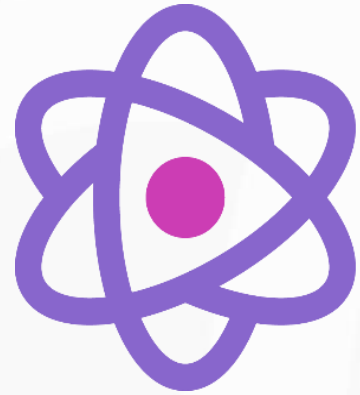




EQUIP-G

European Quantum Infrastructure Project for Gravimetry

Instrument Comparison and Geothermal Use Case

Mirjam Bilker-Koivula, Eveliina Nuttunen, Jyri Näränen + EQUIP-g Consortium

NKG GA 2026, 16/9/2026



EQUIP-G has received funding from the EC's Horizon Europe programme, under the HORIZON-CL4-2024-DIGITAL-EMERGING-02 call.



EQUIP-G - EU Project

A Horizon Europe project towards a future European Research Infrastructure



Funded by
the European Union



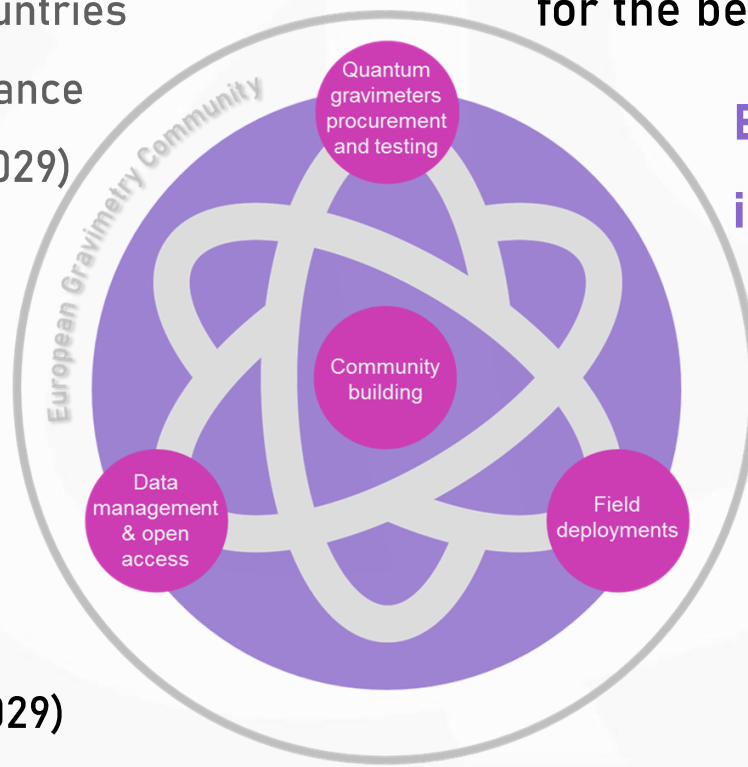
equip-g.eu

Vision

Quantum gravimeters will play a key role to monitor the Earth and tackle some of the most pressing EU societal challenges.

Structure

- ✿ 20 partners, 11 countries
- ✿ Lead by CNRS, France
- ✿ 4 years (2025 – 2029)
- ✿ 4 pillars:



✿ Budget: 25 M€

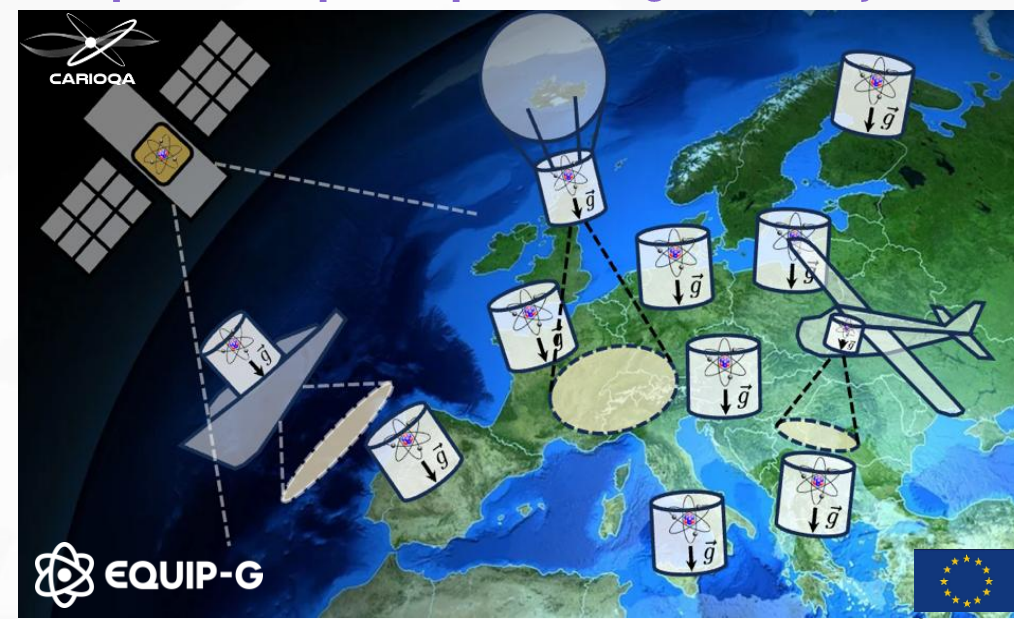
✿ 4 years (2025 – 2029)

Mission

Establish a European perennial research infrastructure managing:

- ✿ a shared park of quantum sensors,
- ✿ a terrestrial reference gravity network, for the benefit and the sovereignty of Europe.

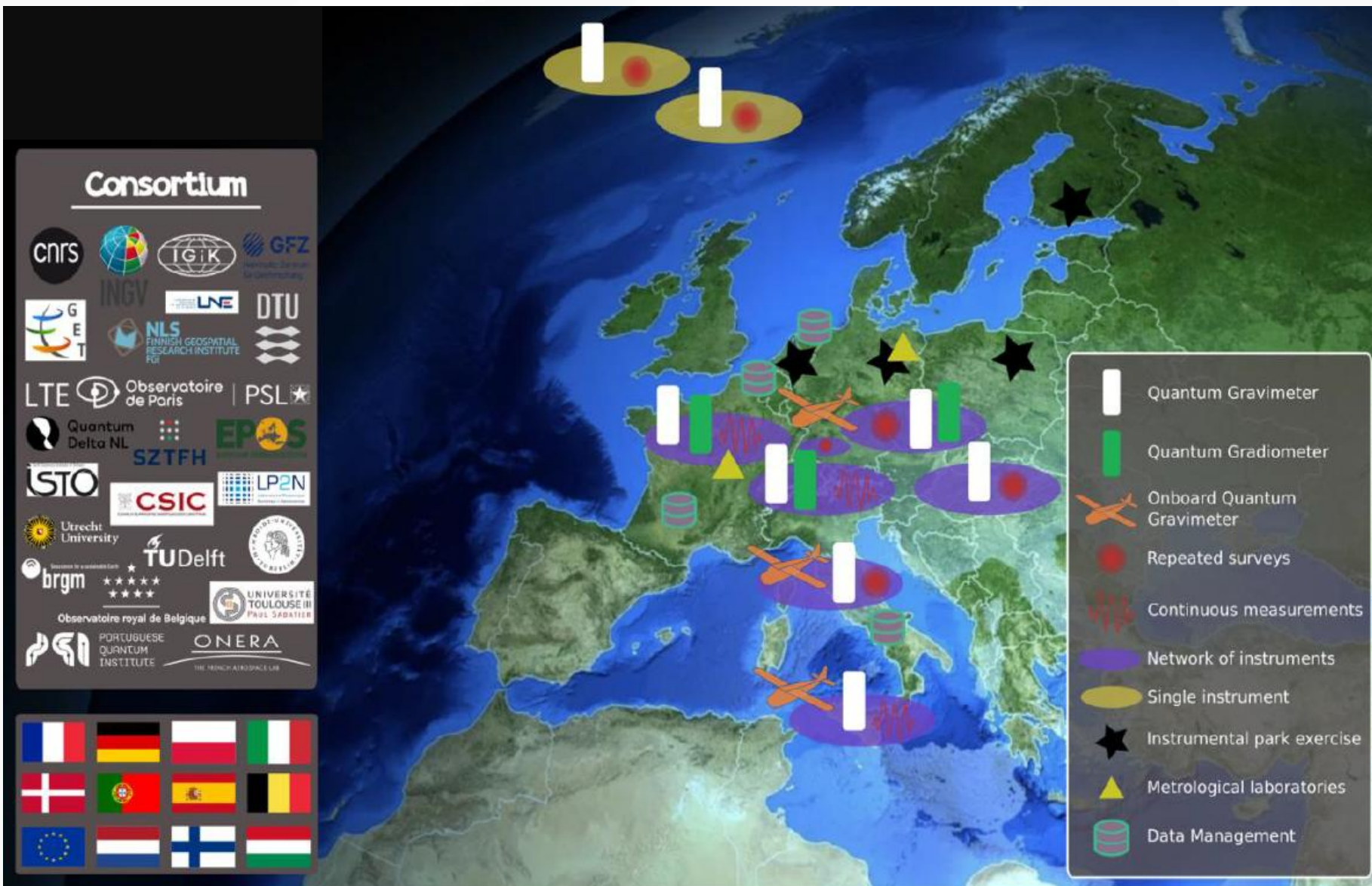
EU vision >2030 : A pan-European quantum gravimetry infrastructure





EQUIP-G - Consortium

A large and committed community towards a future European Research Infrastructure



Expertise in:

- Geophysics, onboard measurement
- Metrology
- Data management
- Operation of quantum sensors

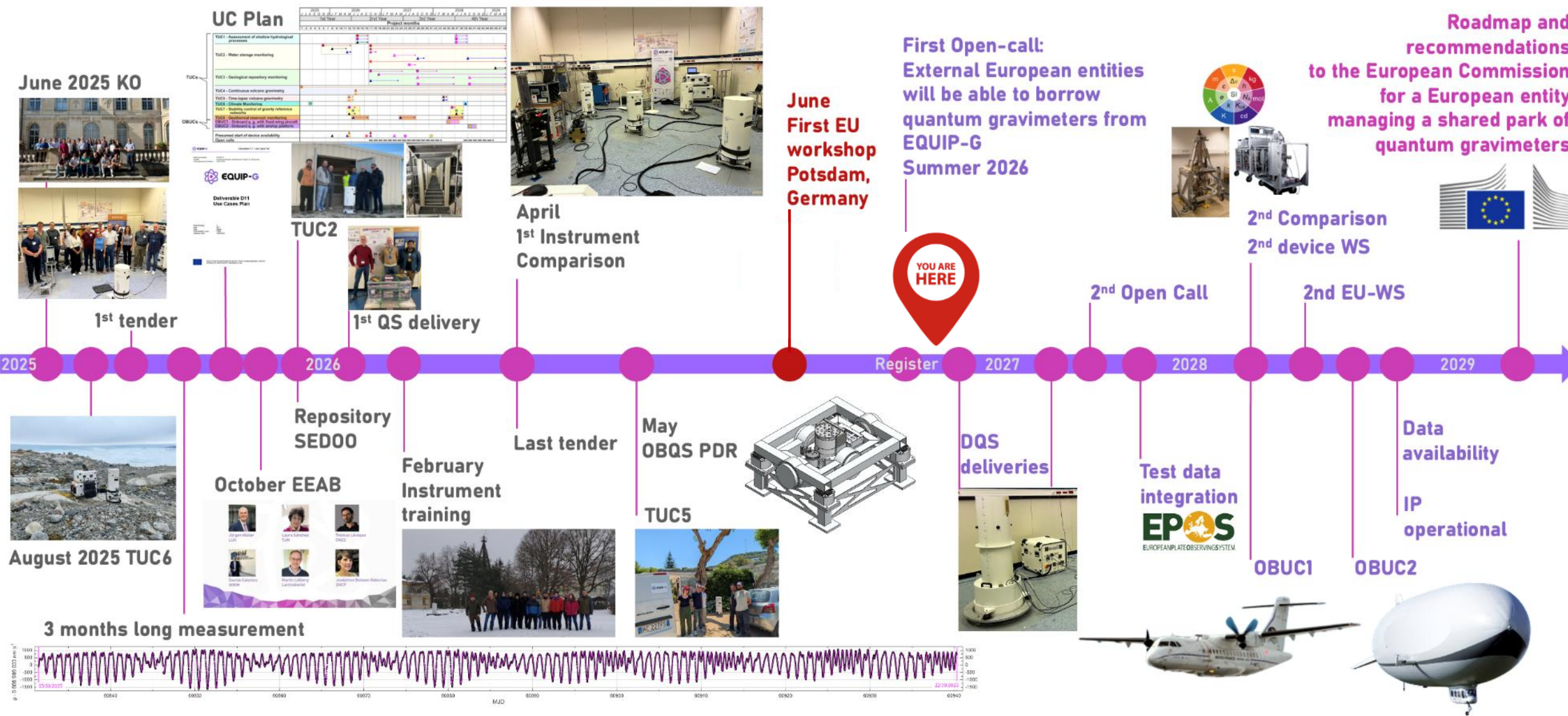
Providing key assets:

- Very first field quantum gravimeter (4)
- Reference laboratory quantum gravimeters (2)
- Gravity reference sites



EQUIP-G - Next steps

Towards the blueprint of a future European Research Infrastructure



NLS-FGI is involved in all Work Packages

Main tasks in WP2

- ✿ Procurement of Absolute Quantum Gravimeter (AQG)
- ✿ Ensure traceability of the instruments involved in the project
 - ✿ Organize AQG comparisons in 2026 and 2028

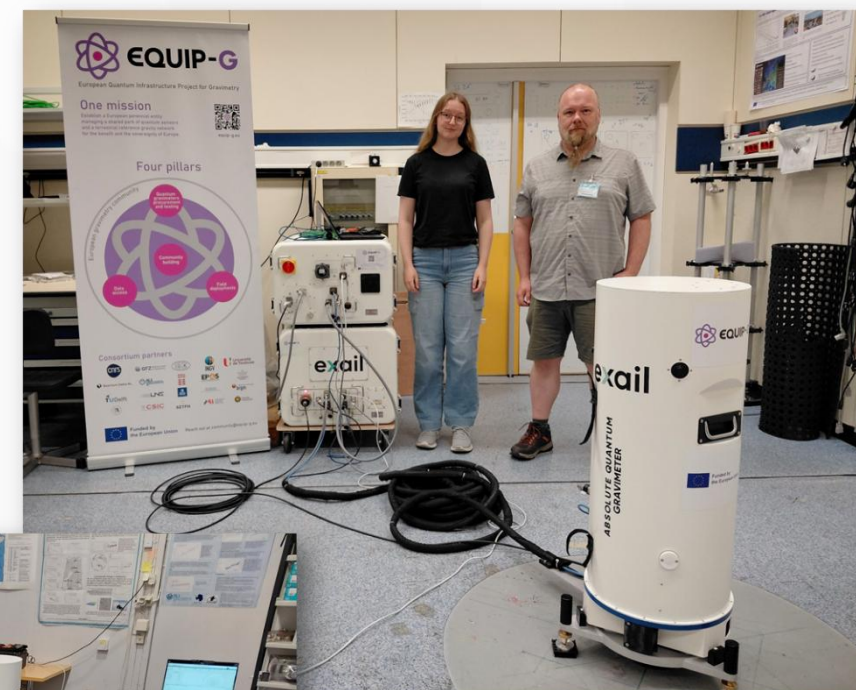
Main tasks in WP3

- ✿ Organize TUC8: Geothermal energy
- ✿ Participate in TUC6: Climate change monitoring – Measurement in Greenland 2028

Procuring quantum gravimeters as products, testing and deploying them in the field

NLS-FGI procurement of Absolute Quantum Gravimeter (AQG)

- ❁ 18.3.2026 - Procurement contract signed
- ❁ 3.8.2026 - Site Acceptance Test at LNE in Trappes (FR) →
- ❁ 17.-20.8.2026 - Reference measurements at Metsähovi Geodetic Research Station (FI) before going to the field
- ❁ 9.2026 onwards - Deployment in the Use Cases ↓



Instrument: Exail AQG-B17

- Temperature range -10...30°C
- Built-in Raspberry Pi computer
- In future part of EU-wide Instrument Park



Procuring quantum gravimeters as products, testing and deploying them in the field

1st Instrument Comparison

Purpose:

-  Guarantee traceability of AQG measurements to the SI-units
-  Verify the interoperability of the AQGs for the use cases
-  Verify the operation of the AQGs

 Location: LNE, Trappes, France

 7.4.-23.4.2026 & 23.7.-5.8.2026

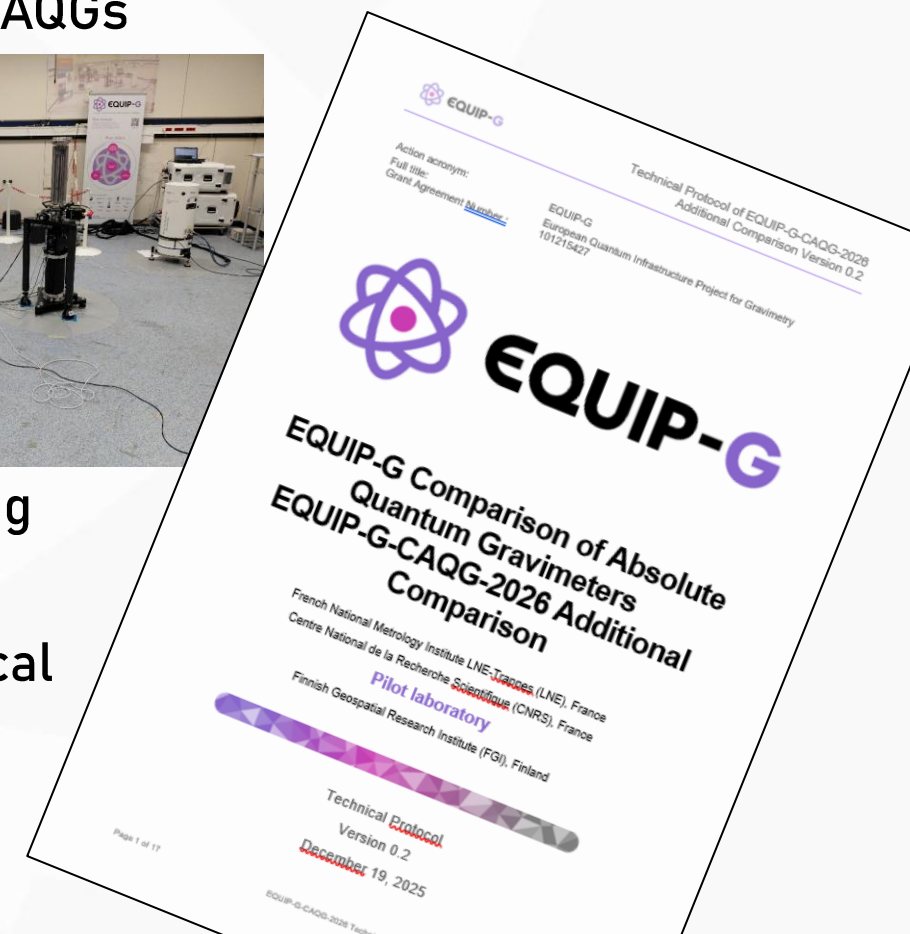
 6 AQGs and 3 FG5(X)-type traditional AGs

 2 new AQGs added in July/Augus 2026

 Superconducting gravimeter monitoring gravity variations during comparison

 Link to last international comparison by two national metrological standard FG5(X)s, FG5X-221 (FGI) and FG5X-206 (LNE)

 Processing of results ongoing



Procuring quantum gravimeters as products, testing and deploying them in the field

1st Instrument Comparison

Week 15

 FG5X-206* – EOST

Week 16

 AQG-B03 – INGV

 AQG-B15 – INGV

 AQG-B07 – IGIK

 AQG-B14 – TUDelft/QDNL

 FG5-228 – GM

Week 17

 AQG-B01 – LNE-OP/LTE

 AQG-B02 – GFZ

 FG5X-221* – NLS-FGI (laser loaned)

Measurement starts latest at:		10:00		18:00
Monday	180° rotation	warm-up & tilts	station exchange	station 1 N
Tuesday		station 1 S		station 2 N
Wednesday		station 2 S		station 3N
Thursday		station 3 S		option to repeat station
Friday		tilts		

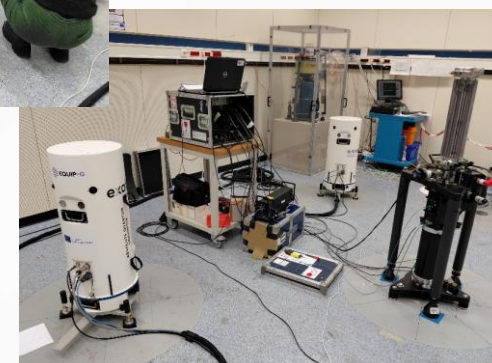
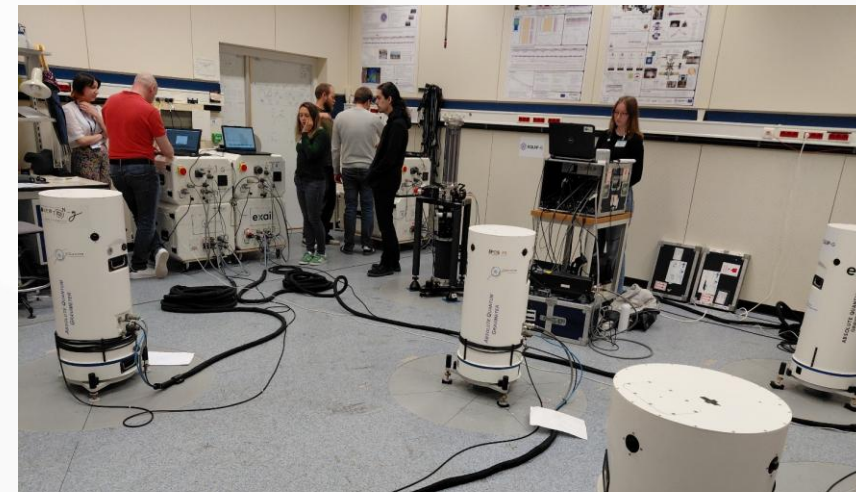
Table 1. Weekly schedule

Week 30/31

 AQG-B16 – INGV

Week 32

 AQG-B17 – NLS-FGI

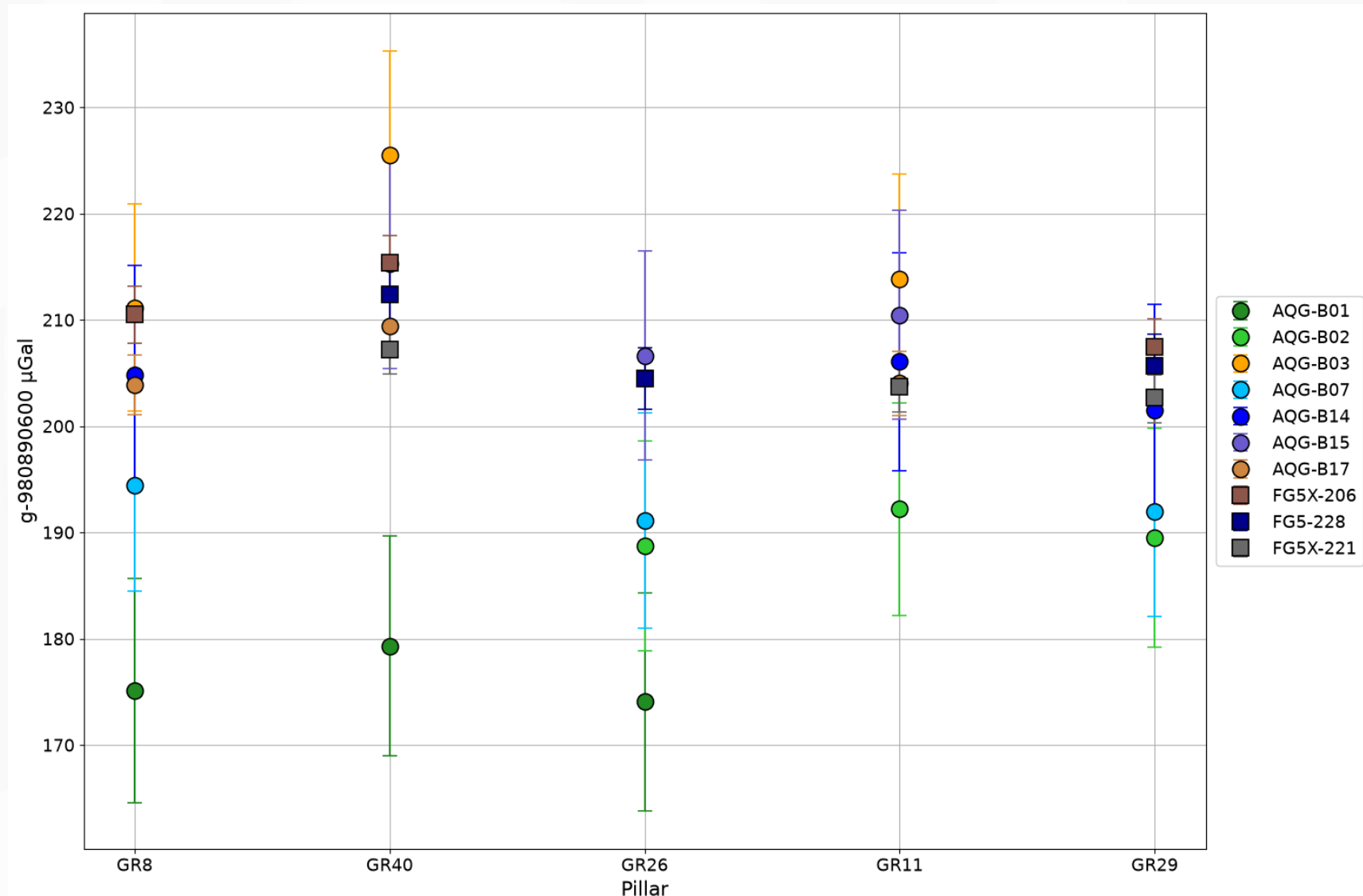


Procuring quantum gravimeters as products, testing and deploying them in the field

1st Results

- AQG results calculated by 4 people / 3 software
- Charlotte Gagne Gouranton's results shown
- AQG-B16 results missing
- AQG N-S results combined
- Reference height 1 m
- SG corrections applied

	EURAMET.M.G-K3	
Gravimeter	DoE (μGal)	$U_{DoE} (k=2)$ (μGal)
FG5X-206	-0.86	4.74
FG5X-221	-0.84	3.36



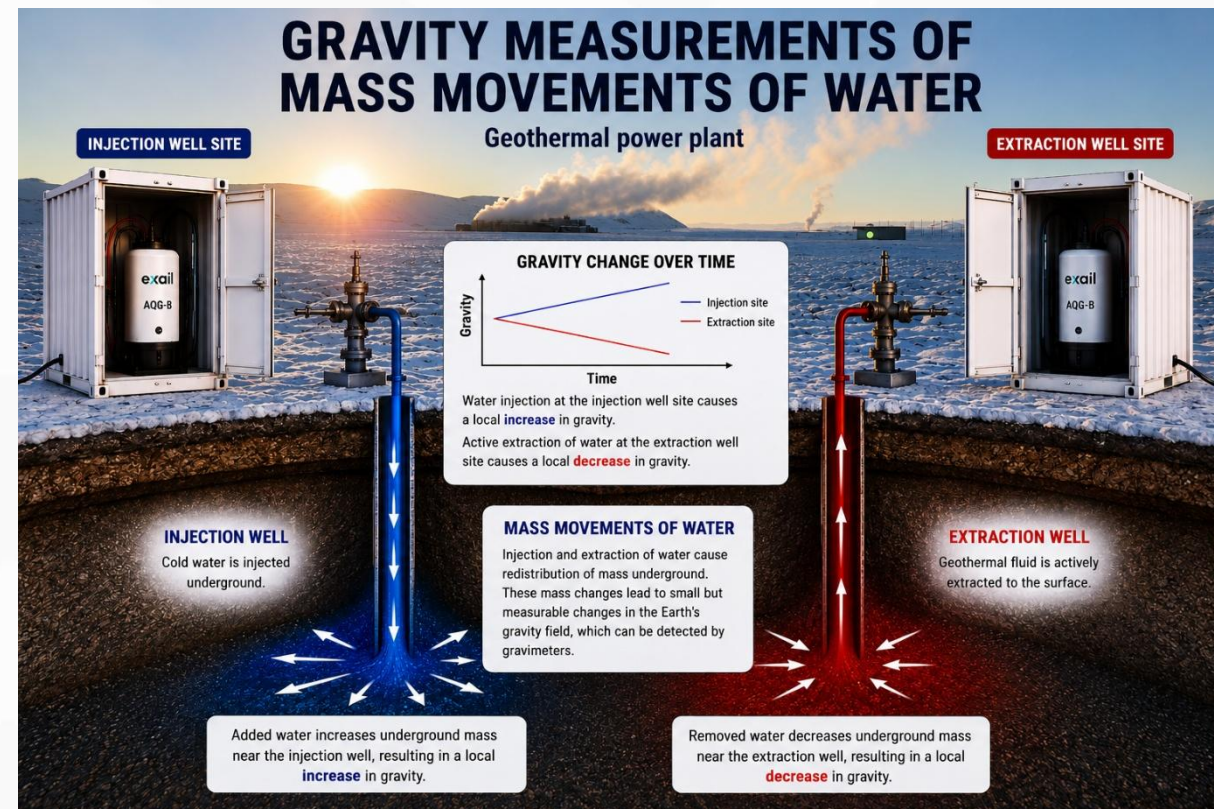


8 use cases to support some of the most pressing European societal challenges

Use Case 8: Geothermal energy

Demonstrate the performance of quantum gravimeters in geothermal reservoir monitoring at Peistareykir power plant in Iceland in summer/autumn of 2026, 2027 and 2028
– in cooperation with GFZ (DE) and Landsvirkjun (IS)

- Monitored by GFZ superconducting gravimeters with drift and scale calibrations by FG5 AG
- AQG-B17 offers absolute, drift free continuous measurements
- Provides information on water mass balance and subsurface fluid dynamics in different temporal domains (hours-days-weeks)
- Control measurements with AQG-B17 before and after in Finland
- 2026: delays due to late arrival of AQG-B17 and customs & transport problems





EQUIP-G

European Quantum Infrastructure Project for Gravimetry



equip-g.eu

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