SPB status and updates
ET Monthly Meeting
Sept. 3rd 2024

D. D'Urso & W. Walk

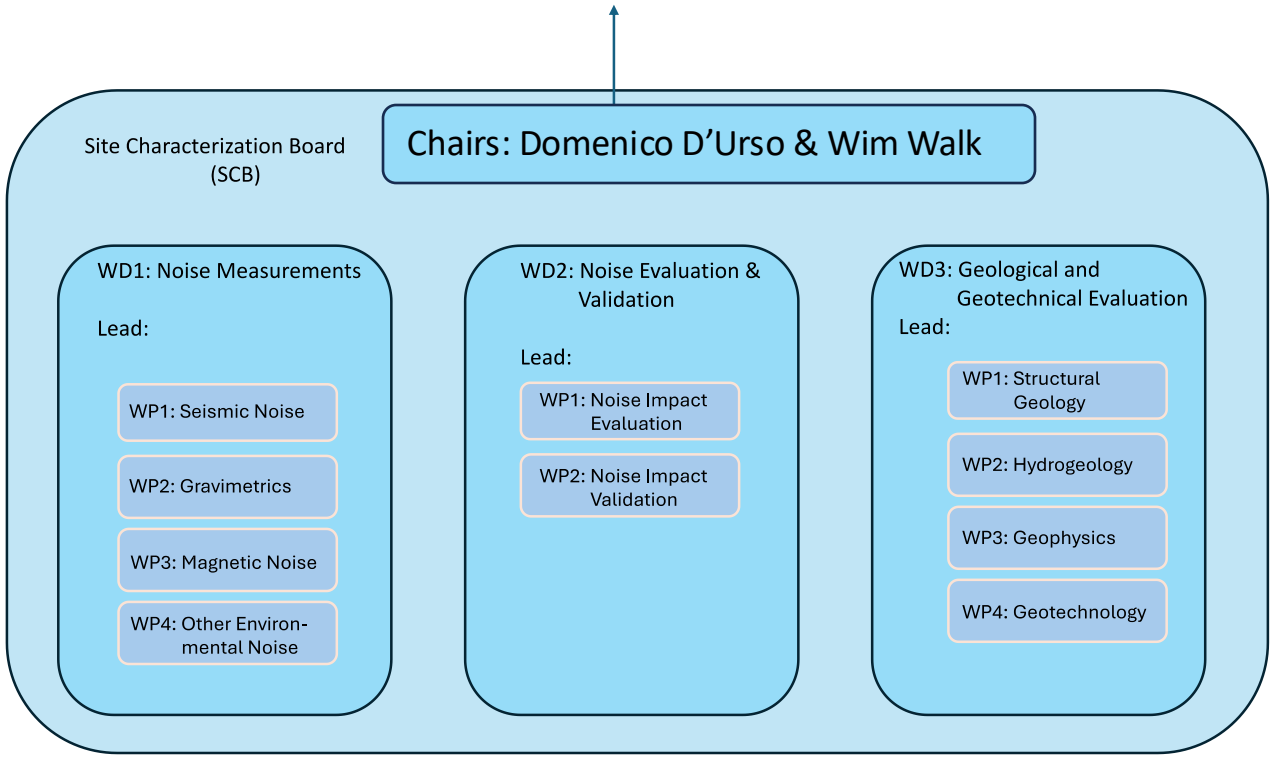
SCB/SPB: General Mission

The SCB/SPB must lead the effort on the Einstein Telescope site related activities

- It must coordinate the activities to acquire the required characteristics for each site proposing to host the Einstein Telescope;
- Collect, organize and/or produce all the characterizations and documentation needed for a fair comparison of the sites;
- Propose a common framework and common basis for the evaluation of the candidate sites.

What are we currently doing?

- Revisiting the SPB Mandate: SPB => SCB
- GOALS:
  - Define methodology to evaluate the impact of environmental noise and coordinate the study of the local teams
  - Define a methodology to validate the results



SPB Documents already produced

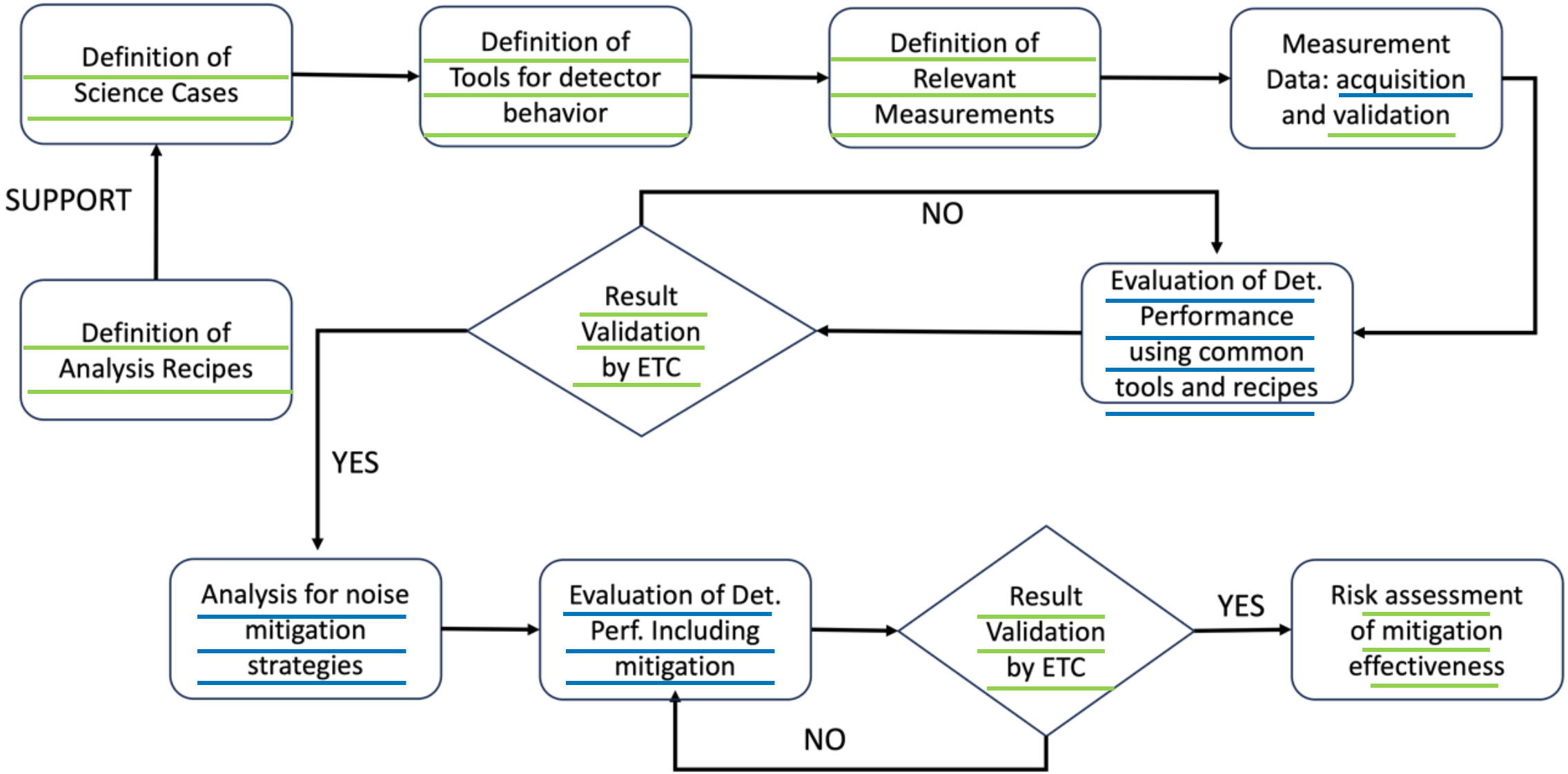
- **M1.1: physical variables**:
  ET-0012A-23, discussed and finalized at the II SPB Workshop (Jan 2023) https://apps.et-gw.eu/tds/?content=3&r=18113
- **M1.2: measurements recommendations and standards**:
  ET-0013A-23, discussed and finalized at the II SPB Workshop (Jan 2023) https://apps.et-gw.eu/tds/?content=3&r=18114
- **M1.3: data format standards and analysis tools**
  ET-0270A-23, **https://apps.et-gw.eu/tds/?content=3&r=18398**

- **ET-PP M04.01:** "*Site-specific Characteristics impacting ET sensitivity and duty cycle" (manly based on previous documents) ET-0252A-23, https://apps.et-gw.eu/tds/?content=3&r=18379*
  (new draft to be approved by EB)

What are we currently doing?

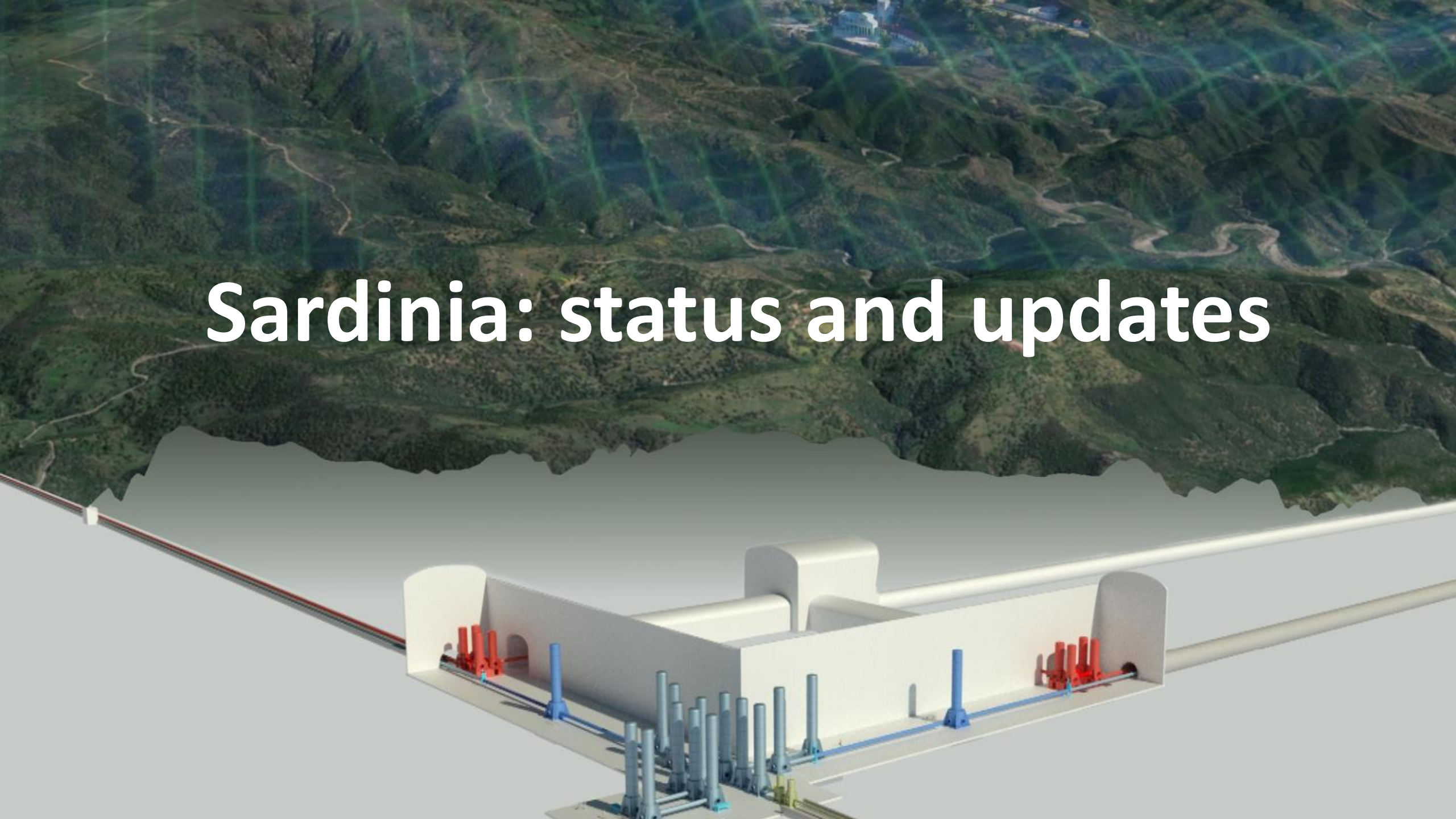
- **ET-PP M04.02:** Draft of “Common methodology to estimate impact of site characteristics on ET sensitivity and operation, and if required, a scheme to compensate it” under discussion by EB

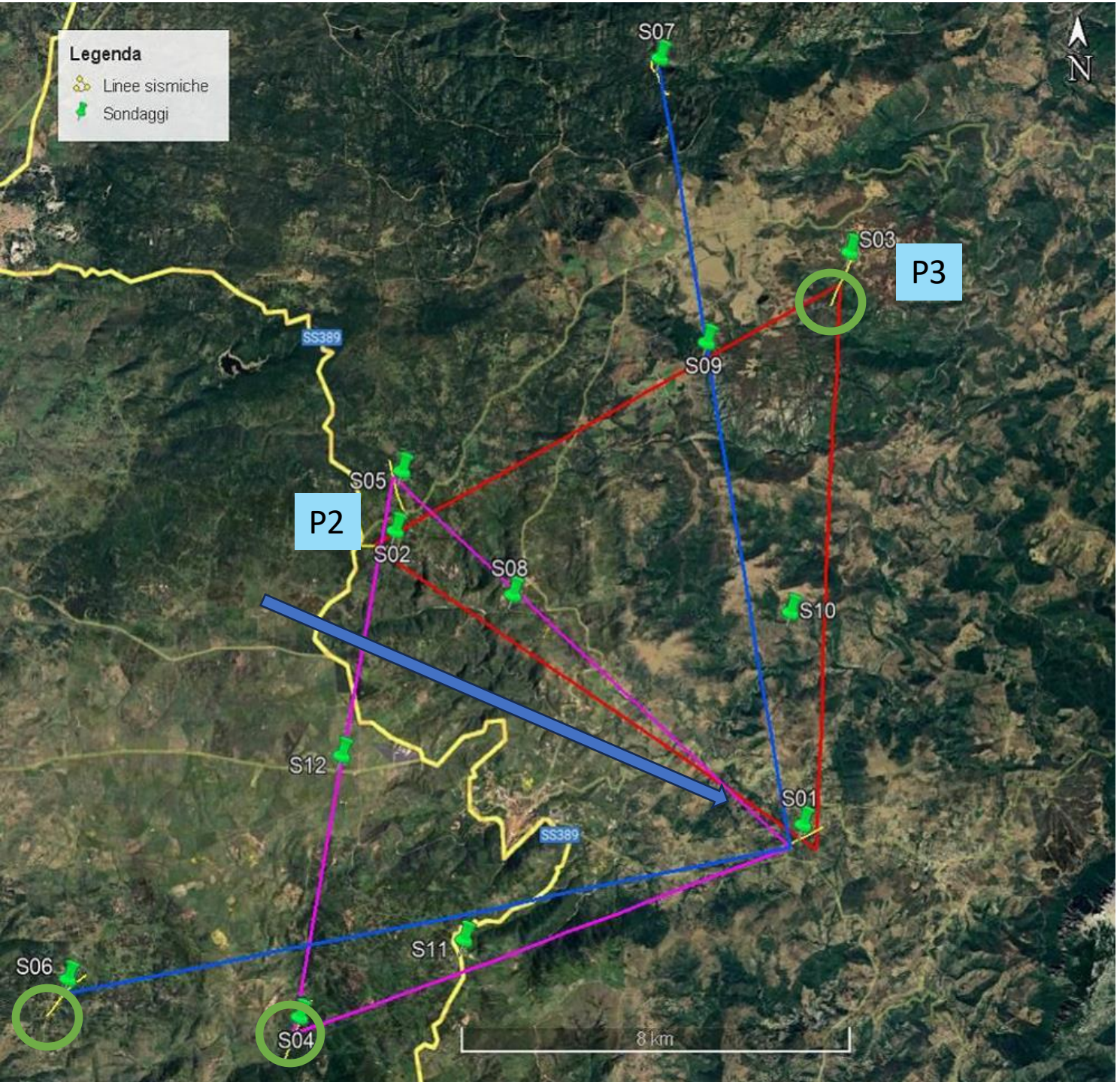
- To be defined the timeline for the “Complete quantification of all aspects impacting ET performance for both sites”
  - On Friday 6th meeting SCB-OSB-ISB chairs
  - Propose a timeline to ETC/ETO/Local Team (organizing a meeting with all the stakeholders, better if in person)


Definition of Science Cases
Definition of Tools for detector behavior
Definition of Relevant Measurements
Measurement Data: acquisition and validation
SUPPORT
NO
Definition of Analysis Recipes
Result Validation by ETC
Evaluation of Det. Performance using common tools and recipes
YES
Analysis for noise mitigation strategies
Evaluation of Det. Perf. Including mitigation
Result Validation by ETC
YES
Risk assessment of mitigation effectiveness
NO

ETO ETC LT

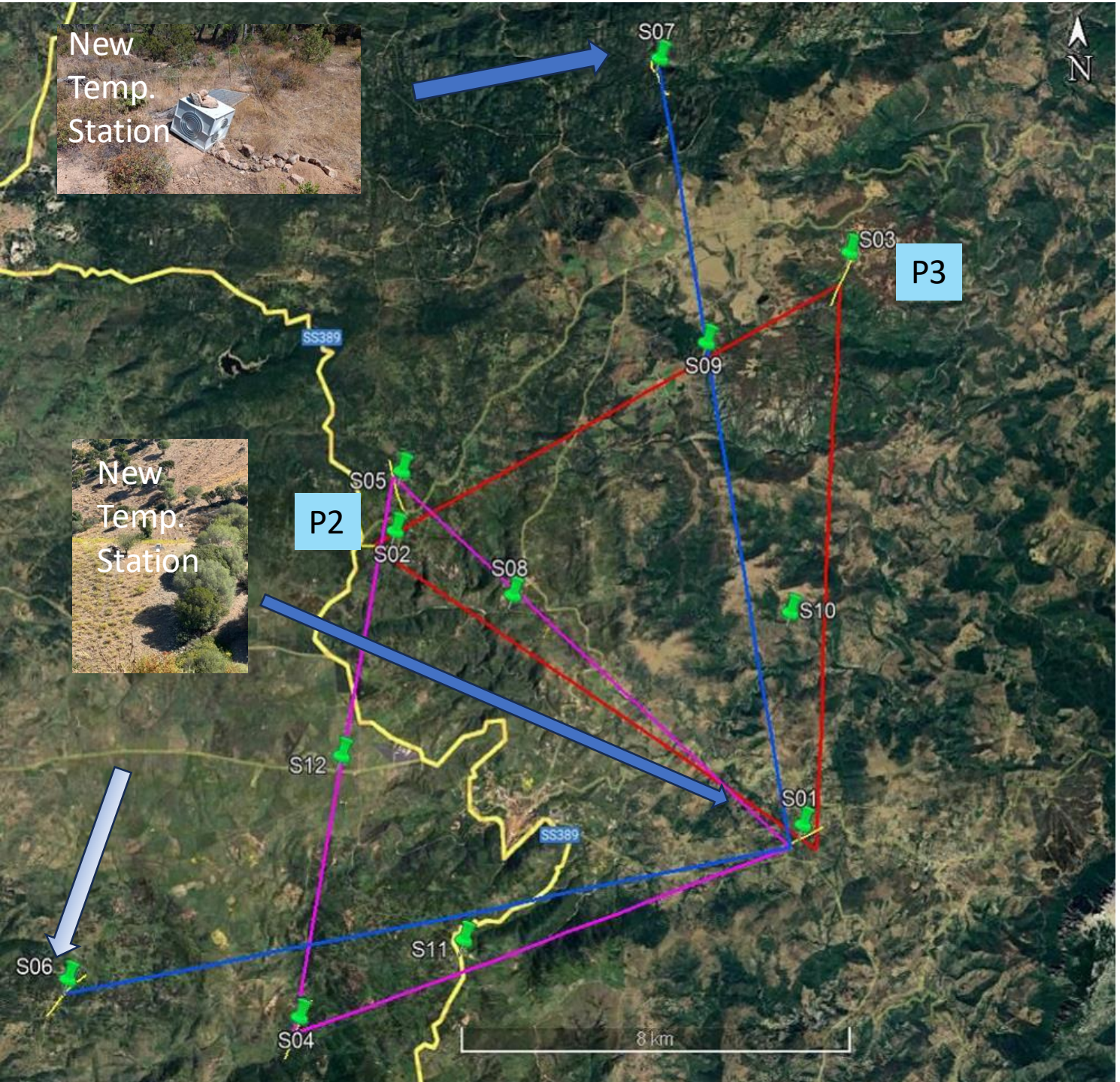
Sardinia: status and updates





New Drilling Campaign started in July ‘24

- 12 boreholes (to be completed by the end ‘24 – beginning ’25)
- 3 ongoing: S03 , S04 and S06
- next one: S07

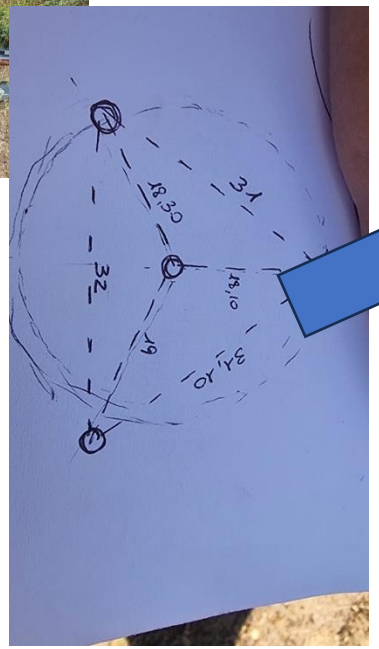


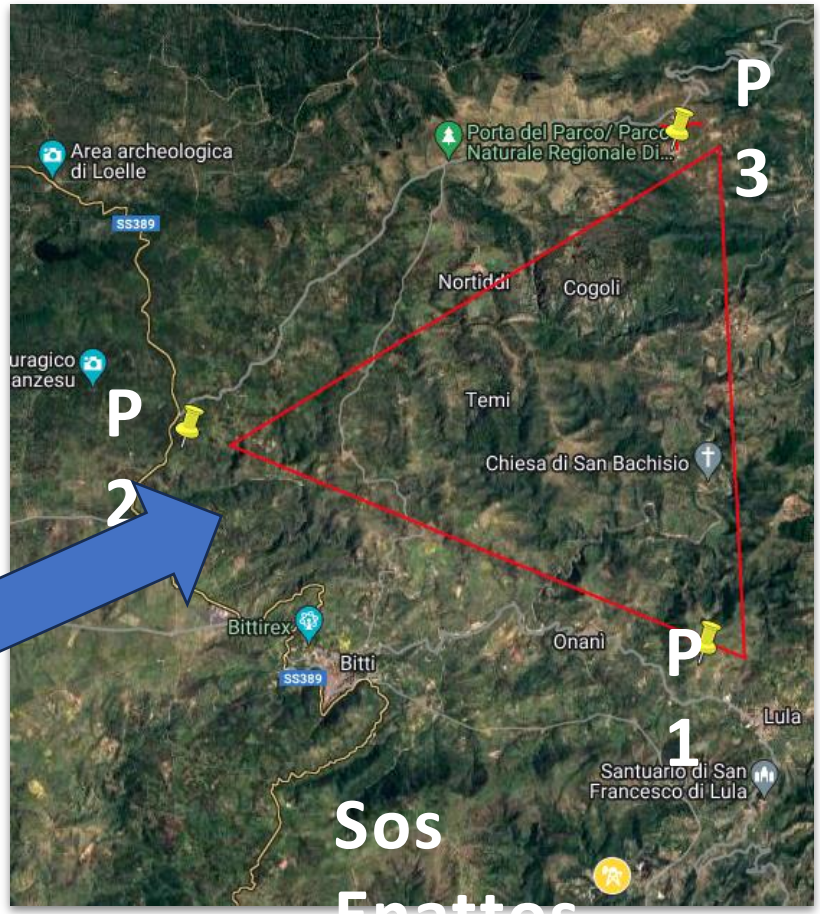
ET ITALY Einstein Telescope

New measurement stations in the other candidate vertices

Acoustic campaign

How deep the detector needs to be built ?
4 microphone stations to characterize the **atmospheric acoustic field** responsible for gravitational fluctuations that would create noise in the Einstein Telescope if constructed at the surface. is to avoid any sensitivity limitations due to this noise from the atmosphere.





https://indico.ego-gw.it/event/710/contributions/6467/attachments/3562/6370/go

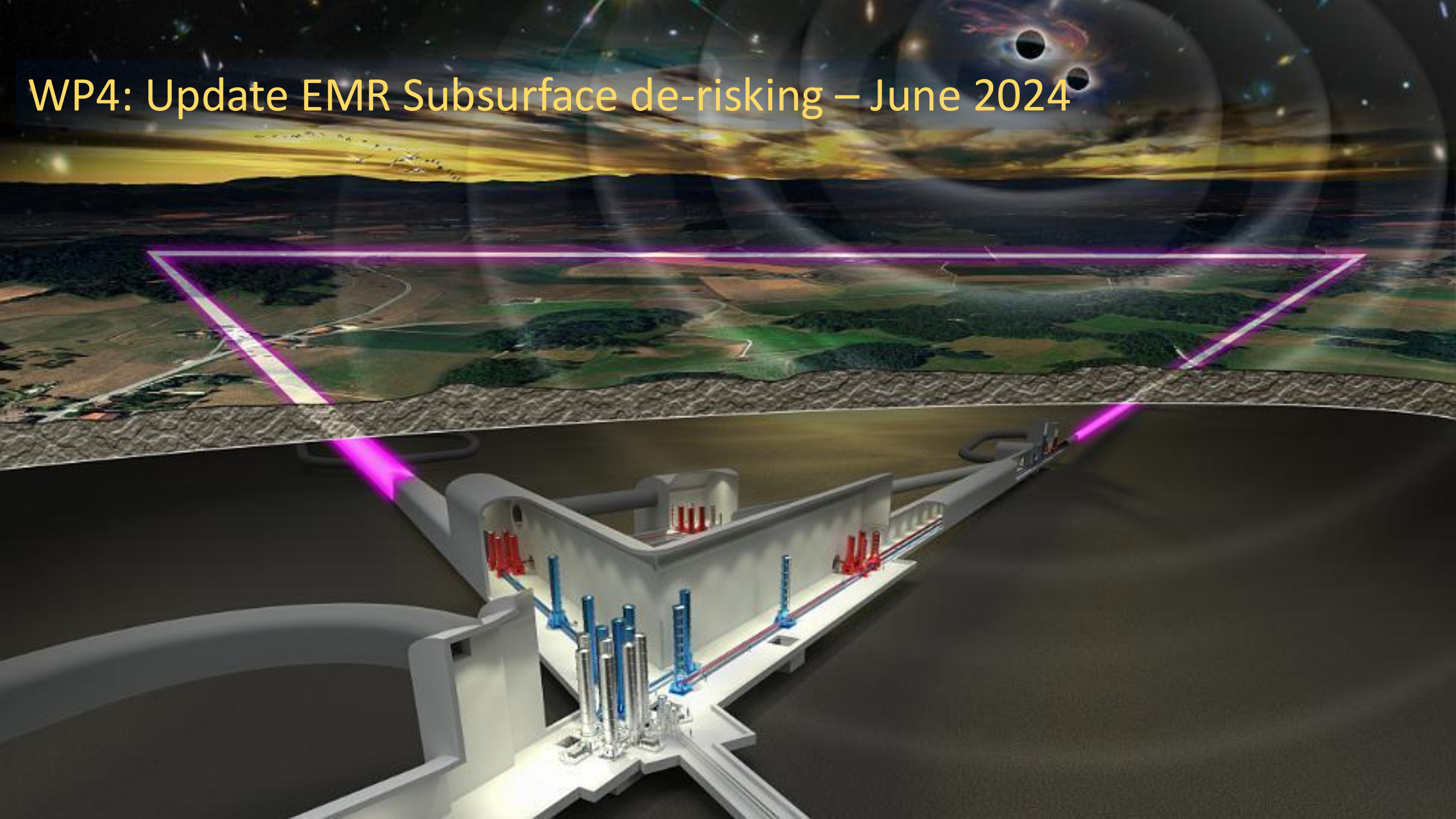
Paper submitted for internal review

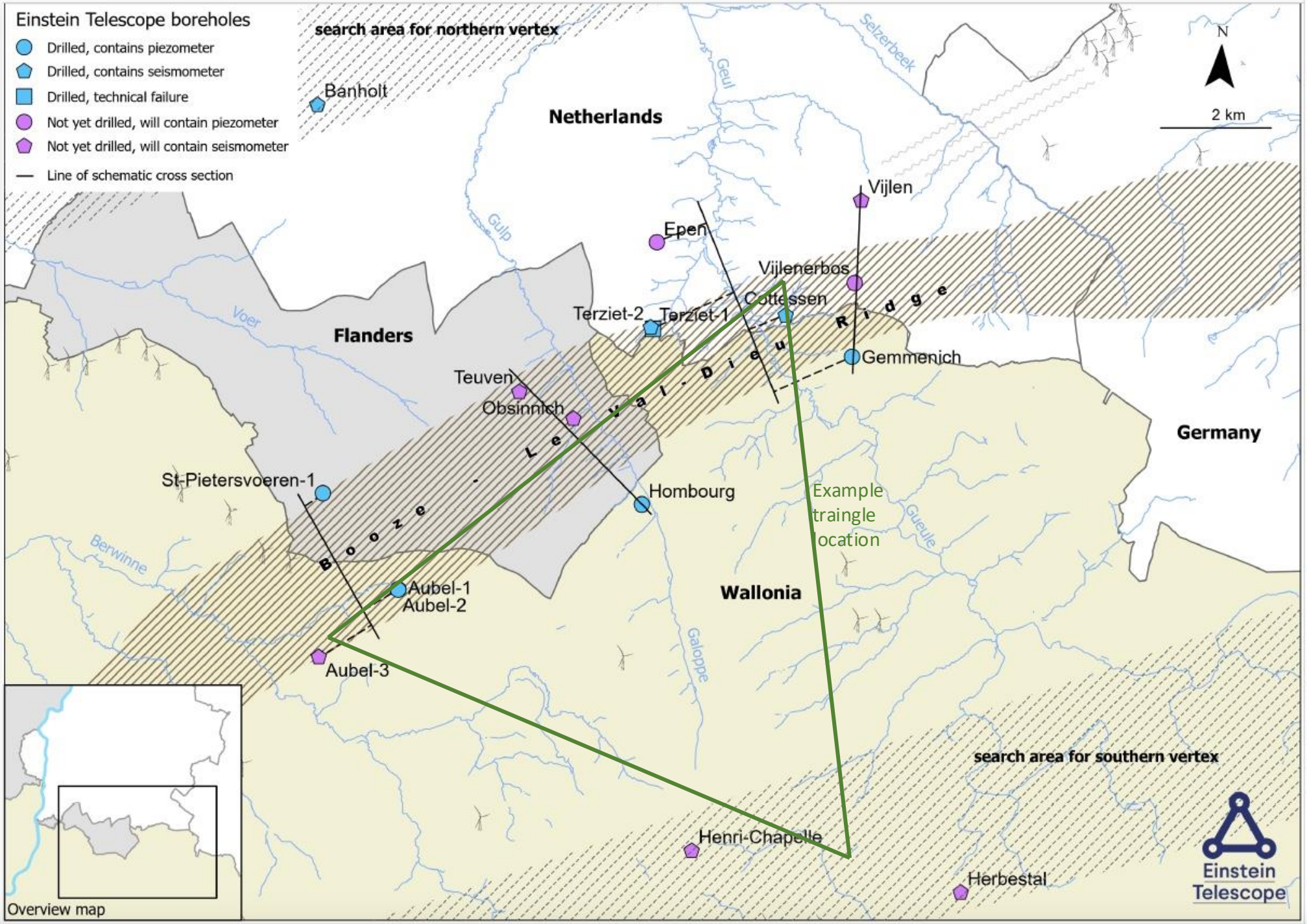
https://apps.et-gw.eu/tds/?call_file=ET-0453A-24_ImpactOnSignalSNROfLocalAmbien.pdf

ET ITALY Einstein Telescope

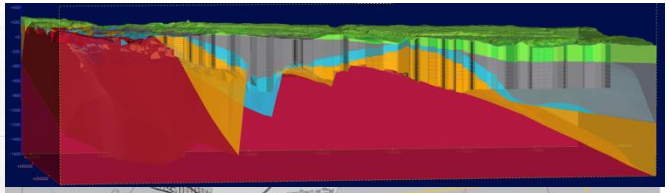
Credits to D. Rozza and M. Di Giovanni

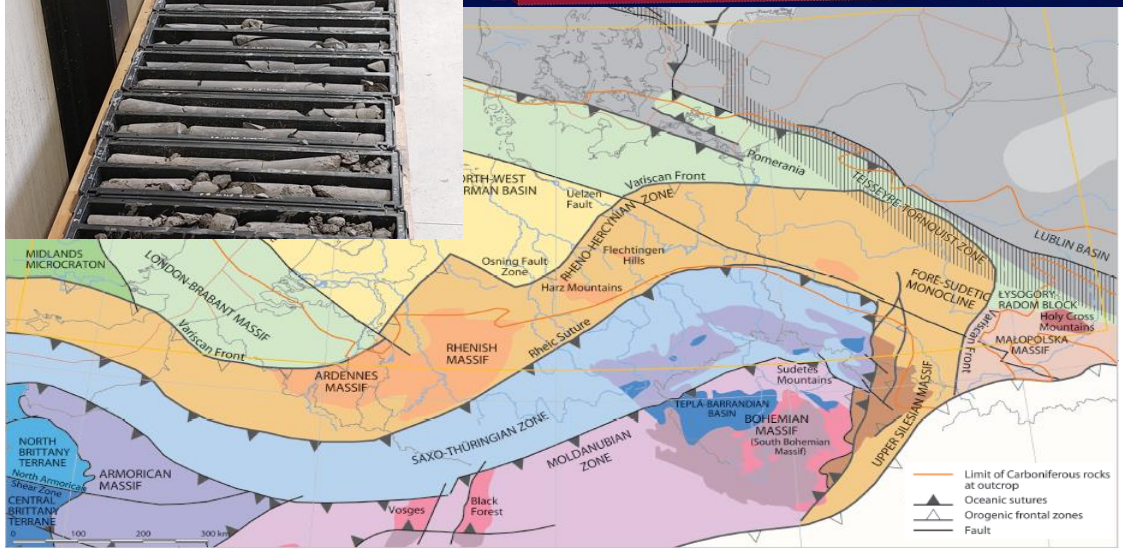
WP4: Update EMR Subsurface de-risking – June 2024

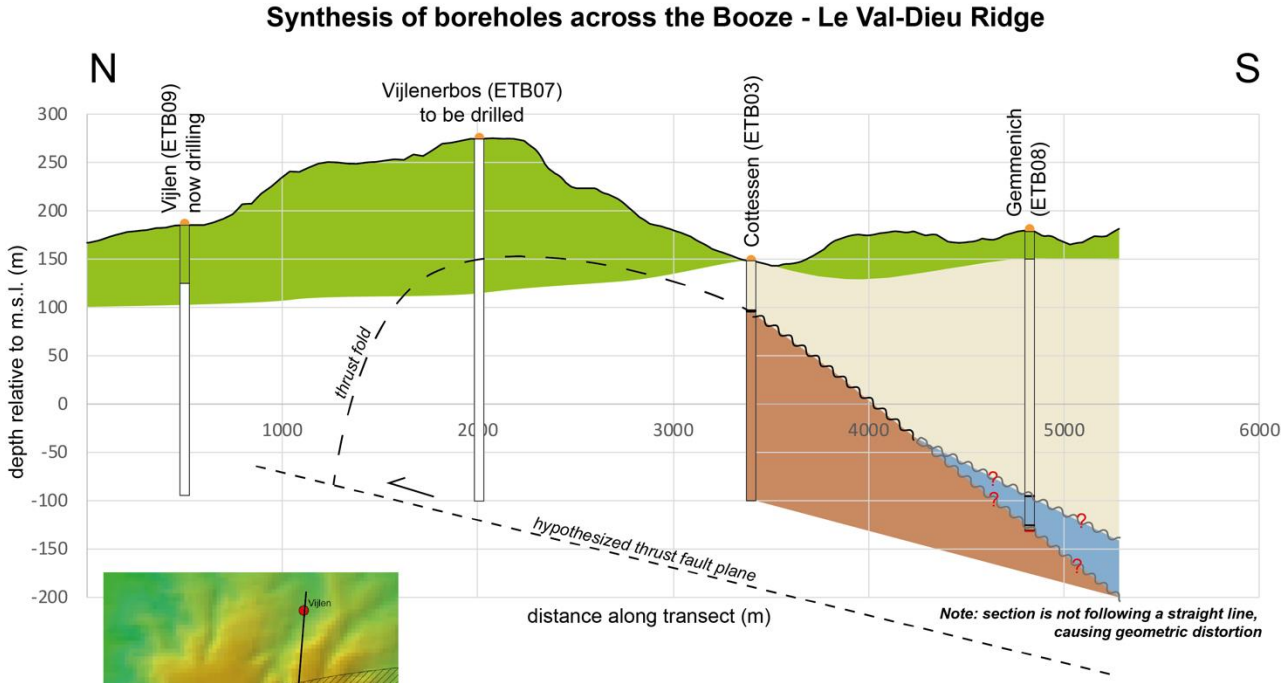


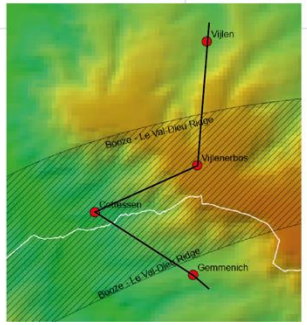

Einstein Telescope boreholes
Drilled, contains piezometer
Drilled, contains seismometer
Drilled, technical failure
Not yet drilled, will contain piezometer
Not yet drilled, will contain seismometer
Line of schematic cross section
search area for northern vertex
Banholt
Netherlands
Geul
Selzerbeek
N
2 km
Vijlen
Epen
Gulp
Vijlenerbos
Cottessen
Terziet-2
Terziet-1
Voer
Flanders
Ridge
Gemmenich
Teuven
Obsinnich
Germany
Land-Dieu
St-Pietersvoeren-1
Hombourg
Example traingle location
Gueule
Berwinne
Booze
Aubel-1
Aubel-2
Wallonia
Galoppe
Aubel-3
search area for southern vertex
Henri-Chapelle
Herbestal
Einstein Telescope
Overview map

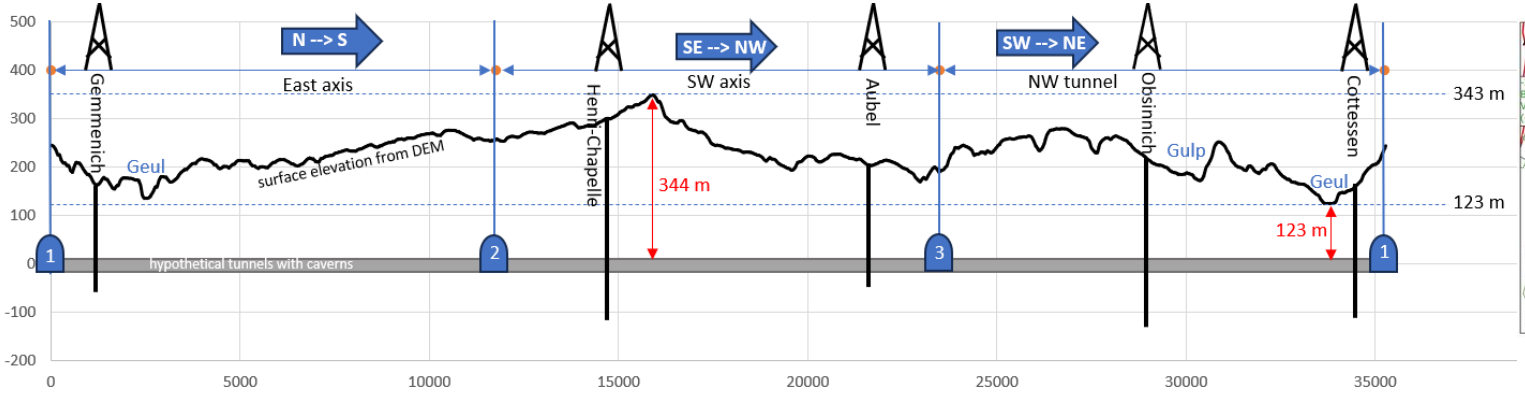
3D Integrated Modeling taking off…

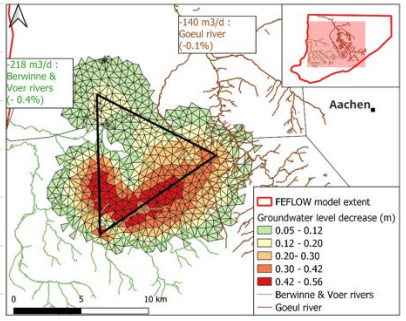


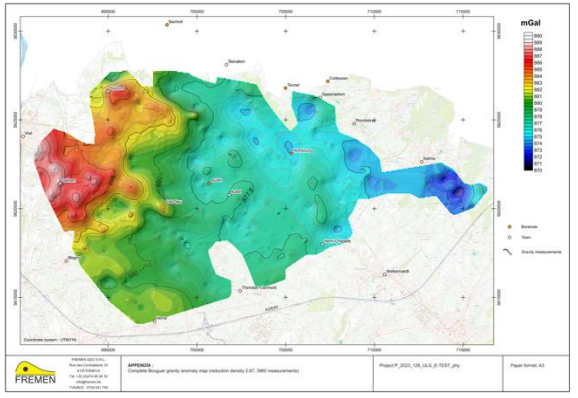






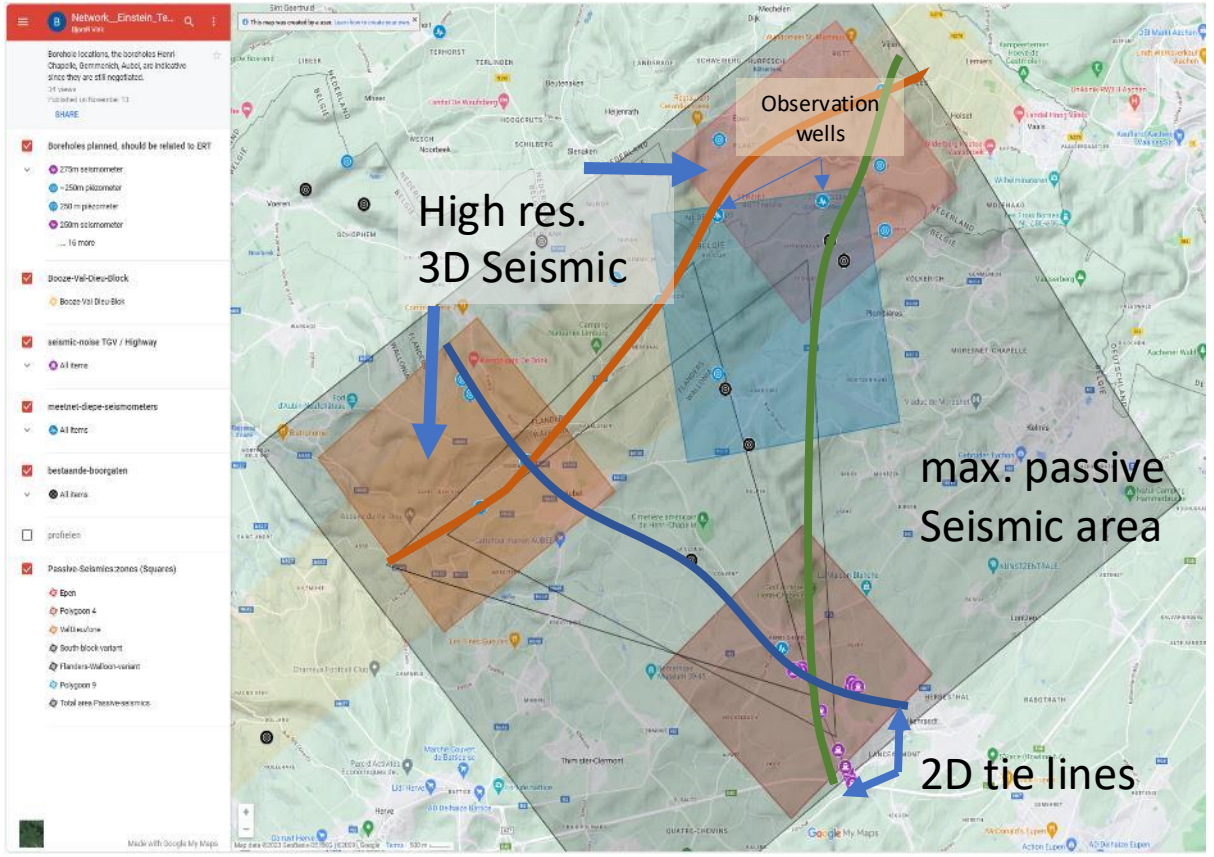






Active seismic campaign 2024 starting this Fall

- 3+ high res. 2D seismic tie-lines between envisioned corner-points
  - Tying into most instrumented wells
  - ➔ crooked lines, total of ~ 50-60km. single vibe (1-100Hz), 5m source, 5m receiver, offset ~1000m, image depth range 0-600m
- 3 high res. 3D seismic surveys (cross-spread based) at potential corner points
  - Each ~1km*1km, 50m source/receiver line spacing, 10m source spacing, 10m receiver spacing ➔ 10k source & receiver positions, 20-line km
- Simultaneously acquire 2D/3D DAS-VSP's at instrumented wells
- 3D passive seismic to delineate Booze Val-Dieu block with Vp, Vs
  - Cover the area (~100 - 225km2) encompassed by the corner-points



Current Status

- 10 out of 11 boreholes completed.
- Final borehole to start this week.
- Logging and geo-mechanical analyses in progress.
- Rock quality is good, hardness at target levels is higher than anticipated and has in fact been causing limited drilling delays.
- Drilling campaign has overall been very successful.
- 2D and 3D seismic to supplement borehole data is being tendered now.
- Six boreholes are now being equipped with down-hole sensors, surface sensors and DAS cable. Noise network should be operational by late Q4.
- Hydro-geological measurements ongoing through pumping tests in selected boreholes.
- Updated results will be presented at yearly meeting.

Useful links

- Wiki page
- Mailing list: et-spb@et-gw.eu (subscribe)
- Site data Web Services
- Einstein Telescope @ Sardinia https://www.einstein-telescope.it/en/home-en/
- Einstein Telescope @ EMR https://www.einsteintelescope.nl/en/