

The image features a composite background. The top half shows a wide aerial view of a landscape with rolling hills and fields under a dramatic sunset sky with orange and red clouds. The bottom half is a 3D cutaway rendering of a tunnel infrastructure project. It shows a long, multi-level tunnel structure with various internal components, including red vertical supports, blue structural elements, and silver cylindrical tanks. The tunnel is illuminated from within, and small human figures are placed throughout to provide a sense of scale.

Updates from Sardinia

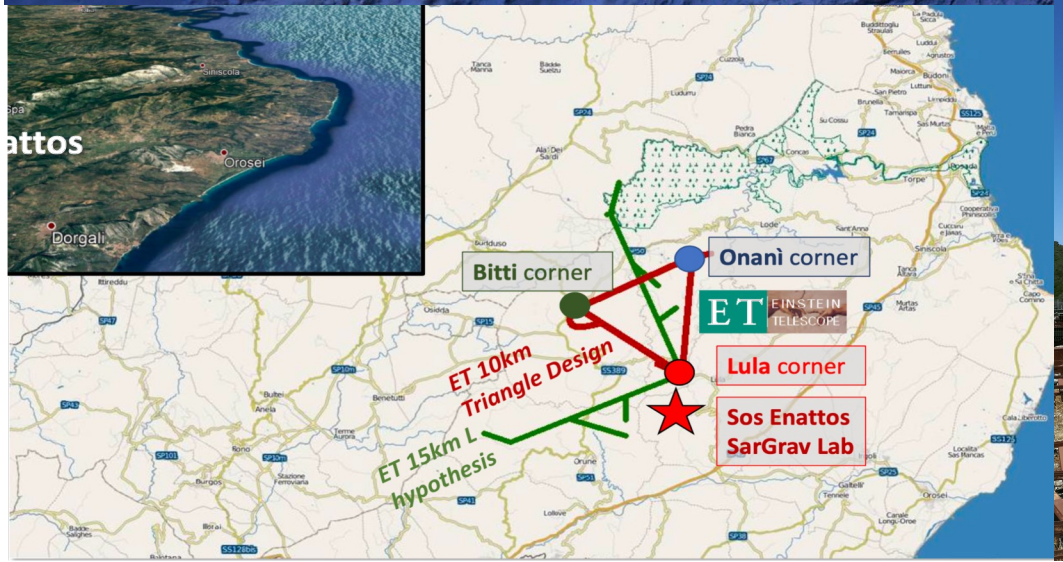
D. D'Urso

ET-PP INFRA-DEV Annual Meeting , 12th- 13th June 2023, Barcellona

Sos Enattos Candidate Site



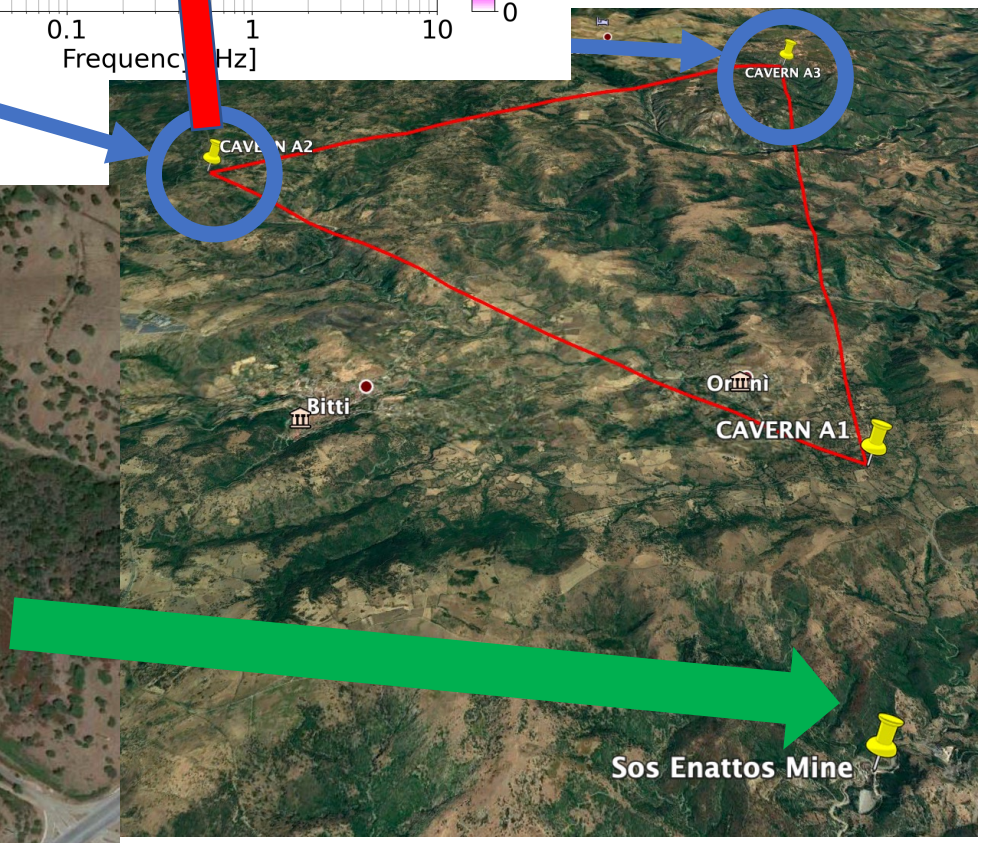
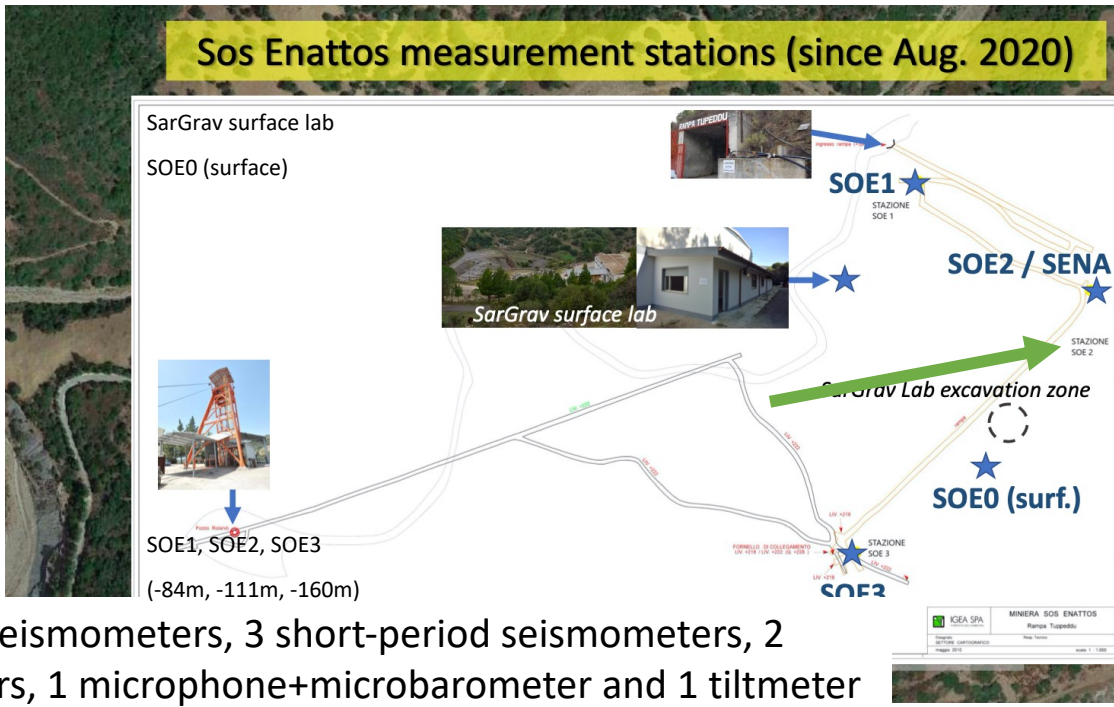
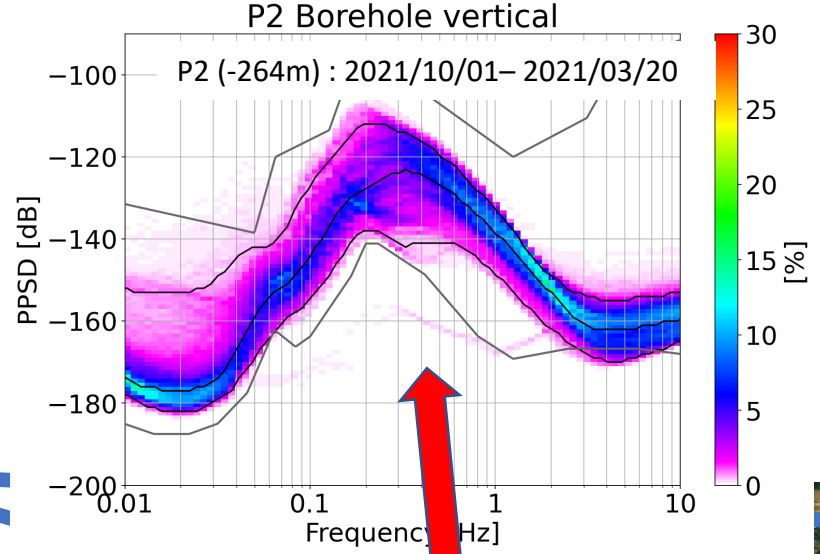
Sos Enattos area among Bitti, Lula and Onanì



Sardinia Site

Long-term measurements

Characterization of the Bitti and Onani corners:
Surface and underground seismic and environmental measurements

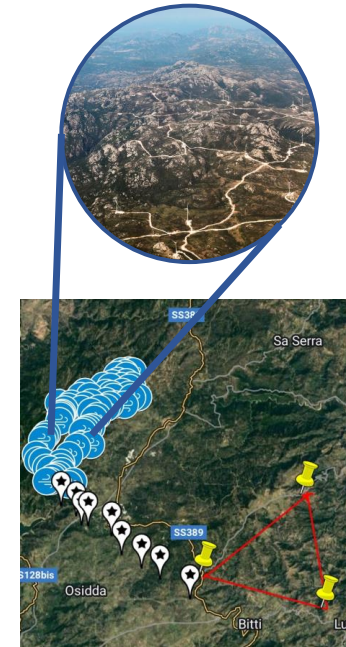


4 broadband seismometers, 3 short-period seismometers, 2 magnetometers, 1 microphone+microbarometer and 1 tiltmeter distributed over underground and surface stations

Status Activities

Sardinia updates:

- Temporary seismometer deployments to study the vibration input and decay due to wind farms;
- Ambient noise characterization (just published: M. Di Giovanni et al., *Temporal variations of the ambient seismic field at the Sardinia candidate site of the Einstein Telescope*, Geophysical Journal International, <https://doi.org/10.1093/gji/ggad178>);
- New long-term seismic stations will be deployed in the area;



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L. Naticchioni, SPB/WD1 status - XIII ET Symposium – Cagliari, 8-12 May 2023

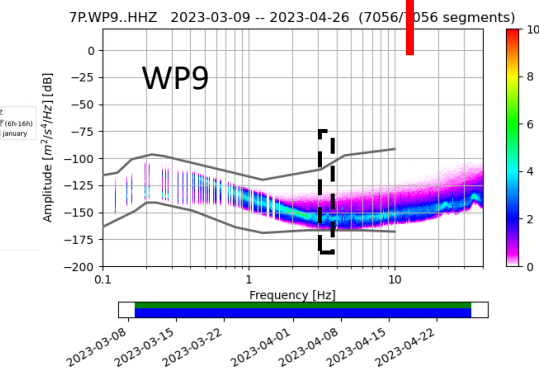
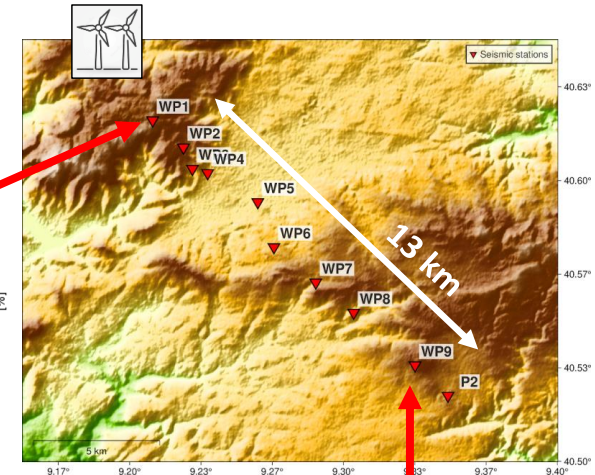
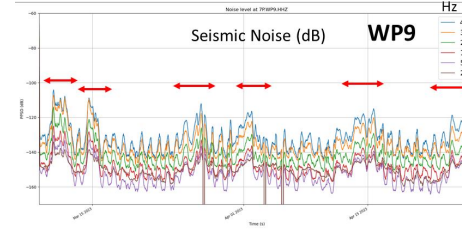
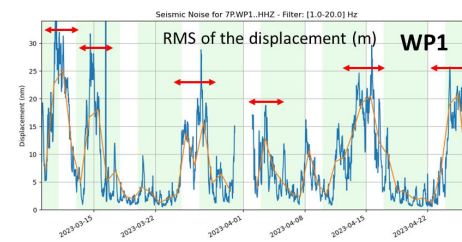
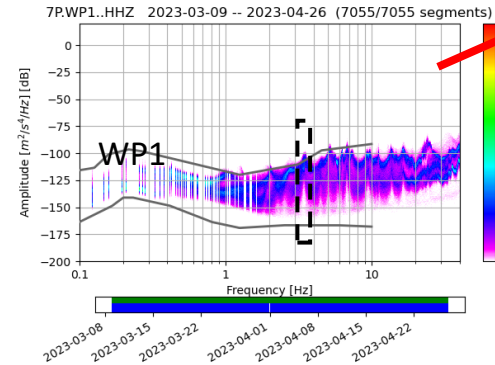


SPB-WD1 – WP1

C. Giunchi & S. Shani-Kadmiel

Wind farm study in Sardinia: a first look at data

- Main peak at 3Hz + harmonics close to the wind farm;
- Only main peak + first few harmonics close to P2, visible wrt to the low background (NLNM);
- Wind-correlated increase of noise rms;
- Analysis ongoing: spectral features and correlation with wind measured at weather stations close to the windfarm and with rotational speed of wind turbines.



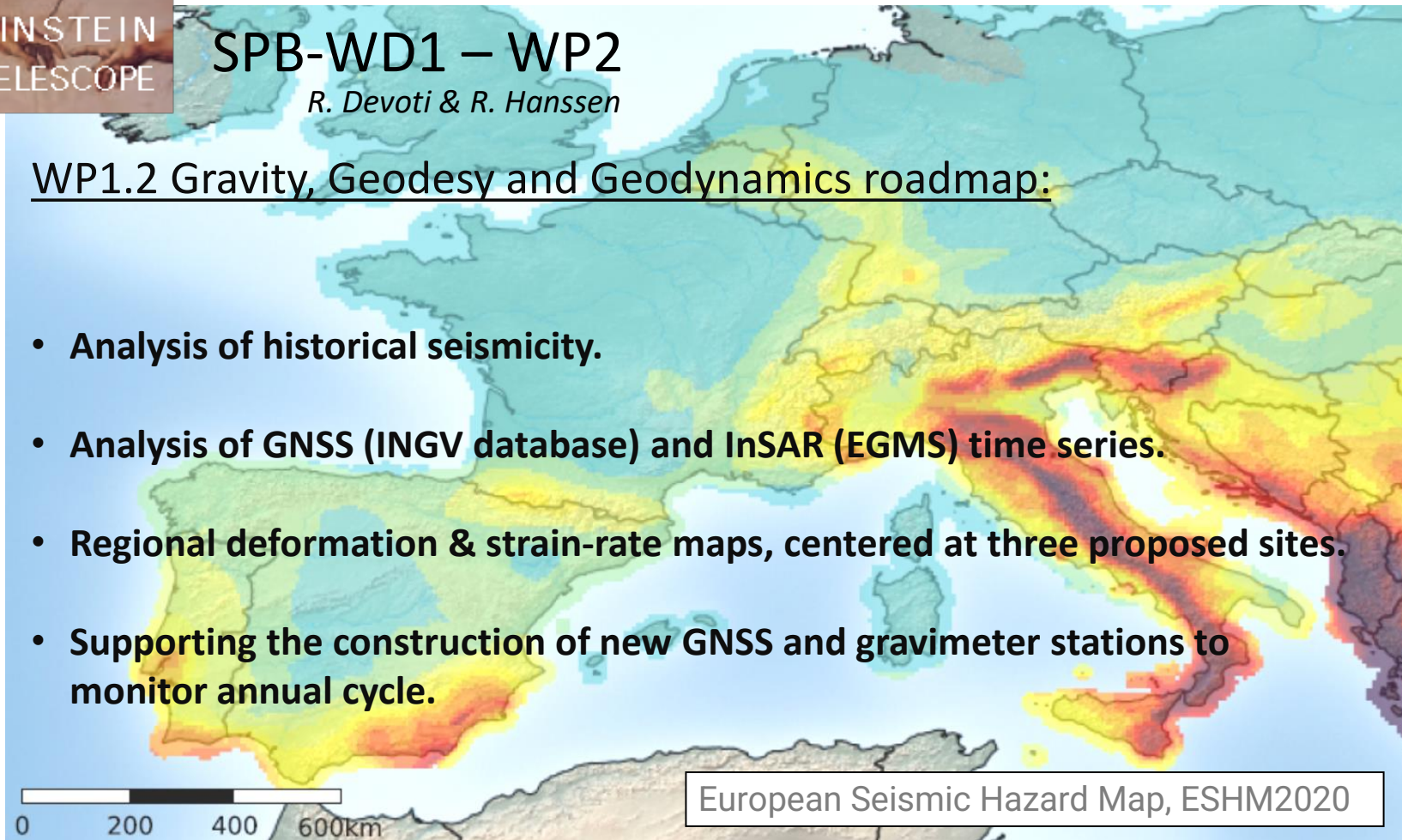


SPB-WD1 – WP2

R. Devoti & R. Hanssen

WP1.2 Gravity, Geodesy and Geodynamics roadmap:

- **Analysis of historical seismicity.**
- **Analysis of GNSS (INGV database) and InSAR (EGMS) time series.**
- **Regional deformation & strain-rate maps, centered at three proposed sites.**
- **Supporting the construction of new GNSS and gravimeter stations to monitor annual cycle.**





SPB-WD1 – WP3

R. De Rosa

Sites Characterization

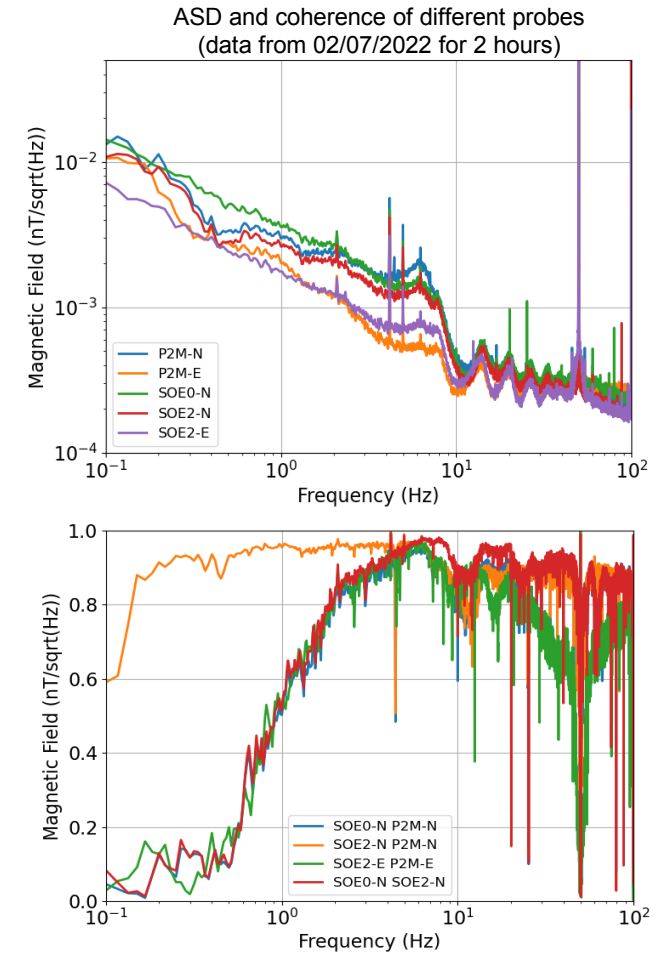
Currently there are:

- 1 mag. probe (N-S direction) in surface at Sos Enattos (SOE0)
- 2 mag. probes (N-S and E-W directions) at -111 m underground at Sos Enattos
- 2 mag. probes (N-S and E-W directions) in surface at Bitti (P2)



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L. Naticchioni, SPB/WD1 status - XIII ET Symposium – Cagliari, 8-12 May 2023





SPB-WD1 – WP4

T. Bulik & S. Shani-Kadmiel

▣ Studies concentrated on Sardinia (international collaboration):

- Installed microphones in the mine:

- Italian (EGO microphones)
- Polish UW (Astrocent microphones) - from Nov 26, '22
- Hungarian campaign -Nov 21-26, '22

- Installed microphones outside the mine:

- Astrocent from Nov 26, '22

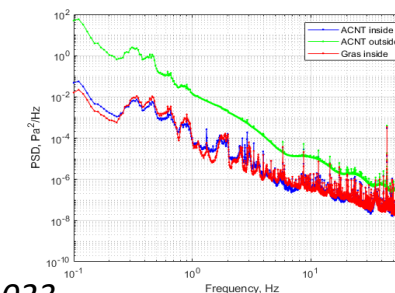
▣ LNGS experiment with noise in large cavern - see talk by Bulik

▣ No updates from the EMR side

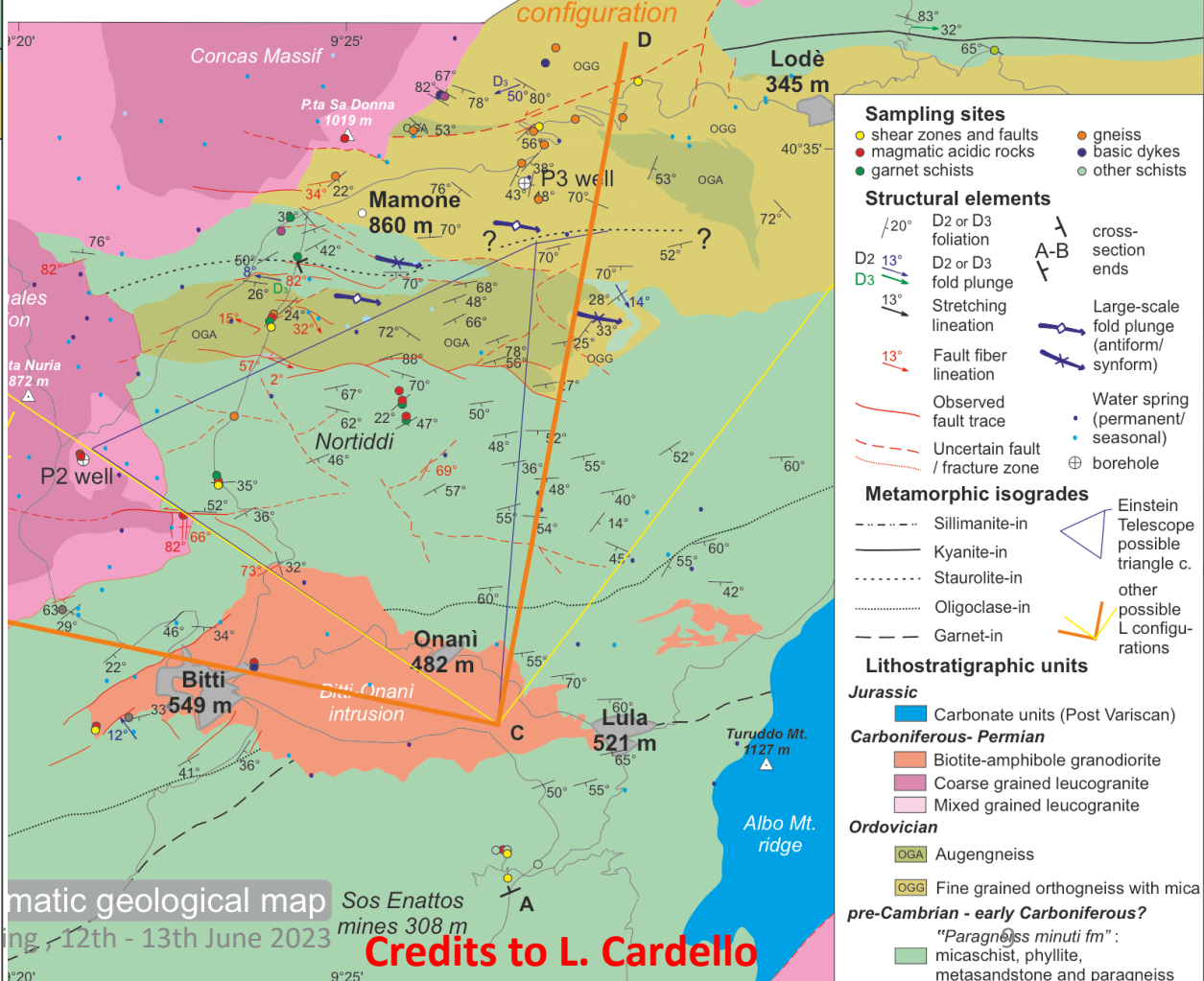
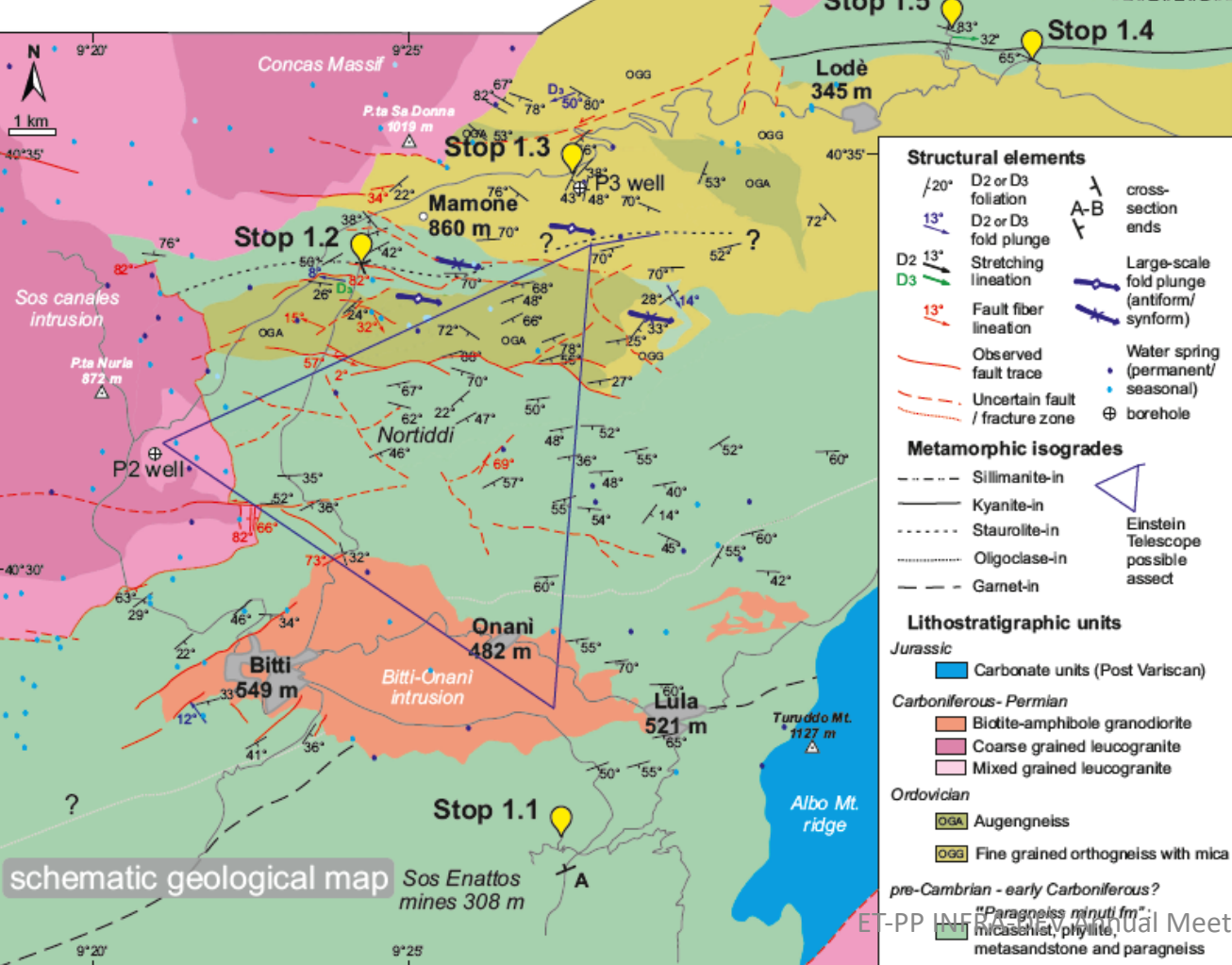
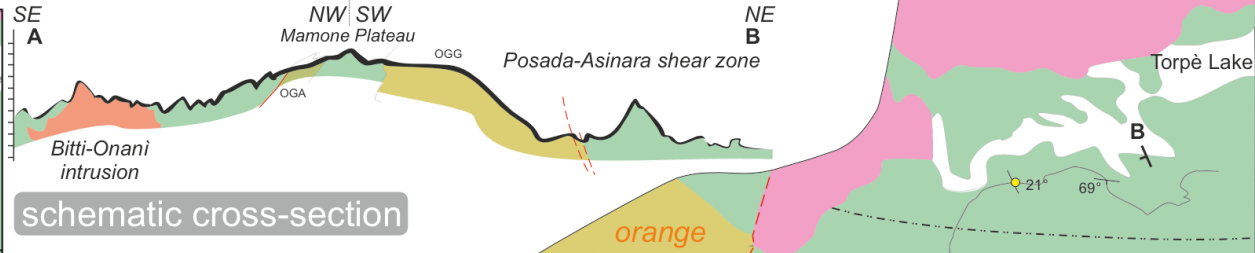
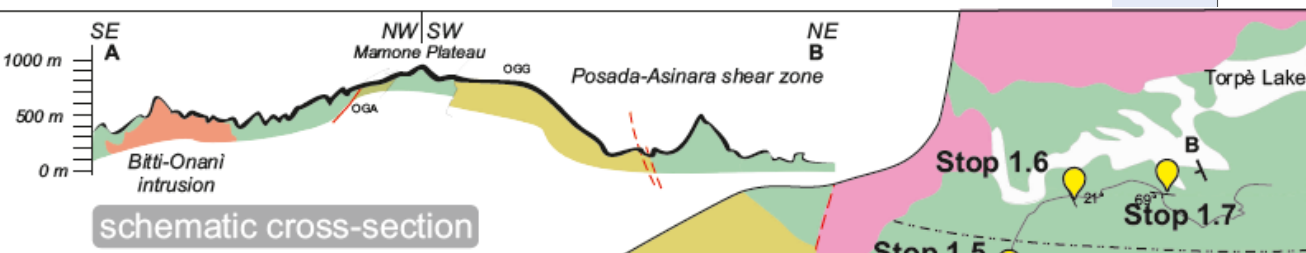
▣ Planned GSSI campaign with new microphones and covers.

▣ Maintaining wiki site: <https://wiki.et-gw.eu/SPB/OtherEvnNoise>

▣ Data stored in: etrepo.df.unipi.it



THE 2022 STRUCTURAL MAP



Structural elements

- 20° D2 or D3 foliation
- 13° D2 or D3 fold plunge
- Stretching lineation
- 13° Fault fiber lineation
- Observed fault trace
- Uncertain fault / fracture zone
- cross-section ends A-B
- Large-scale fold plunge (antiform/synform)
- Water spring (permanent/seasonal)
- borehole

Metamorphic isogrades

- Sillimanite-in
- Kyanite-in
- Staurolite-in
- Oligoclase-in
- Garnet-in
- Einstein Telescope possible aspect

Lithostratigraphic units

Jurassic

- Carbonate units (Post Variscan)

Carboniferous- Permian

- Biotite-amphibole granodiorite
- Coarse grained leucogranite
- Mixed grained leucogranite

Ordovician

- OGA Augengneiss
- OGG Fine grained orthogneiss with mica

pre-Cambrian - early Carboniferous?

- "Paragneiss minuti fm": micaschist, phyllite, metasandstone and paragneiss

Sampling sites

- shear zones and faults
- magmatic acidic rocks
- garnet schists
- gneiss
- basic dykes
- other schists

Structural elements

- 20° D2 or D3 foliation
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Metamorphic isogrades

- Sillimanite-in
- Kyanite-in
- Staurolite-in
- Oligoclase-in
- Garnet-in
- Einstein Telescope possible triangle c.
- other possible L configurations

Lithostratigraphic units

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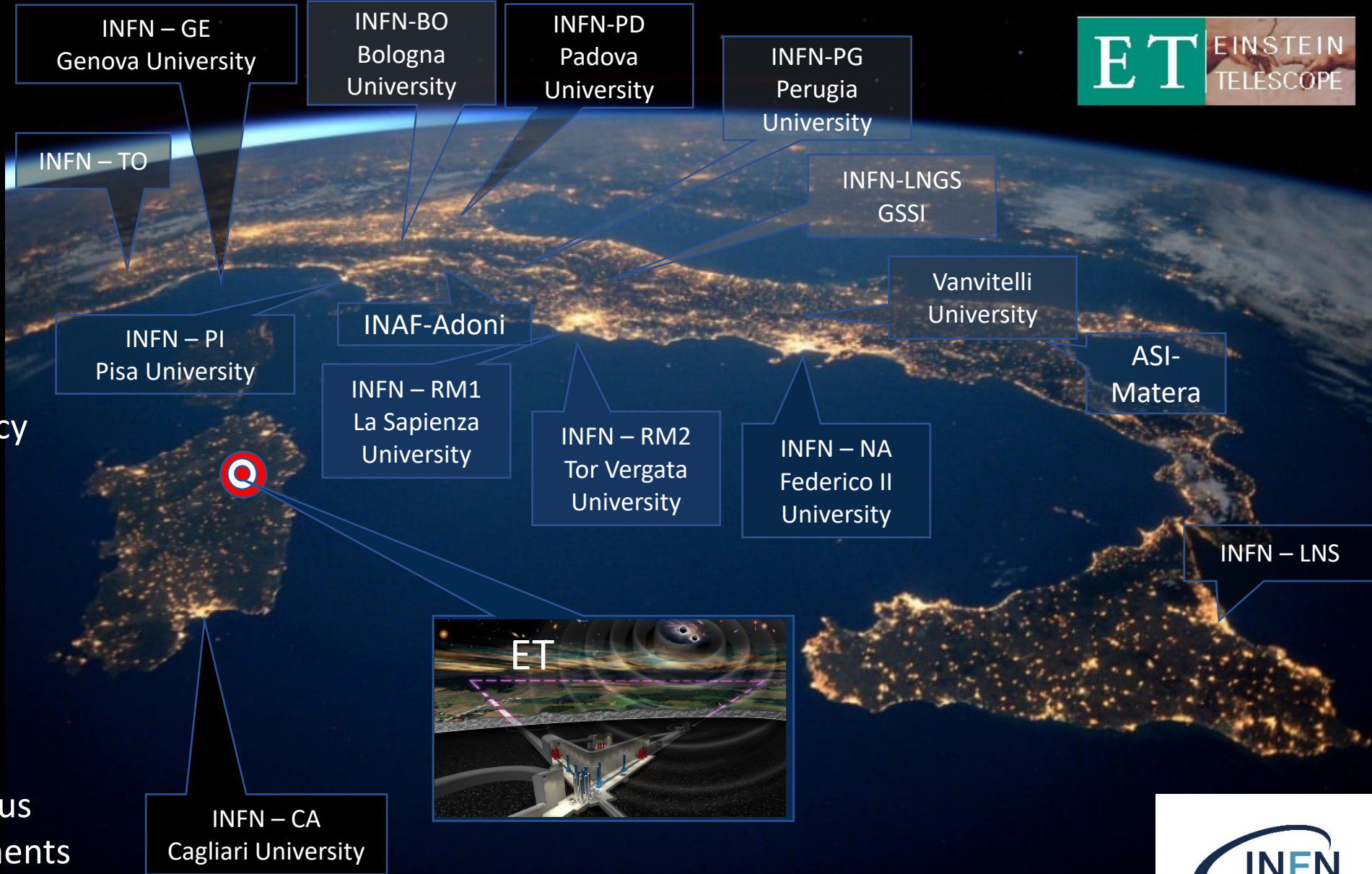
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Credits to L. Cardello

ETIC – Einstein Telescope Infrastructure Consortium



Next Generation EU (PNRR)
Investment focused on ET
enabling technology and
Sardinian site candidature
support

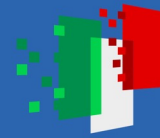
Led by INFN,
Partners:
11 Universities
INAF and Italian Space Agency

Budget 50M€

Start of the project:
1st January 2023

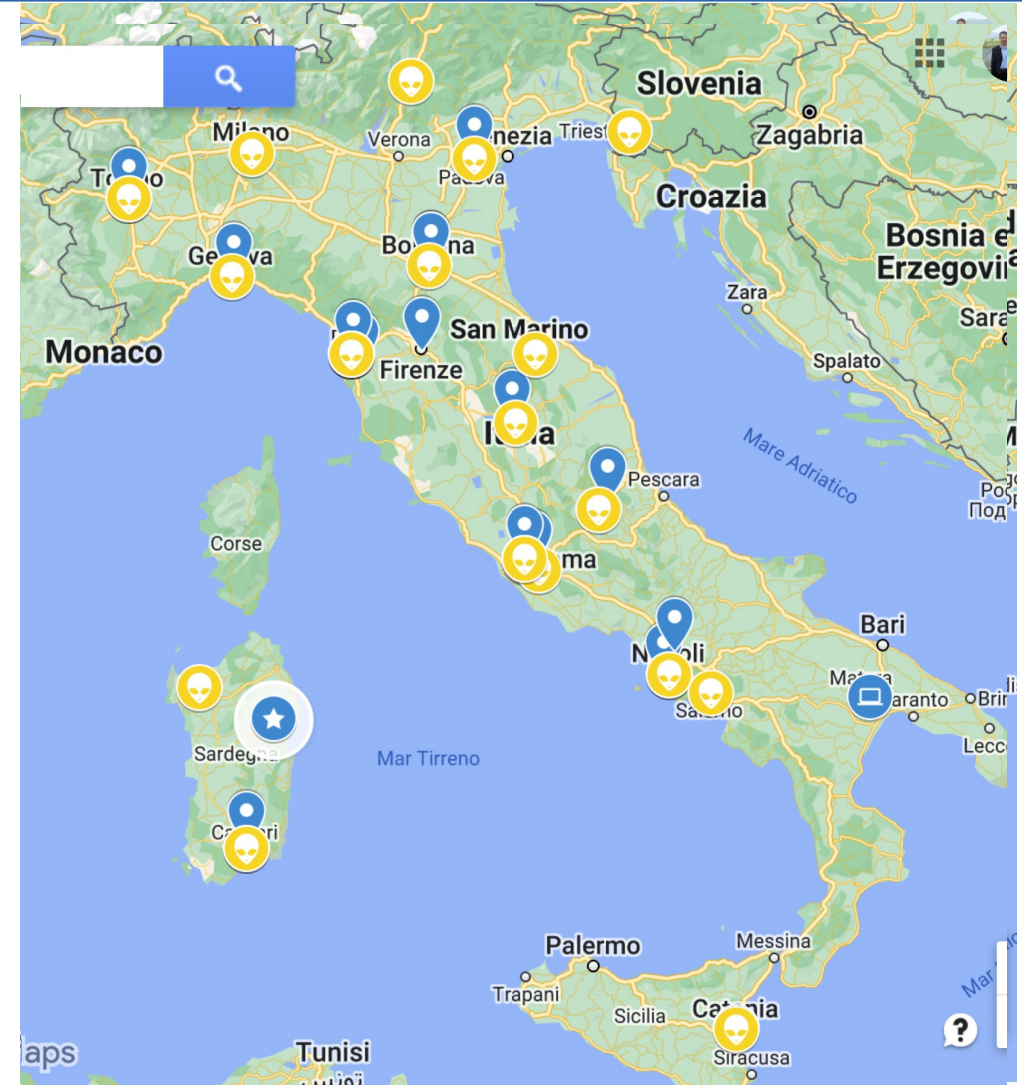
Full support from the previous
and present Italian Governments
on the Italian site candidature





ET-ETIC

- Operative Units and Research Infrastructures
- 20M€ Preparatory studies for ET design
- 30M€ R&D Research Infrastructures
- Timing: 30 months (+6) from Jan 2023



Credits to M. Punturo





Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



Preparatory activities for the ET sustainable design

Maria Marsella – ETIC -WP6 Leader
Sapienza DICEA –Roma1 INFN
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ET Symposium –Cagliari – 8-12 may 2023



ETIC spill-overs for ET

- ETIC invest on engineering services, modeling labs and higher education jobs for the pre-feasibility phase of the ET civil engineering design
- Call for tenders of the PNRR ETIC project has been published for the preliminary feasibility study for ET in Sardinia (14 Million of euro , to be assigned by dec. 2023 and delivered by dec. 25) in different geometric configurations
- WP6 " Sustainable Design" in ETIC project gathers a multidisciplinary working group to
 - ✓ support the formulation of engineering solutions satisfying scientific requirements
 - ✓ applying environmental sustainable strategies
 - ✓ define a shared eapproach for the optimization of the ET geolocalization on the surface and underground

Next steps

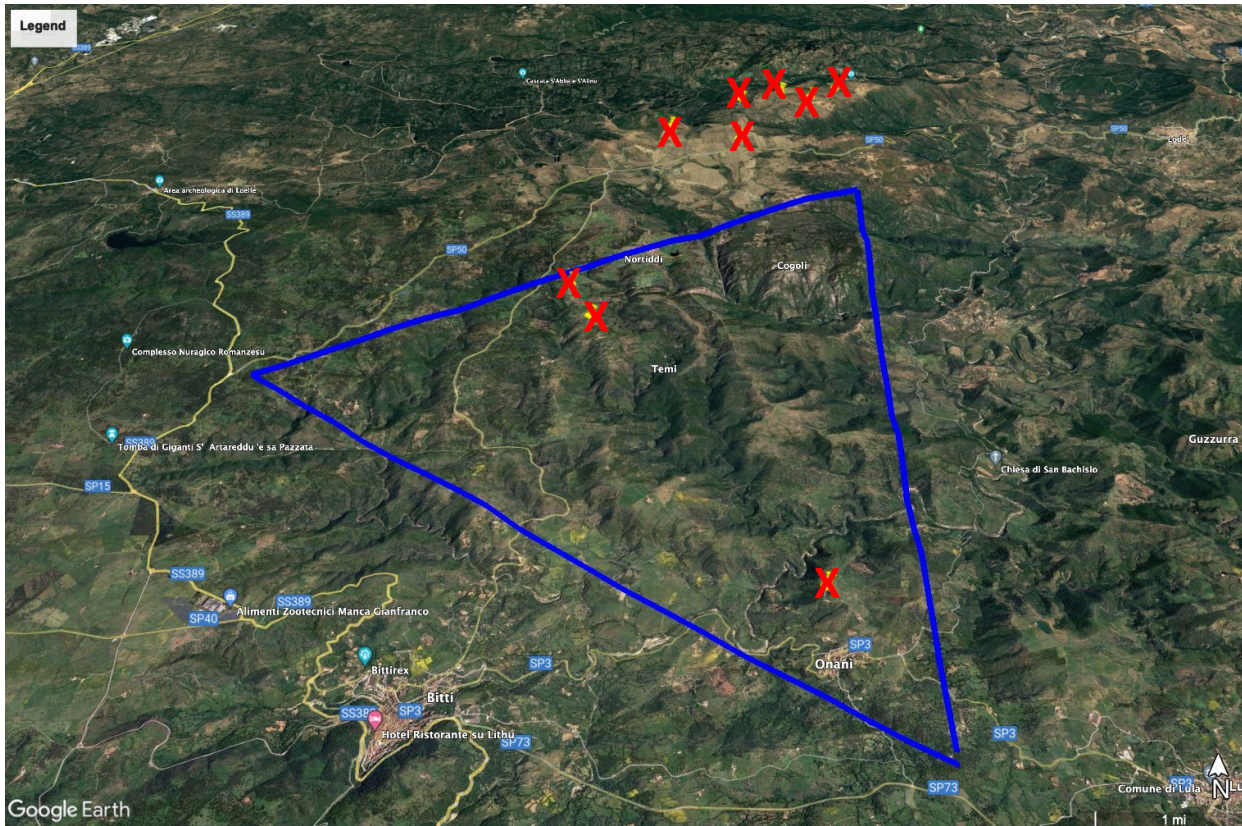
- share the specialized studies with scientific boards and experts (MOU with CERN)in ETO
- enforce engineering team to consolidate specifications for civil works design (CE – INFRADEV)
- interact with thematic working groups to gather relevant parameters for design, risk identification, maintenance and operations needs

Credits to M. Marsella

ET sustainable design

- Modeling and Layouts
- Preliminary cost estimate (excavation)
- Evaluation of TBM configuration and tunnel monitoring
- Preliminary indications on the management of excavated lands and rocks
- Preliminary strategy on the management of excavated soil and rock
- Call for tenders of the PNRR ETIC project for the preliminary feasibility study for ET in Sardinia (14 Million of euro , to be assigned by dec. 2023 and delivered by dec. 25) in different geometric configurations

Site preservation



Sardinia

- All the windturbine projects have been stopped
- future human activities that may affect ET performance adversely have to be approved by the INFN
- Measurement campaigns in April with **existing windmills**