The use of the EPOS Data Portal in seismotectonic studies: applications to Southern Italy

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EPOS EUROPEANPLATEOBSERVINGSYSTEM www.epos-eu.org

Introduction

OBJECTIVE

- Define the spatio-temporal distribution of instrumental seismicity in Southern Italy and the relationship with mapped seismogenic faults.

SCIENTIFIC IMPACT

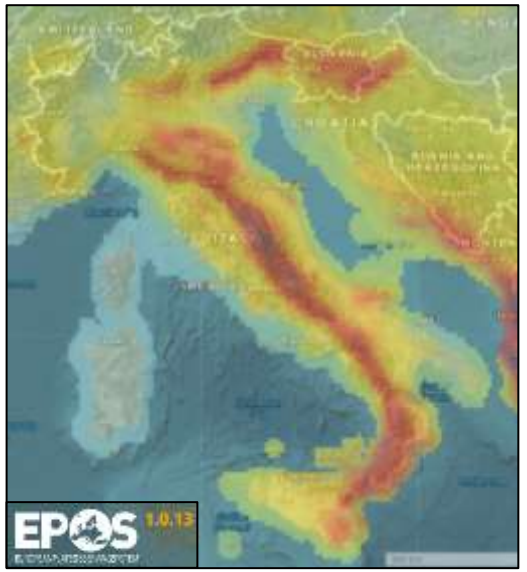
- Combination seismological and geological data is necessary for a proper assessment of seismic hazard.

IMPACT ON SOCIETY

- Seismic hazard assessment is fundamental to reduce the impact of earthquakes on human activities and to prevent human/natural disasters (e.g. Irpinia 1980).

Irpinia 1980 earthquake

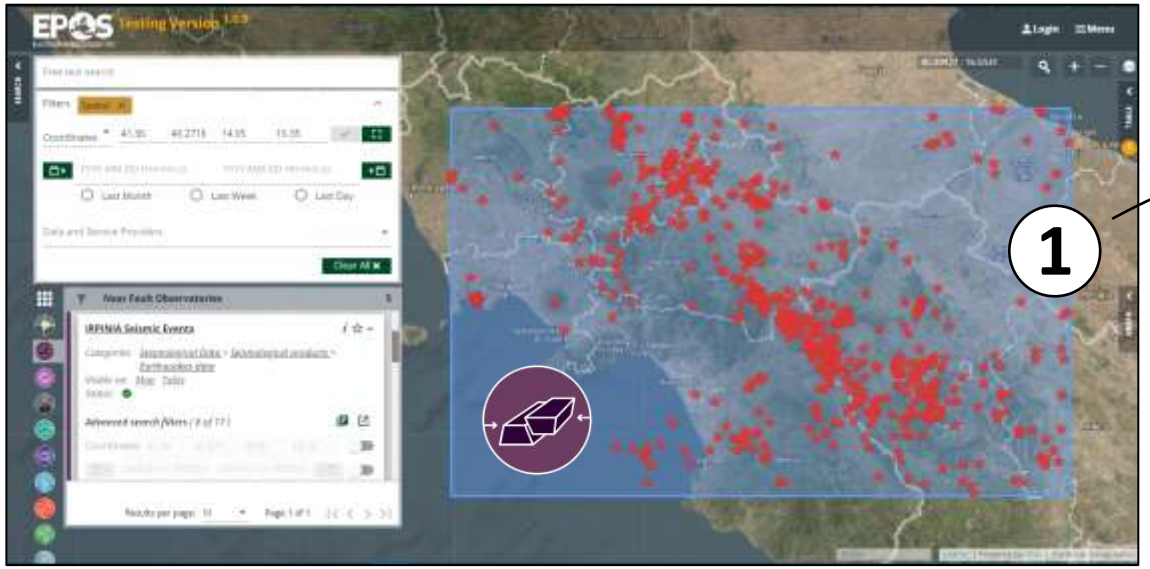
European Seismic Hazard Model 2020



EPOS DATA PORTAL
LIVE
DEMOSTRATION

SCIENTIFIC ANALYSIS USING DATA AVAILABLE IN THE PORTAL

SCIENTIFIC ANALYSIS – data download & management



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2

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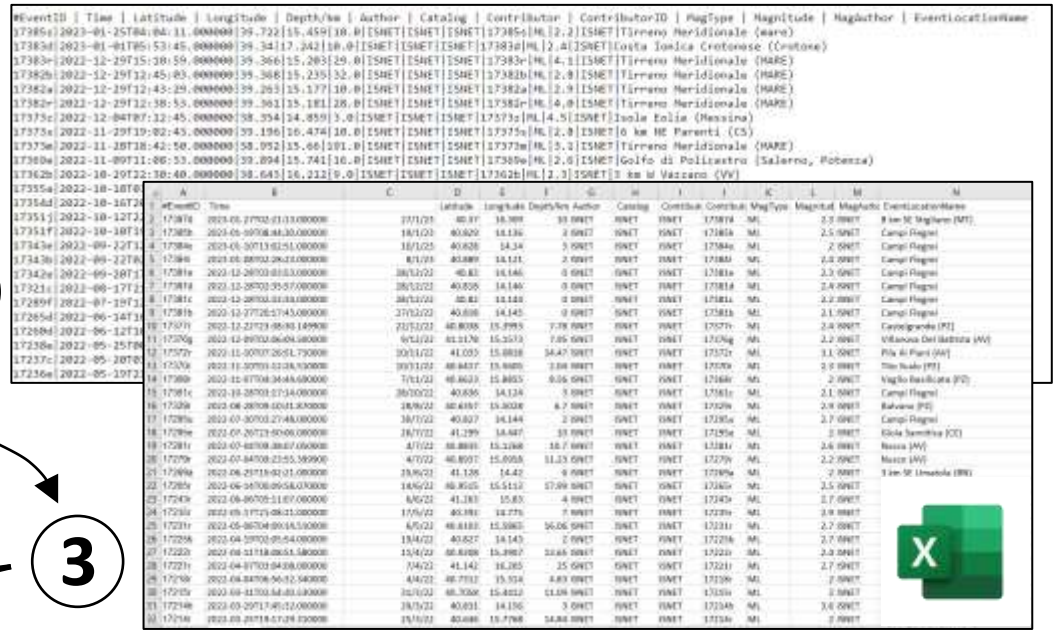
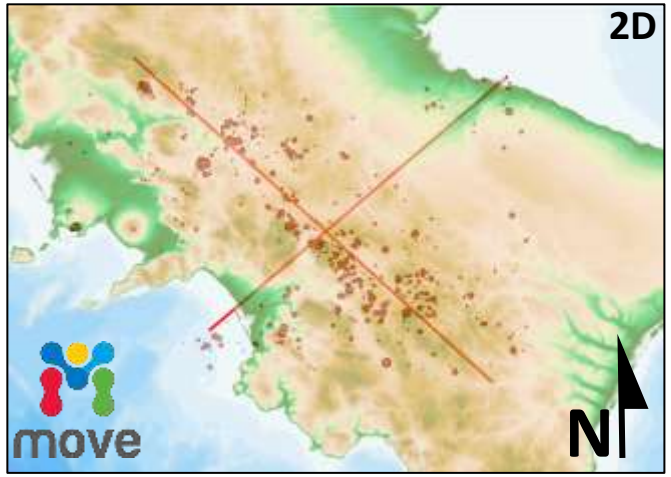
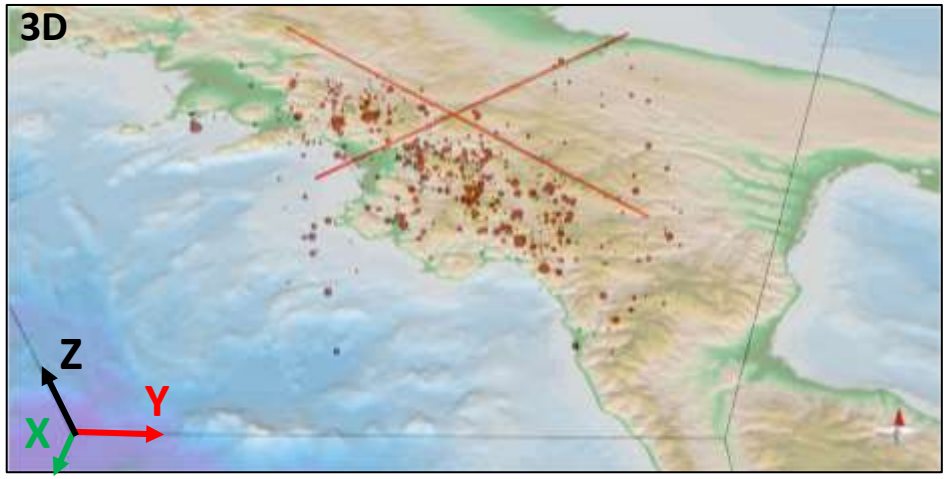




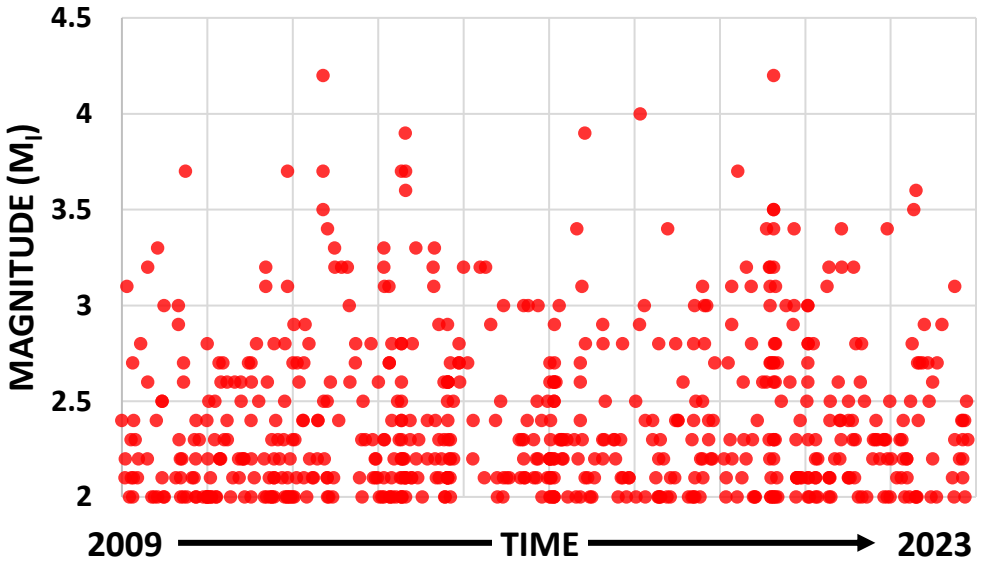


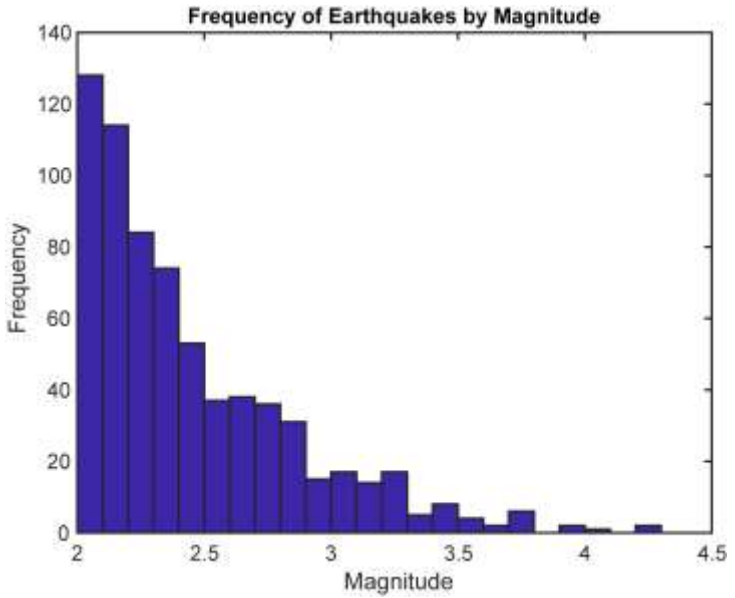
Time necessary:
5 minutes

SCIENTIFIC ANALYSIS – seismicity of the last decade

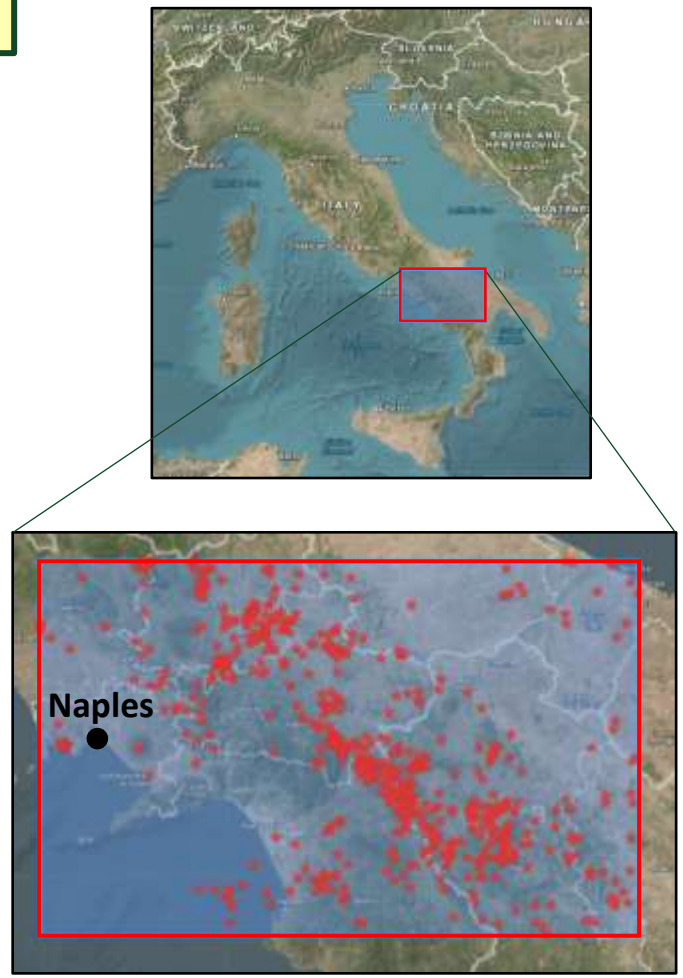
Scientific question:
How is instrumental seismicity distributed in the Southern Apennines through time?

Earthquakes trend in the last decade – Irpinia region





Irpinia region

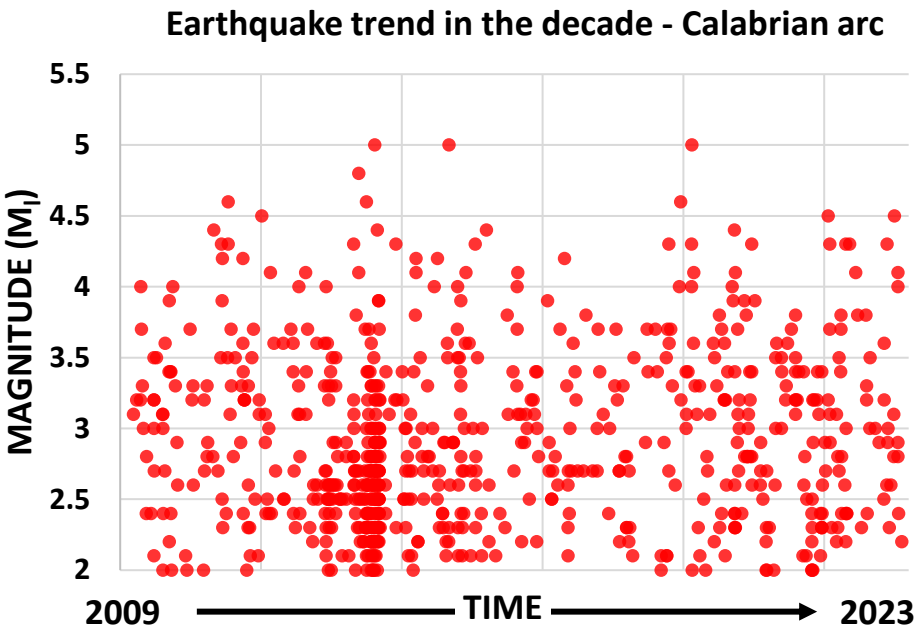


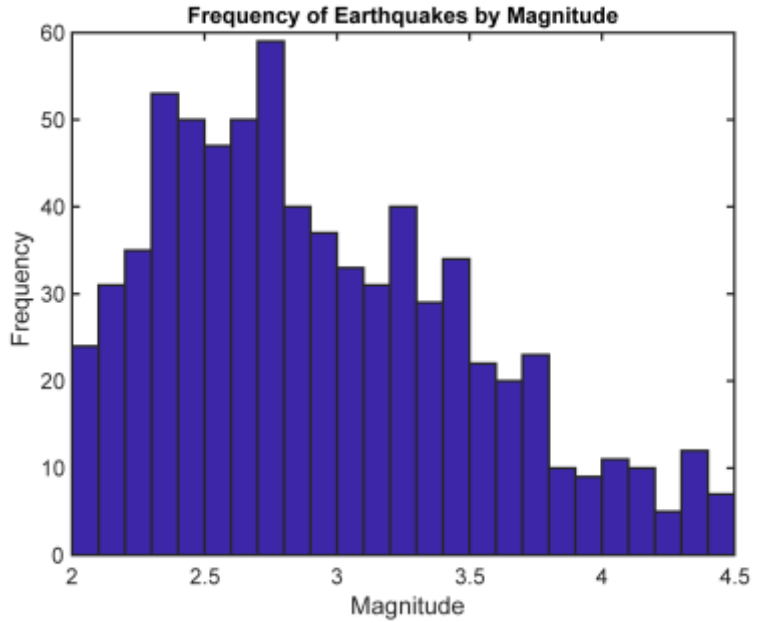
NEAR FAULT OBSERVATORIES

IRPINIA Seismic Events

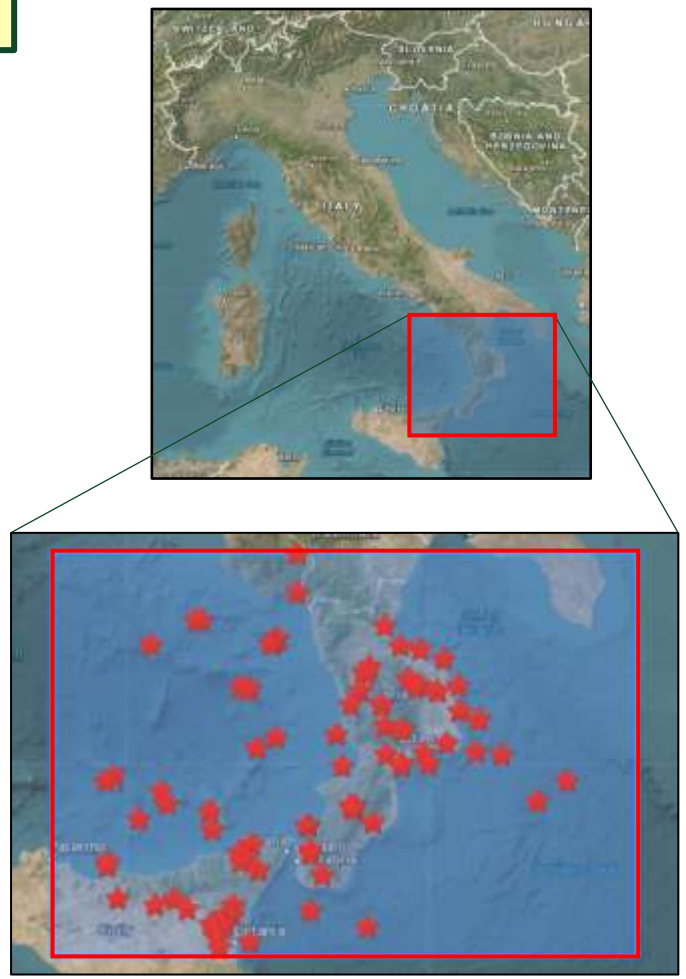
SCIENTIFIC ANALYSIS – seismicity of the last decade

Scientific question:
How is instrumental seismicity distributed in the Southern Apennines through time?





Calabrian arc

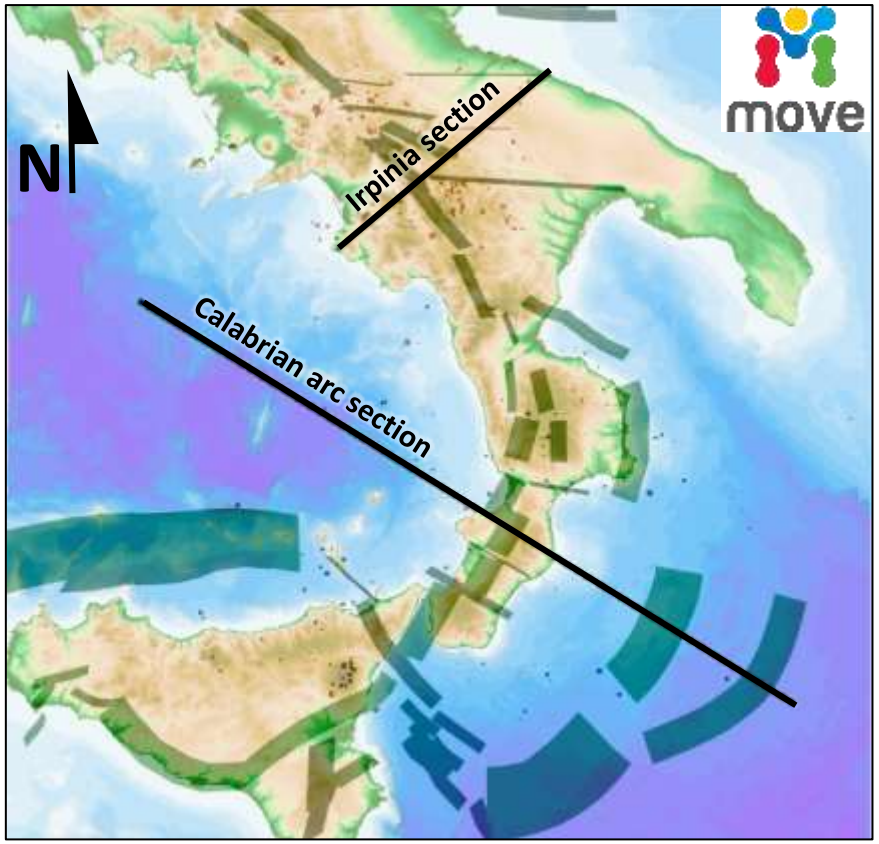


NEAR FAULT OBSERVATORIES

IRPINIA Seismic Events

SCIENTIFIC ANALYSIS – seismogenic faults and earthquakes

3D WORKSPACE CONSTRUCTION



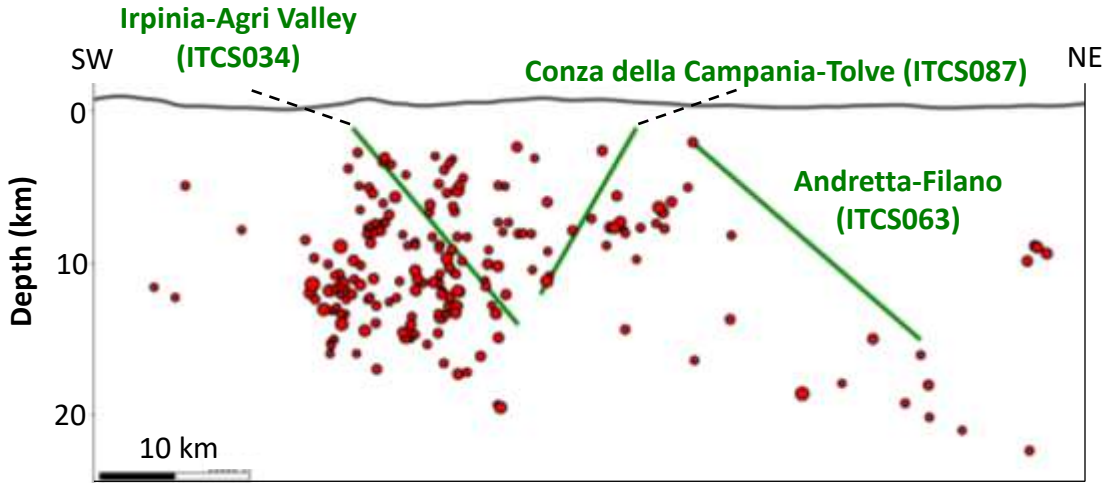
NEAR FAULT OBSERVATORIES + **SEISMOLOGY**

IRPINIA Seismic Events

European Fault Source Model 2020

Analysis made at: SISMOLAB 3D

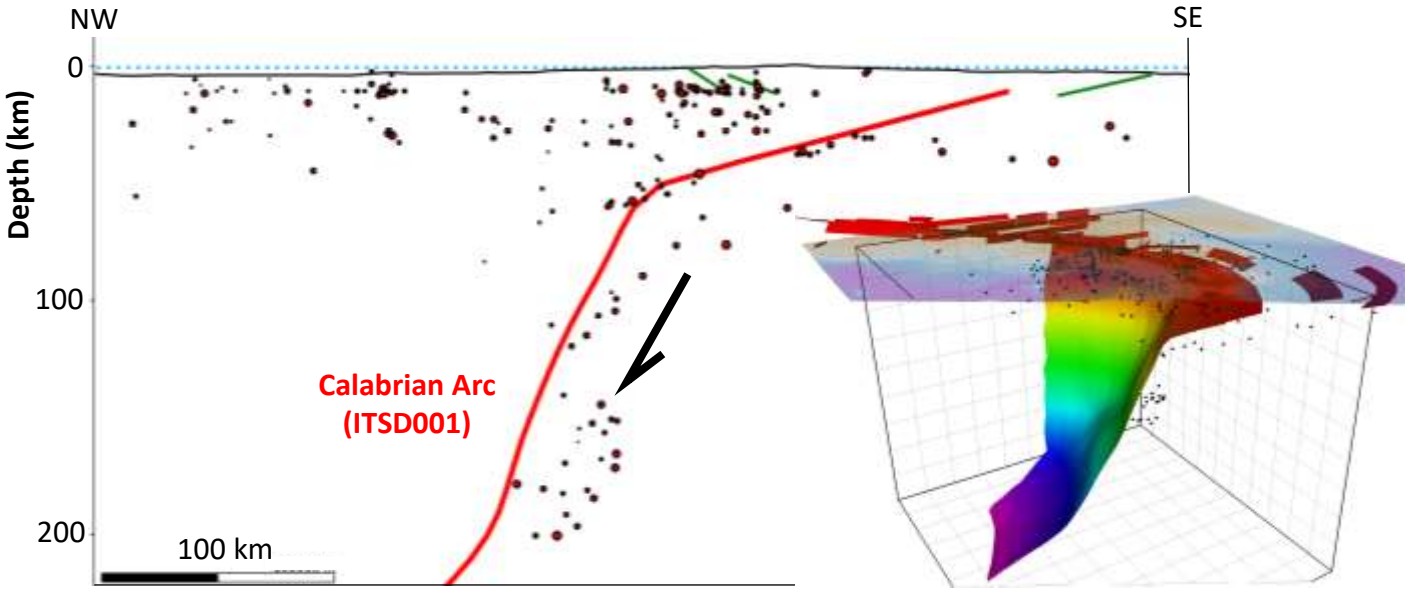
SCIENTIFIC ANALYSIS – seismogenic faults and earthquakes

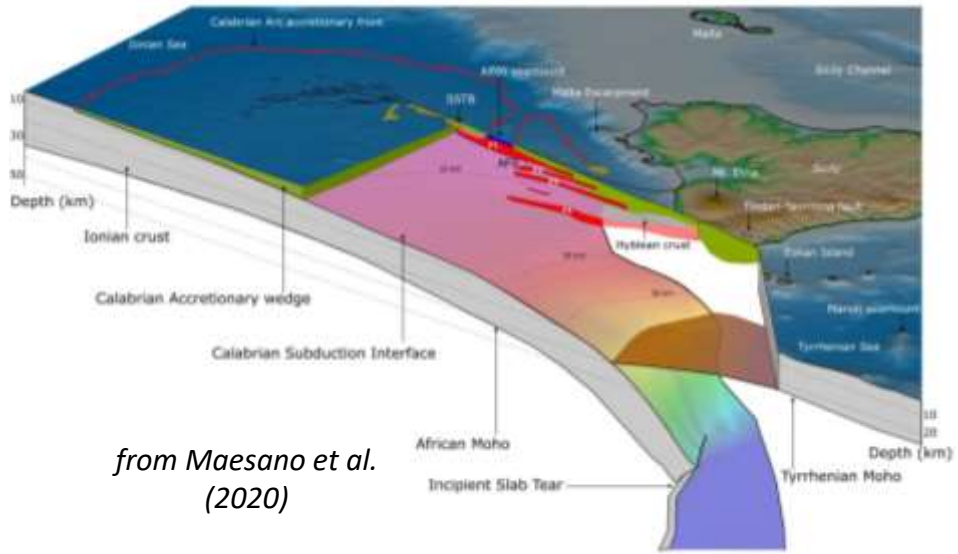


S.Q.: How is seismicity distributed at depth and which are the relation with mapped seismogenic structures?

Irpinia section

- Seismicity in the **first 20 km**
- **Magnitude (M_L)**: 2-3.7
- **Events**: 2007-2023





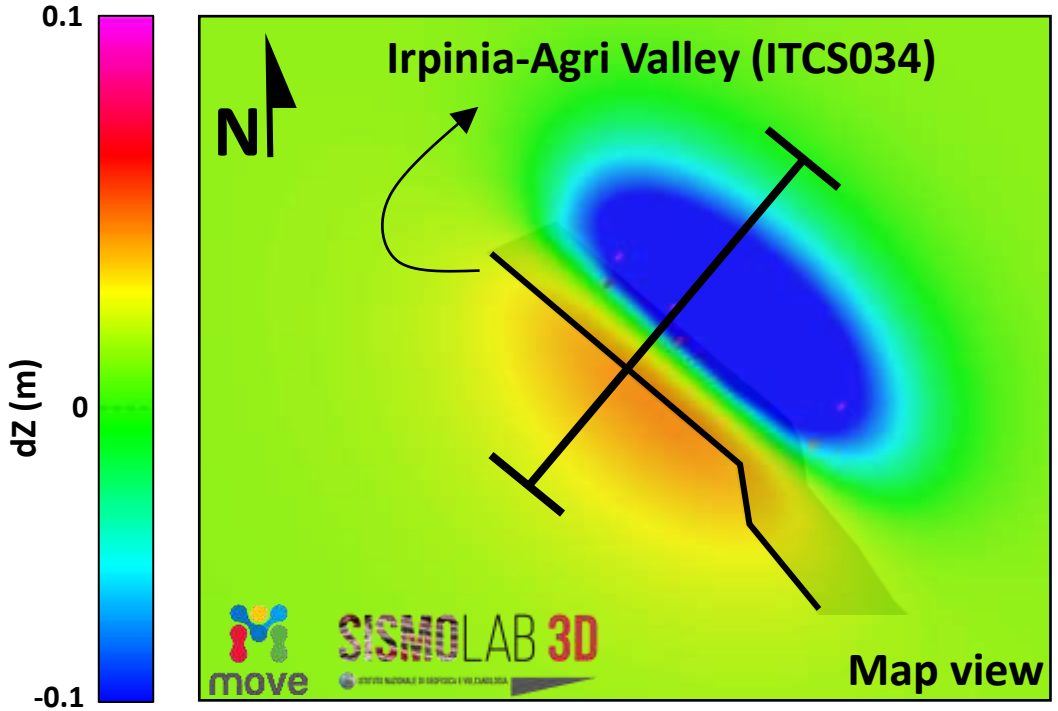
from Maesano et al. (2020)

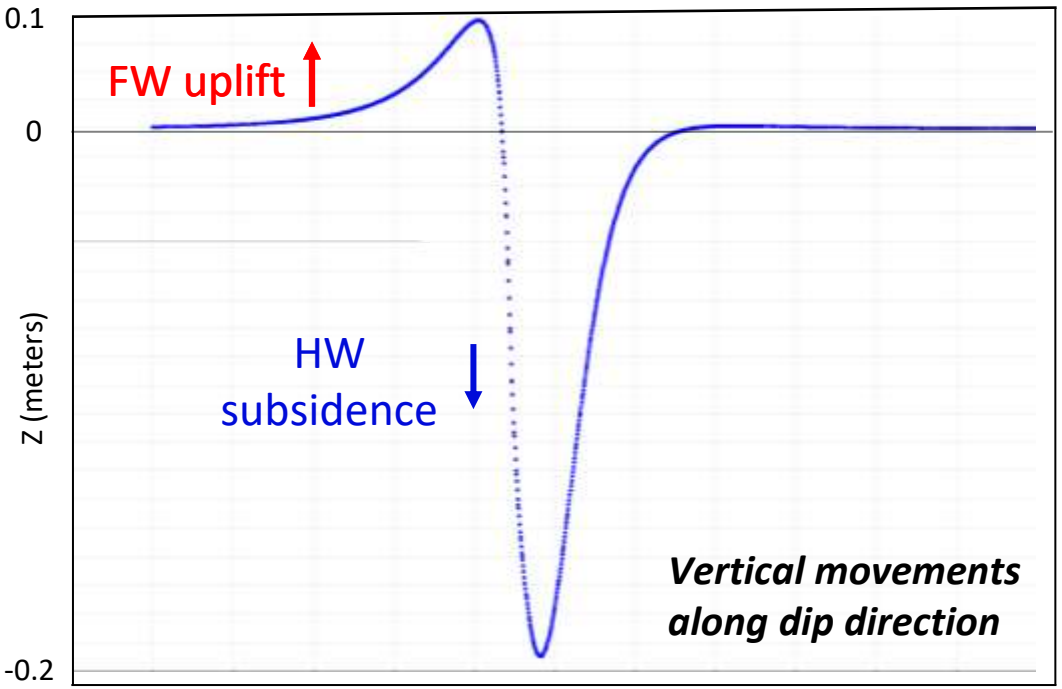
SCIENTIFIC ANALYSIS – Fault response modeling

S.Q.: Can we simulate **fault-induced displacement** using the 3D fault geometry provided by the «European Fault Source Model 2020»?

"**Fault Response Modelling** uses elastic dislocation theory to calculate the displacement, strain and stress at observation points within a medium with defined elastic and mechanical properties"

European Fault Source Model 2020
- Crustal Faults (OGC WFS)





Concluding remarks

- The EPOS Data Portal was used to perform some seismotectonic analysis in the Southern Italy.
- Combination seismological and geological data is necessary for a proper assessment of seismic hazard.
- The **Geological information and Modeling**, **Near Fault Observatories** and **Seismology** Thematic Core Services (TCS) were used to define the spatio-temporal distribution of instrumental seismicity in Southern Italy.
- High seismic activity all over Southern Italy is testified by numerous seismic events, but the distribution of seismicity at depth is very different, with shallow crustal seismicity in the Irpinia region and both shallow and deep seismicity in the Calabrian arc region.
- The **integrated access to multidisciplinary data** has simplified these analyses, especially reducing the time needed to collect and integrate data.
- **Further developments** may include analysis and visualization functionalities, for example, graphical analysis and 3D visualization directly on the EPOS Data Portal.