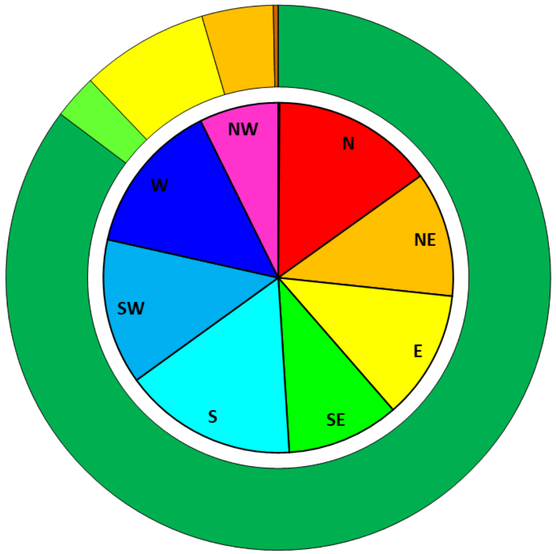
September 2019 - August 2020

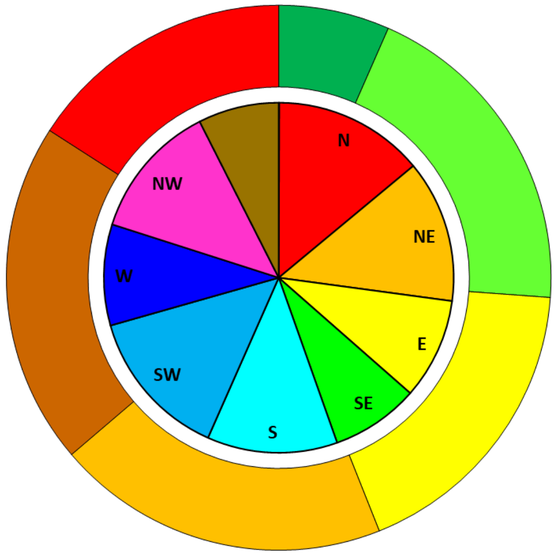
Anomalies spatial distribution

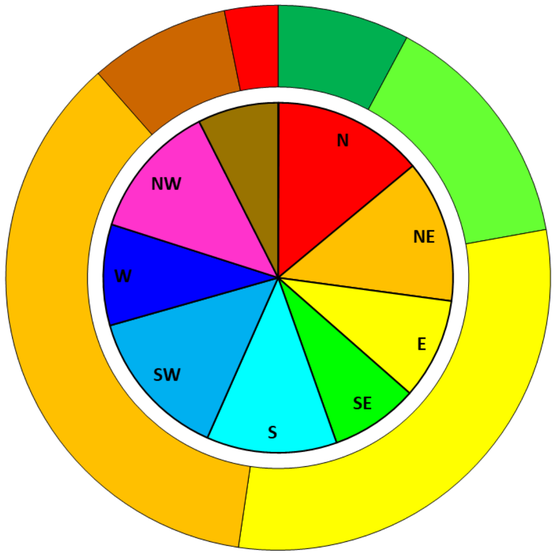






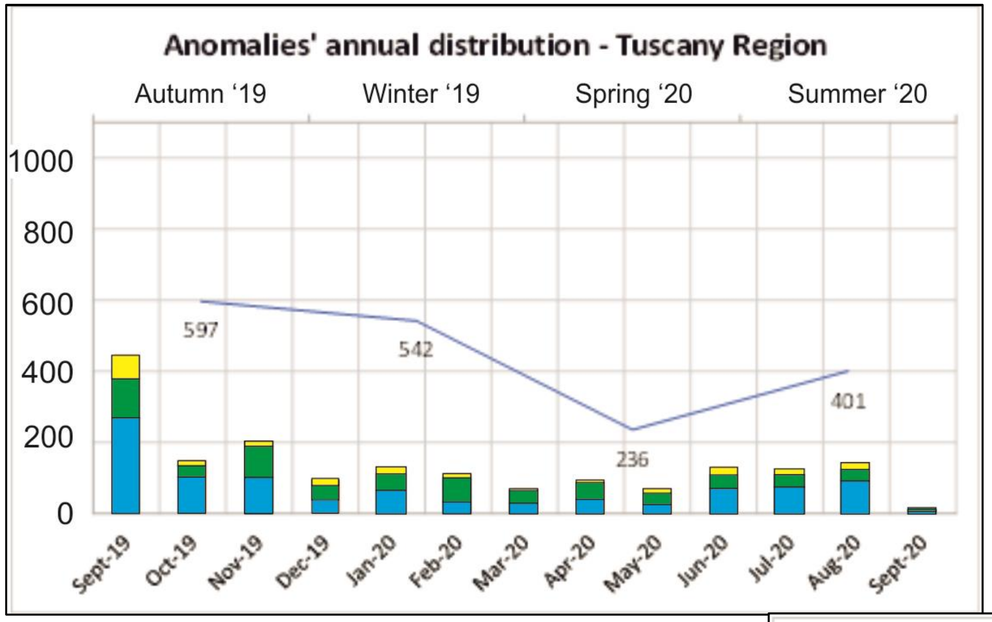


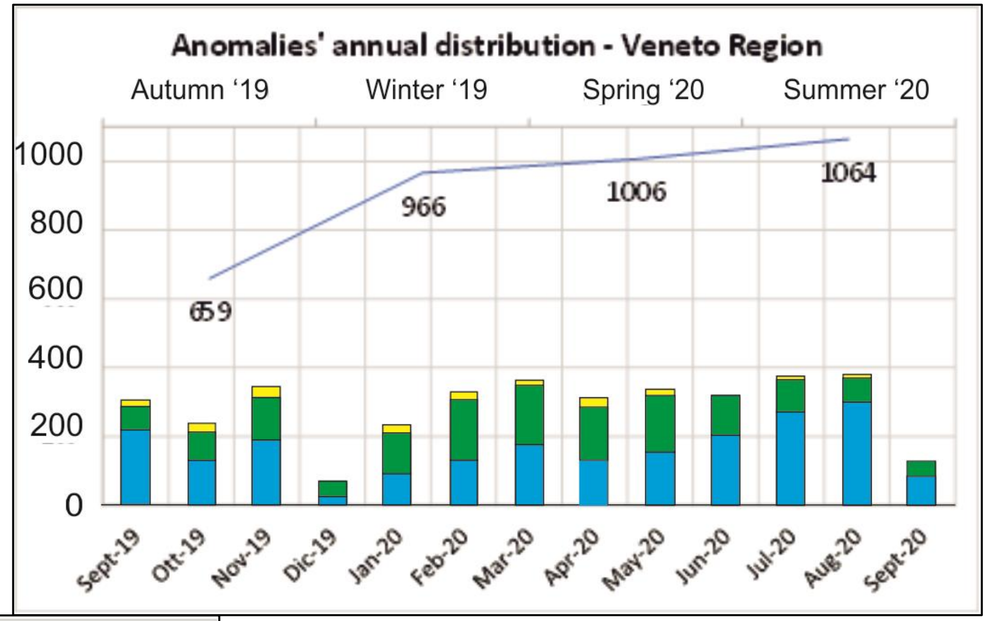


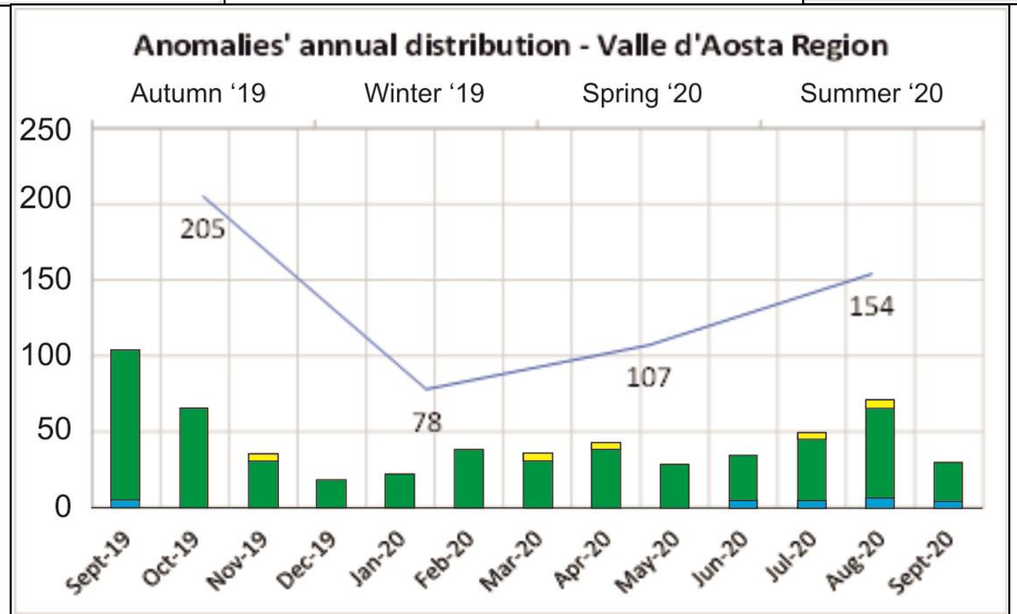


< 10° 10° - 20° 20° - 30° 30° - 40° 40° - 50° > 50°

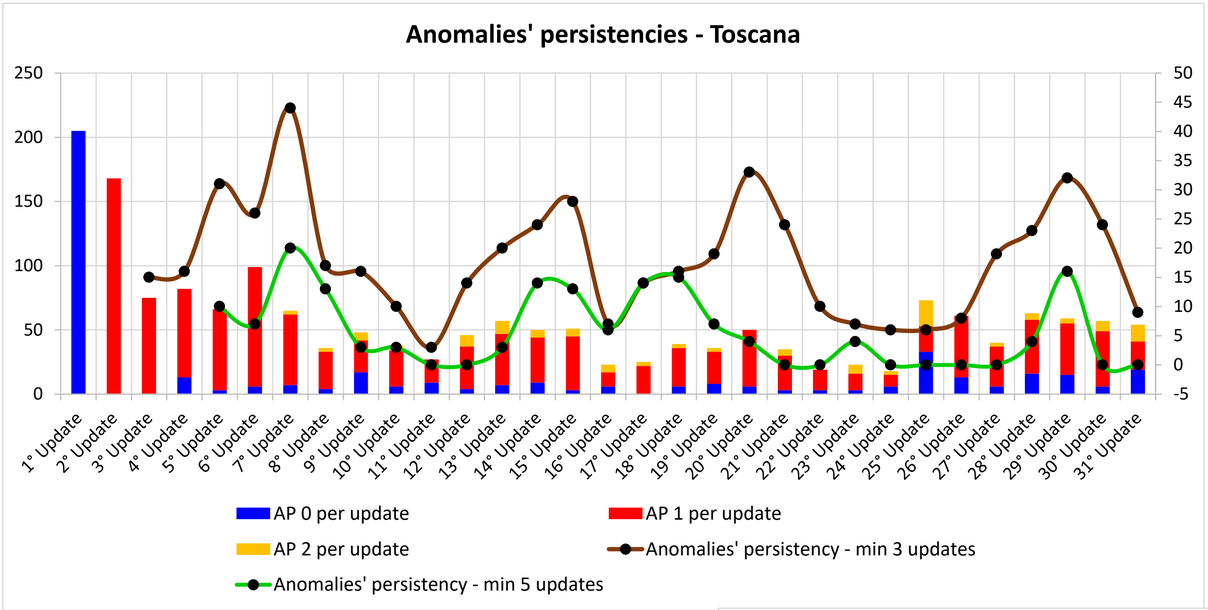
Anomalies temporal distribution

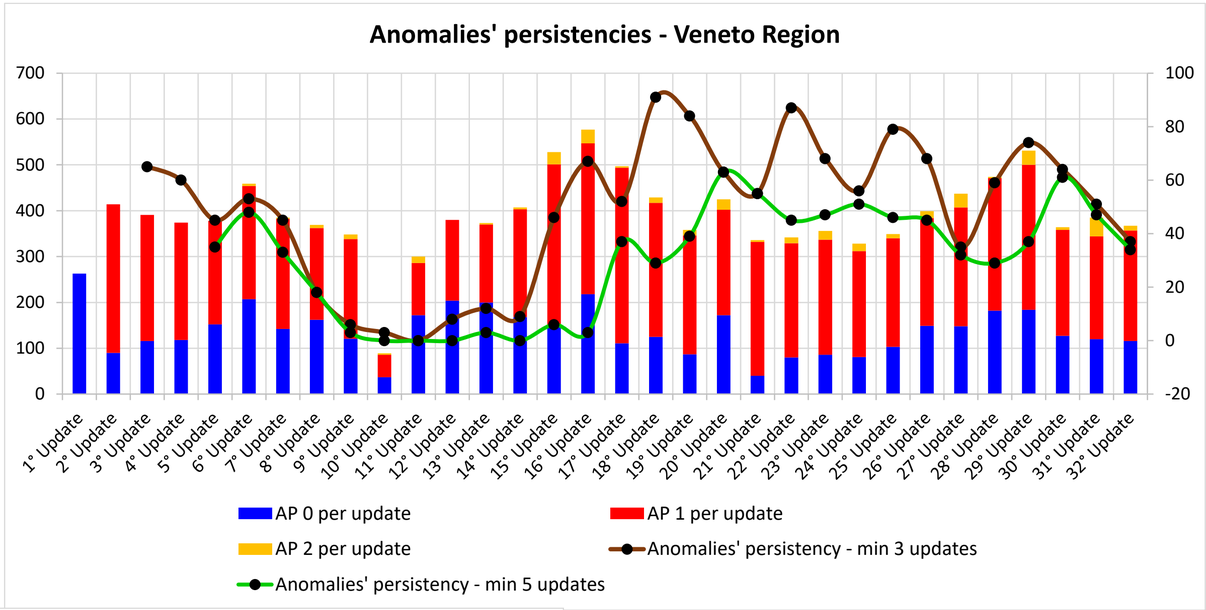


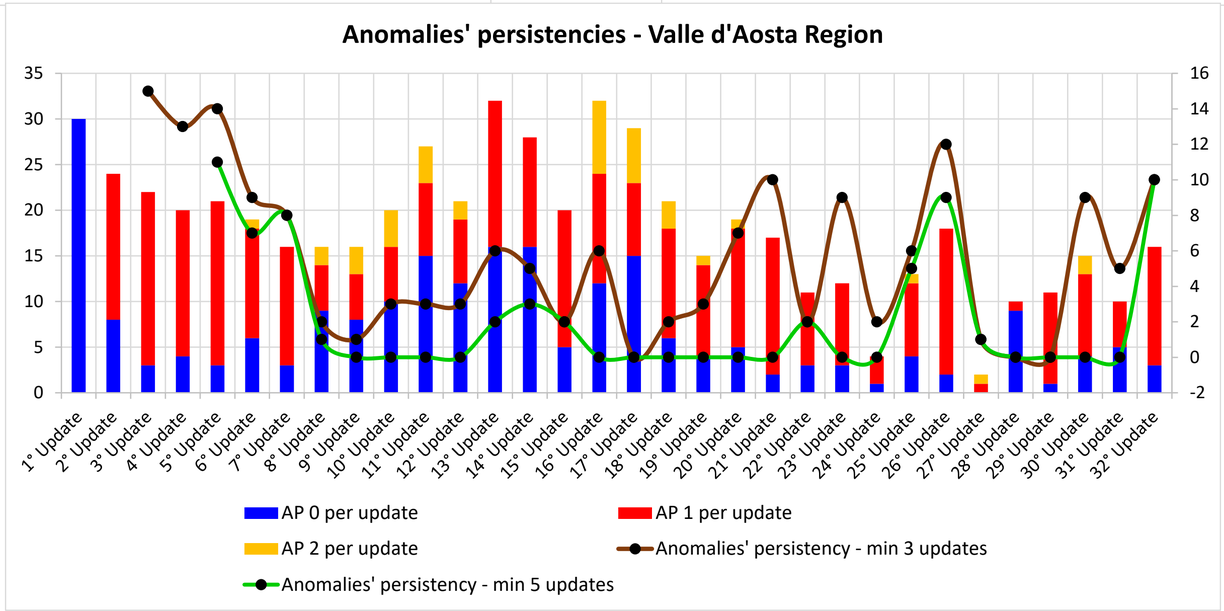




Anomalies persistencies

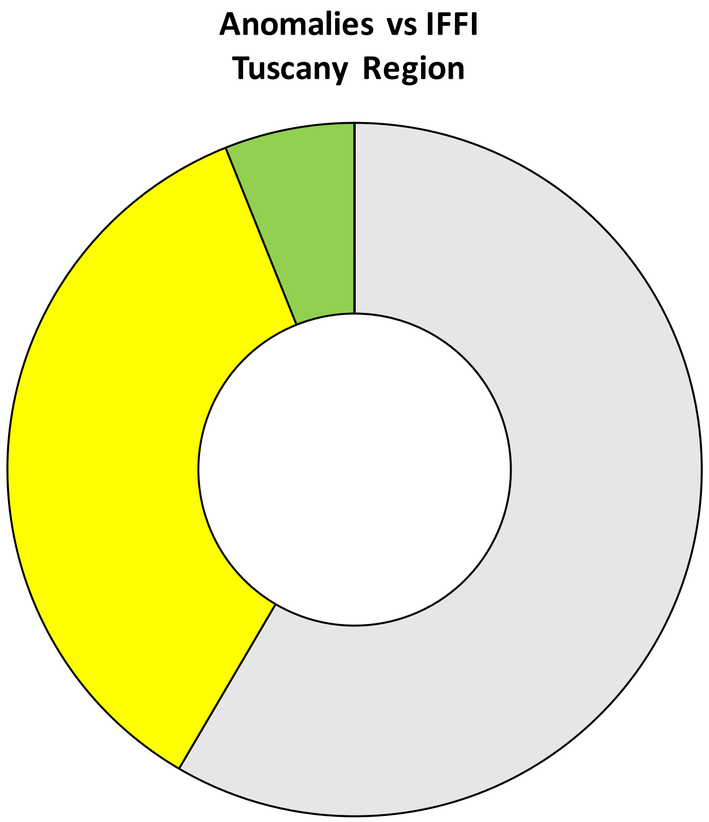




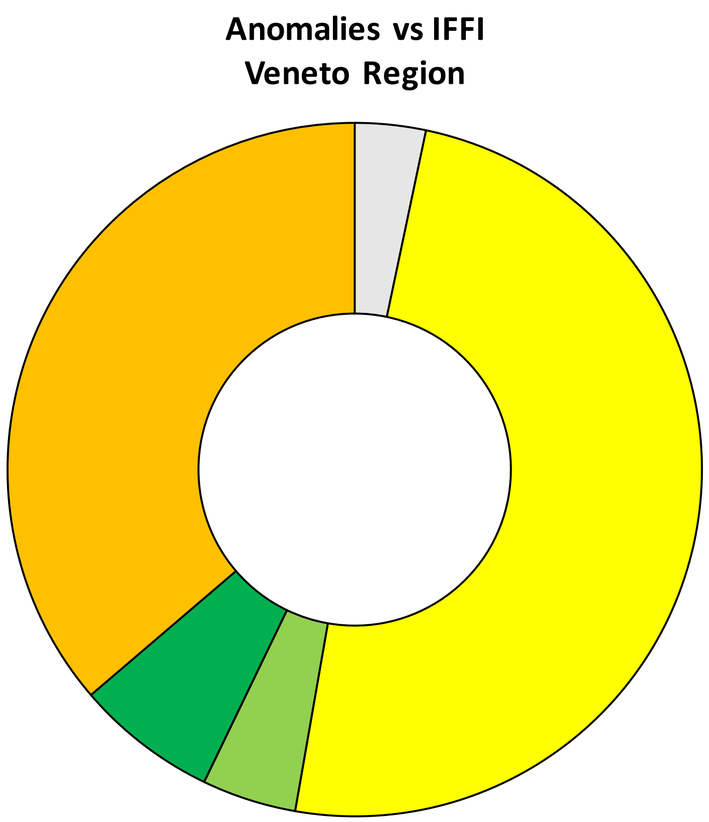


Anomalies vs landslide inventory

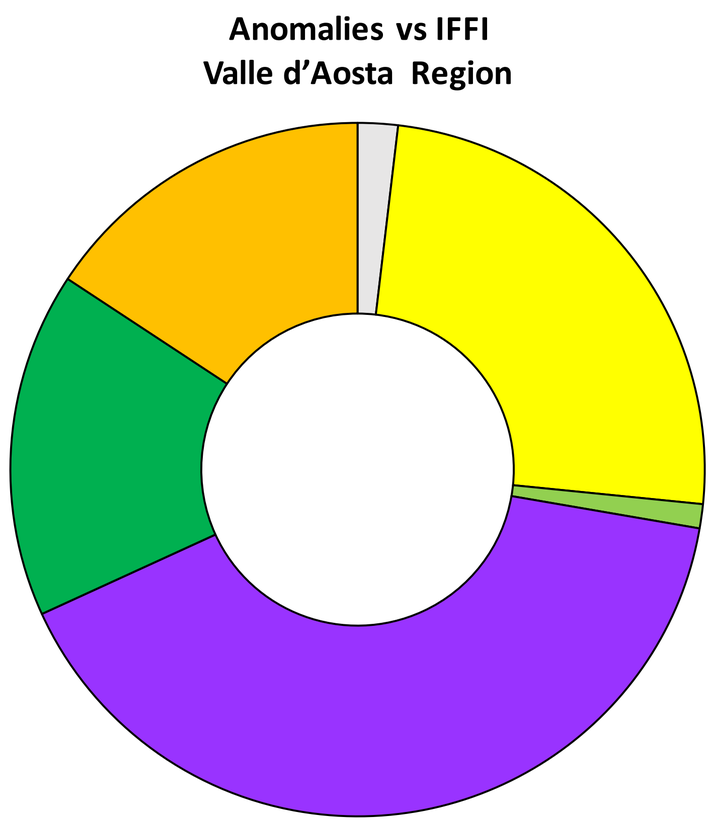
< 30 %



< 10 %



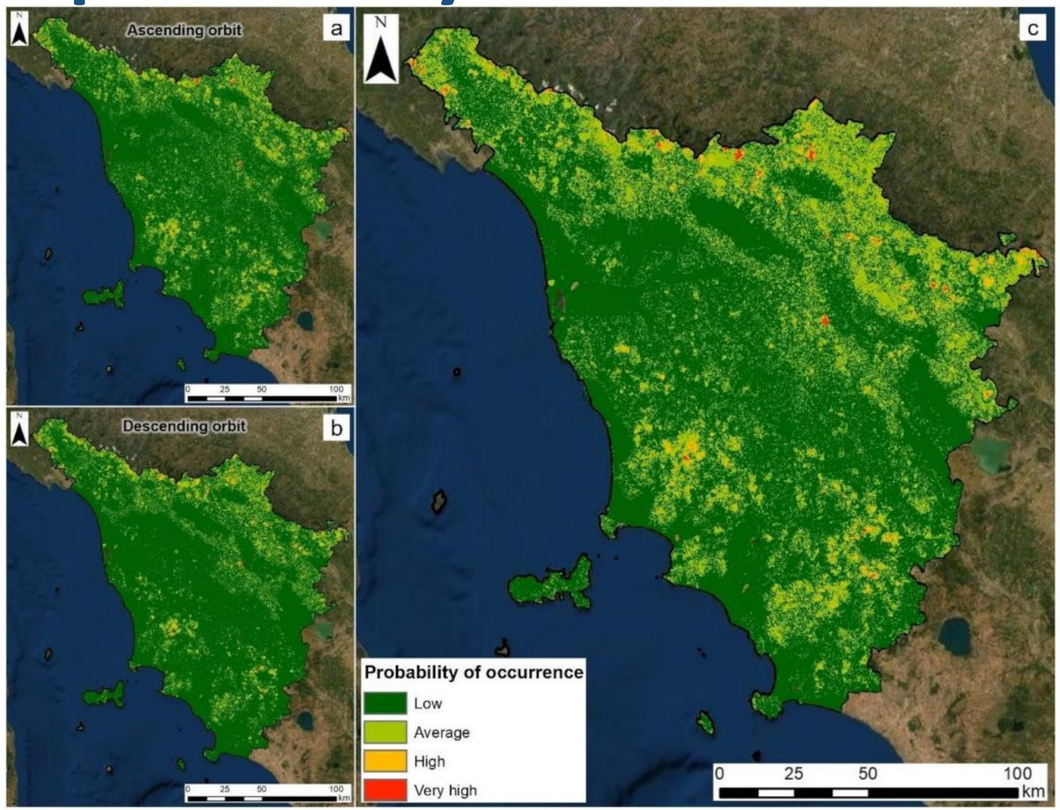
~ 55 %



N.d. Sliding Rapid flow Toppling Lateral expansion Slow flow Complex

What for..?

Anomalies
probability of occurrence



Check and update
of the landslide inventory

Machine Learning for Defining the Probability of Sentinel-1 Based Deformation Trend Changes Occurrence

by Pierluigi Confuorto * , Camilla Medici , Silvia Bianchini , Matteo Del Soldato , Ascanio Rosi , Samuele Segoni and Nicola Casagli

Final remarks

Statistical and critical analysis on the 1-year of InSAR continuous monitoring and trend change detection (i.e. anomalies) over Tuscany, Veneto and Valle d'Aosta Regions

- The spatial consistency shows as the SI and S anomalies are distributed according to the morphology (e.g. height, and slope)
- The number and temporal distribution exhibits different trends for each Region related to the triggering factors (e.g. rainfall or withdrawl)
- Intersecion with existing landslide inventories show as several SI anomalies are recorded out from the mapped areas
- The involved anomalies were purified to which classified as R or ND, thus noise or not determined. ND and R mainly refers to determined classes of CLC such as coniferous or vegetated areas
- The results are useful for the creation of probability of occurrences maps and for better understand the territories and their active ground deformations

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Thanks for the attention

International Journal of Applied Earth Observation and Geoinformation

Sentinel-1-based monitoring services at regional scale in Italy: State of the art and main findings

Pierluigi Confuorto [a,*], Matteo Del Soldato [a], Lorenzo Solari [b], Davide Festa [a], Silvia Bianchini [a], Federico Raspini [a], Nicola Casagli [a]

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