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Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA
ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

# WP 4
# Coordinator
# Gaetano Festa

## Implementation Of Irpinia Near Fault Observatory

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Assigned Budget: 1.9 M€

## Participants

Irpinia Near-Fault Observatory

INGV

INGV-Pisa – OU7

### FIBIR-LONG

Sensing long-fiber cables with DAS systems

collaboration with UNIMIB, UNINA

UNINA – UO17

### INFARRAYS

Installation of arrays within ISNet

collaboration with INGV

# Cost breakdown

| Cost description | Region | Cost (euro) |
|---|---|---|
| Personnel (2 Technologists, 1 Technician) | OS | 326.760 |
| DAS and storage systems | S | 594.994 |
| Hosting cases for fiber | S | 12.826 |
| 10 central stations and 54 nodes for 6 arrays – servers | S | 600.000 |
| Site installation - hosting cases for arrays | S | 241.122 |
| General costs | S OS | 124.298 |

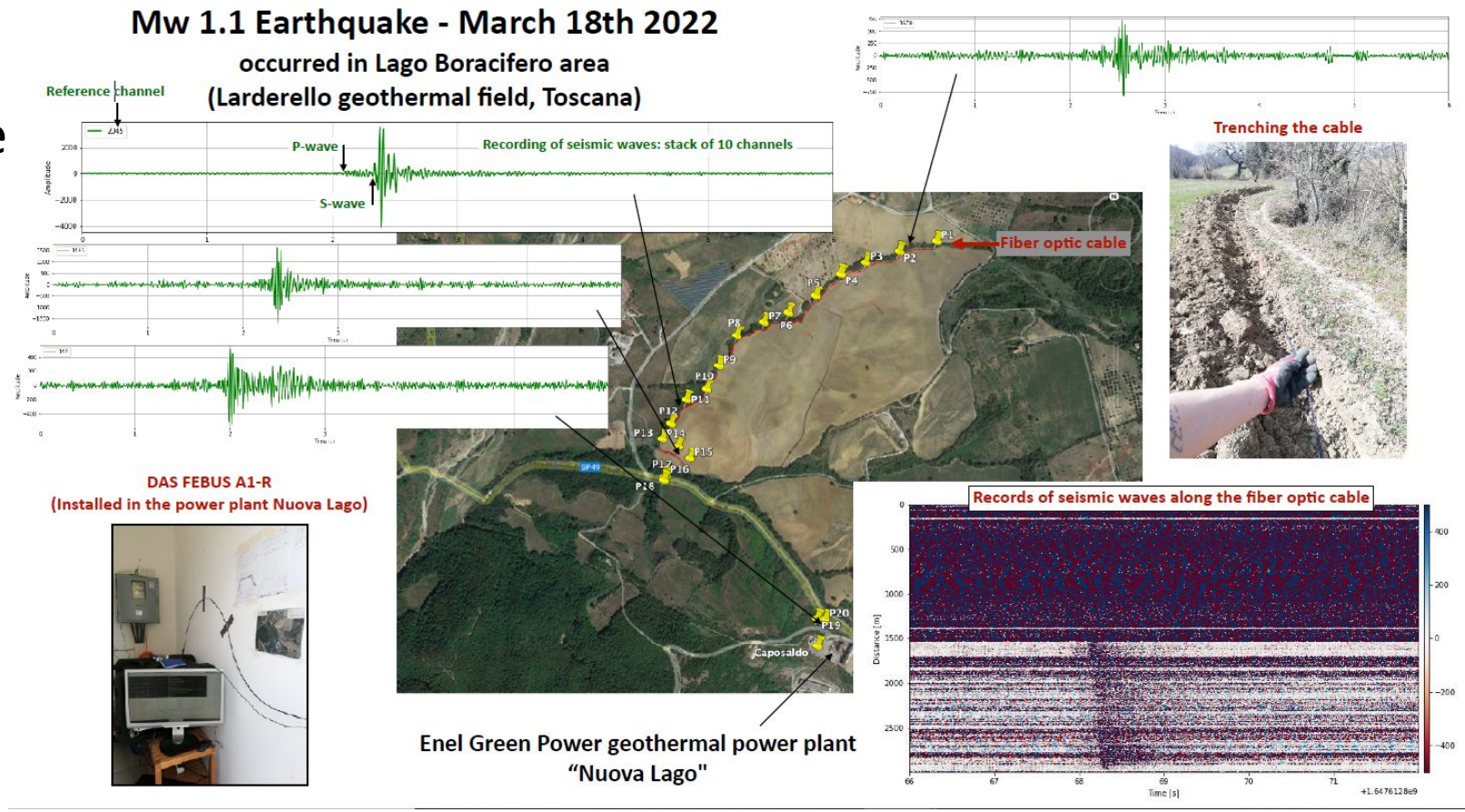
# FIBIR - LONG

- Prototype monitoring system based on **fiber optic cables** and **3 DAS** from 1km-long to existing 30-50 km-long fibers in the Irpinia region.
- **Scouting of fiber cables**, according to their availability and quality and ensuring an appropriate spatial coverage of the area (→ **TIM, SNAM, RIMIC**)
- Yearly amount of data produced **50-75 TB** → strategies for data storage, processing and distribution, inclusion in EPOS RI and Geo-Inquire.

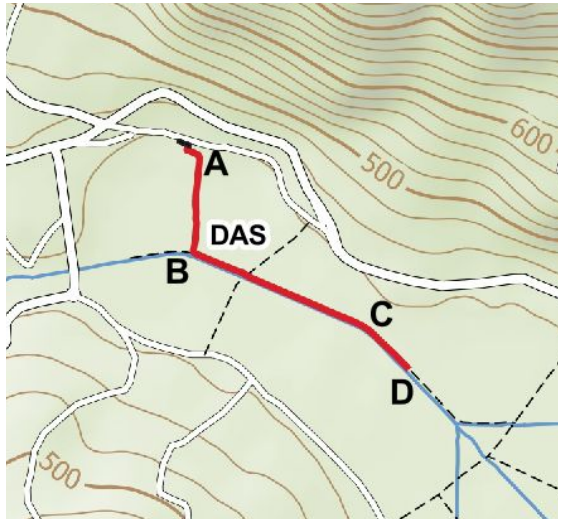
# FIBIR – LONG – Expected scientific impact

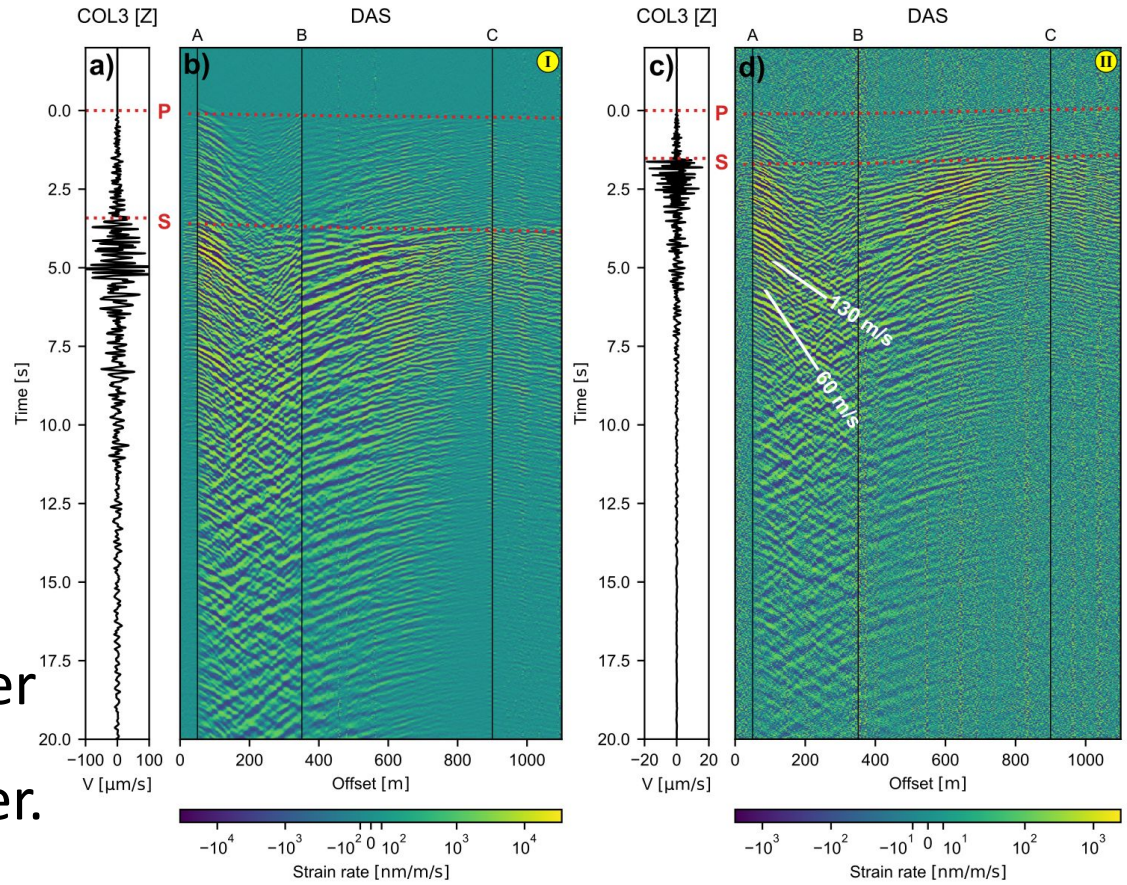
New approach to monitoring with **nearly continuous data**: an example from the Larderello geothermal field

Tracking the **propagation of seismic waves** along a geo-localized cable



# FIBIR – LONG – First approach in the Southern Apennines

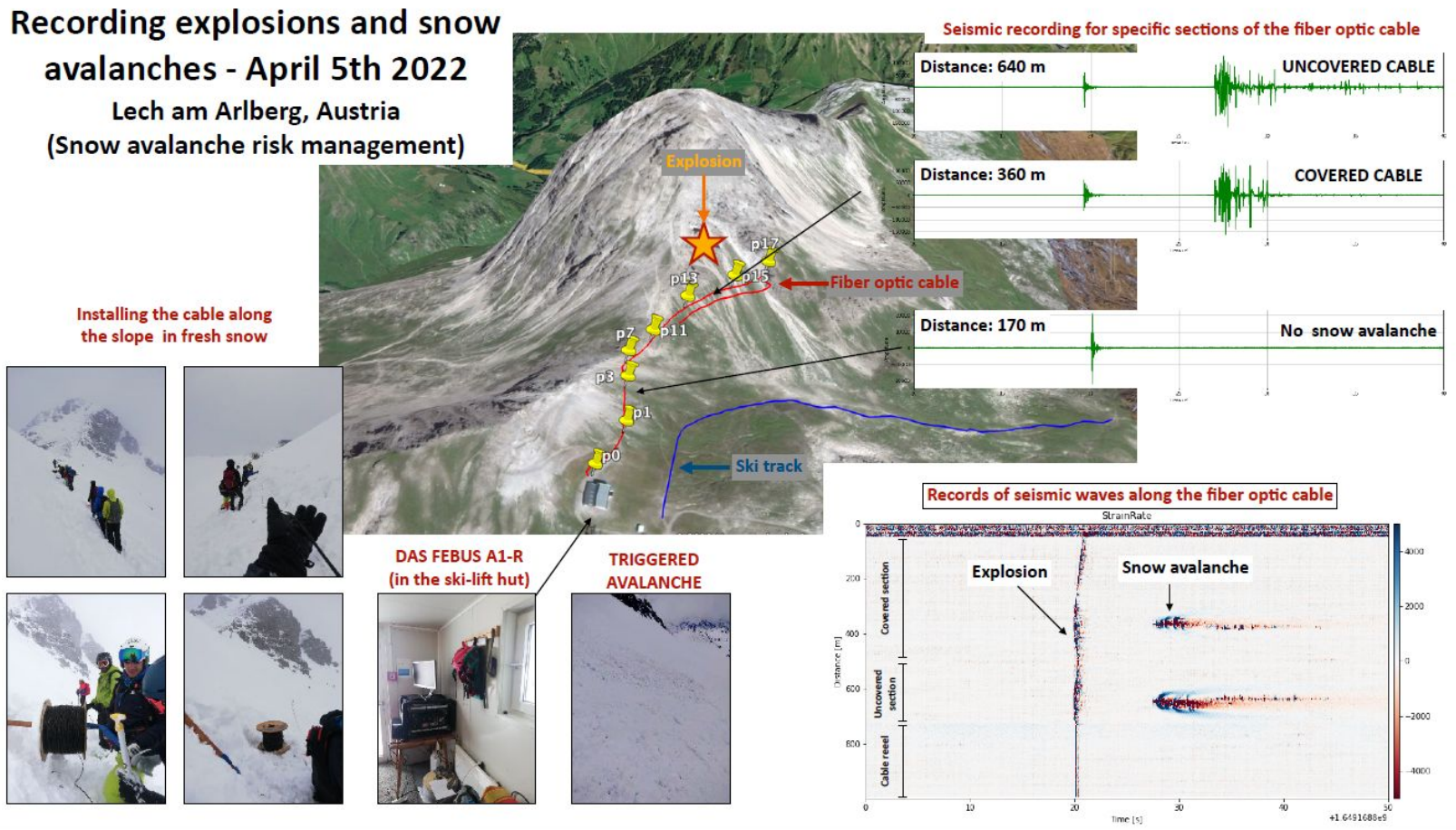




**1.1 km-long cable** to monitor microseismicity and infer **source properties** from waves recorded along the fiber.

# FIBIR – LONG – Monitoring beyond earthquakes

Possibility to monitor other strain transients, such as **landslides** and avalanches.

Potential use for early warning and site effects.

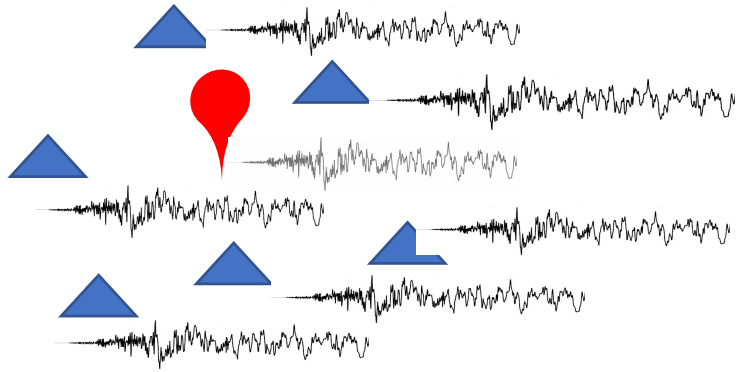


# INFARRAYS

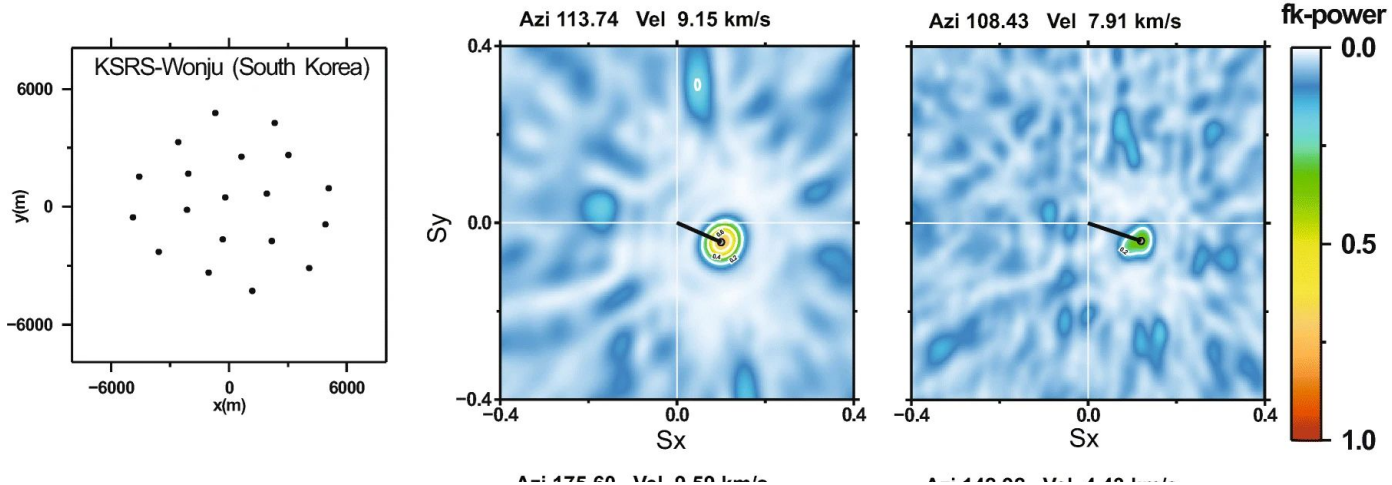
- New prototypal monitoring system, transforming 6 seismic stations into **constellations**, forming **arrays of 9-10 nodes** at kilometric distance.
- Each peripheral node sending data in **real-time, continuous mode** to the central station.
- Additional **upgrade of 4 more** central stations (from 31 to 85 stations).
- Large amount of data from arrays requests upgrade of **control center servers**.
- New **services** and **procedures** implemented to provide data and products.

# INFARRAYS

New approach to monitoring with **redundant data** to reduce the signal to noise ratio.



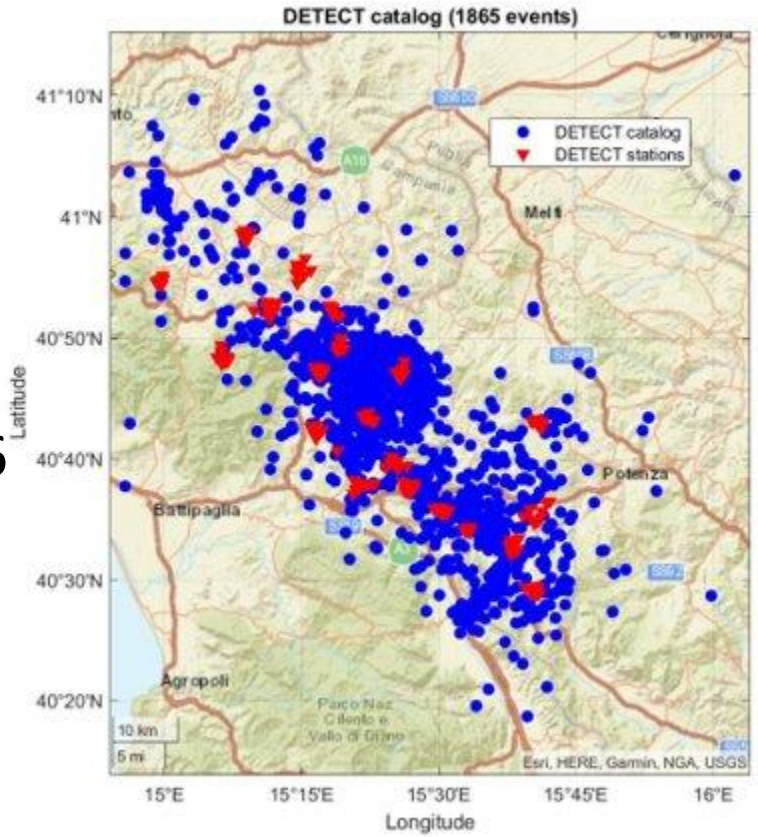
Enabling array detection techniques to improve **event location** and **characterization**

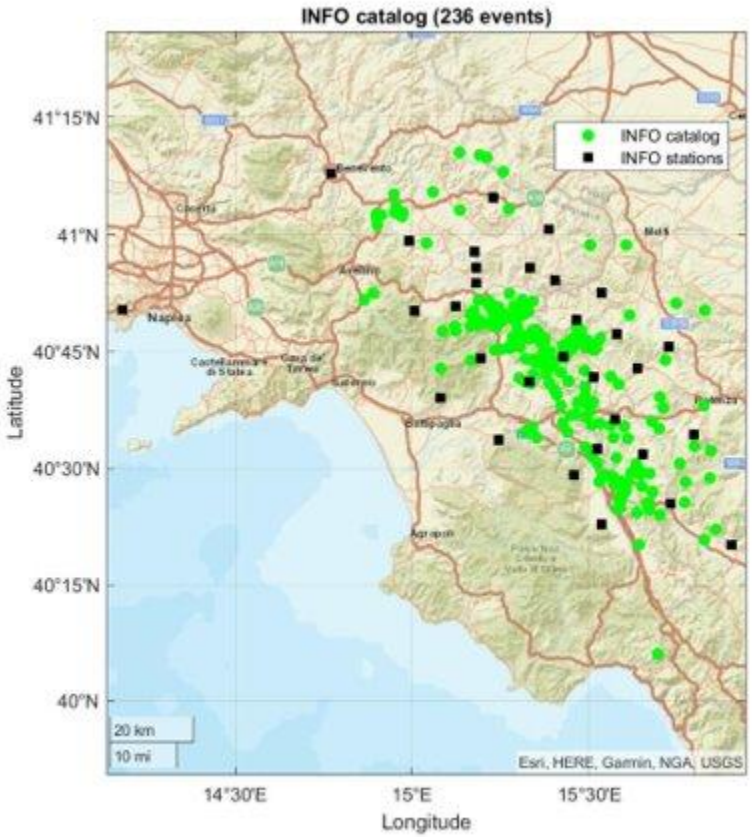


# INFARRAYS: The prototypal DETECT experiment

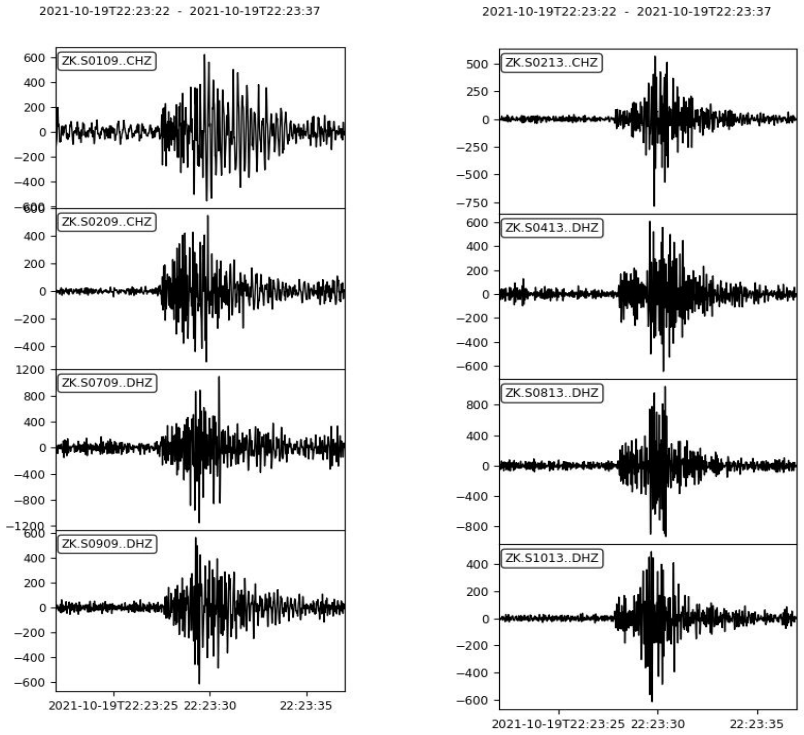
DETECT experiments**: 200+ stations** in 20 arrays along the Southern Apennines (INFO area).

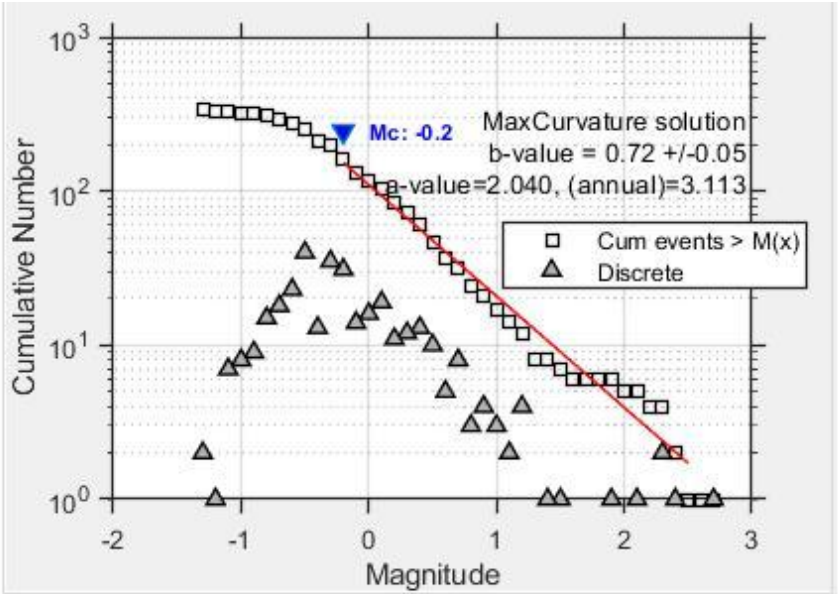
Detection of **1865 events** in nearly 6 months, **8x** with respect to the manual catalog (*+EQTransformer*)



# INFARRAYS: The prototypal DETECT experiment




*Frequency-magnitude distribution of the final catalog. b-value and Mc are estimated using ZMAP*

**M -0.2** (new magnitude of completeness) event detected at 12 stations, located with <0.5km uncertainty**.**

# List of Deliverables

| Title | Bimester | Deliverables |
|---|---|---|
| **IO4.1** | 4 | D4.1 Definition and completion of the hiring procedures<br>D4.2 Purchase of the central station acquisition systems |
| **IO4.2** | 8 | D4.3 Purchase of the servers for network control center of the Irpinia seismic Network<br>D4.4 Purchase of the storage system for optical fiber data distribution<br>D4.5 Purchase of the DAS systems |
| **IO4.3** | 12 | D4.6 (B12) Purchase of the Array – Nodes instrumentation |
| **IO4.4** | 15 | D4.7 Finalisation of the civil infrastructures for the WP<br>D4.8 Instrument installation and data distribution<br>D4.9 Completion of all the expenses referred to the indirect costs |