

Comparison and characterization of the field Atomic Quantum Gravimeter (AQG#B01)

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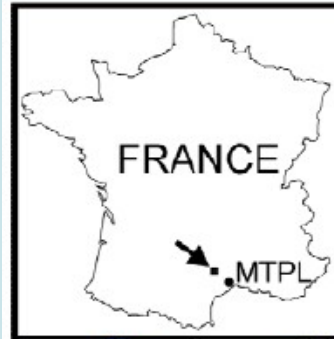
Objectives:

- Evaluation sensibility of the Muquans field absolute quantum gravimeter (AQG-B).
- First measurements of hydrogeological gravity changes
- Evaluation of the long term drift of AQG-B
- Evaluation of sensitivity to tilt and temperature

The Larzac observatory (RESIF / OZCAR / eLTER)

Larzac Observatory

- Operational since 2011:
 - 50 m² building
 - low noise level
- Gravity observations:
 - Superconducting Gravimeter (iGrav#002)
 - Absolute Gravimeter (FG5#228)
 - Atomic Quantum Gravimeter (AQG#001)
- RESIF GNSS and seismological station
- Flux tower
- 3 boreholes monitored
- Hydro-chemistry at the outlet



The building



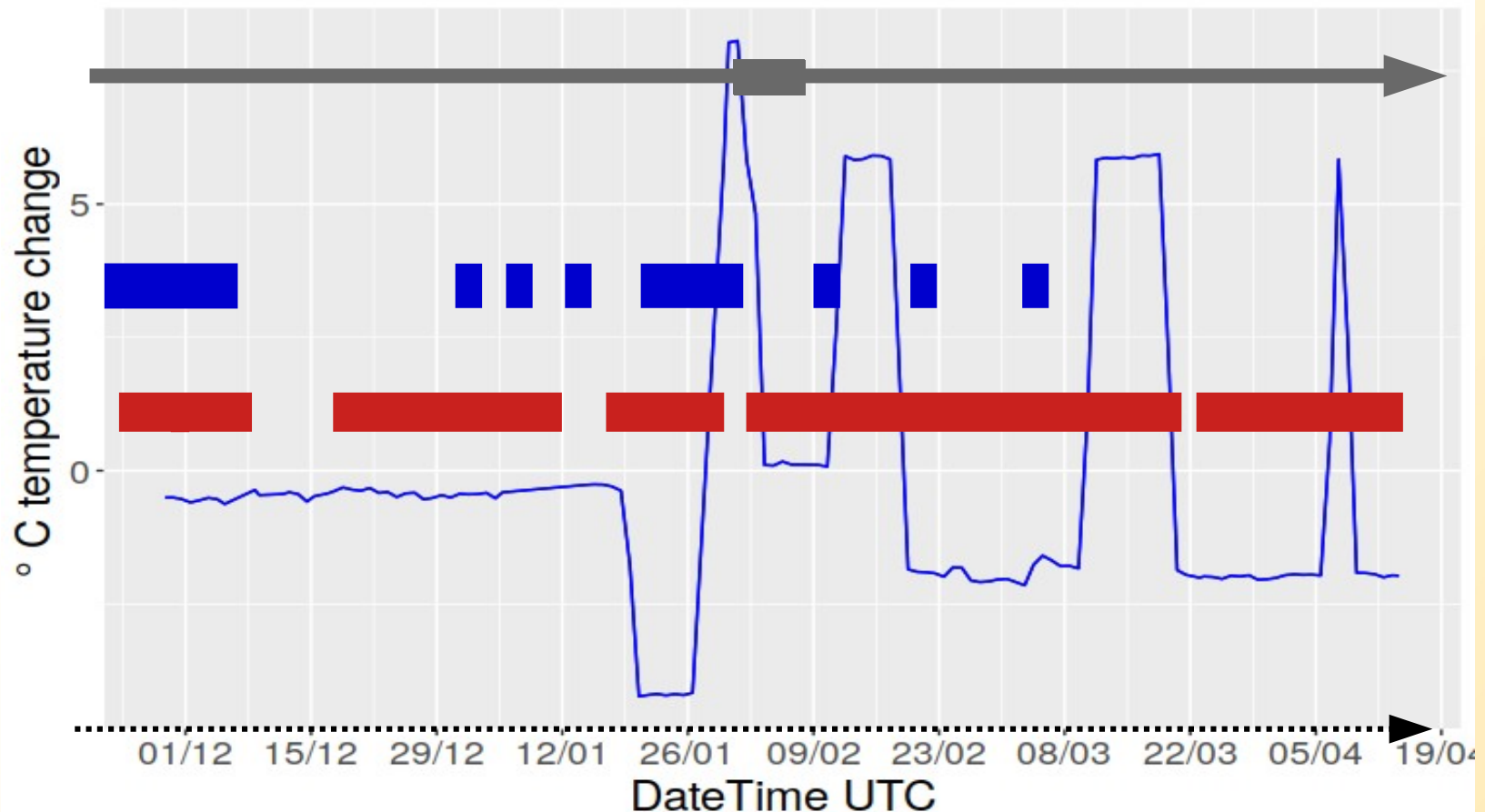
The igrav #002



Absolute Quantum Gravimeter (AQG) In the Larzac Observatory

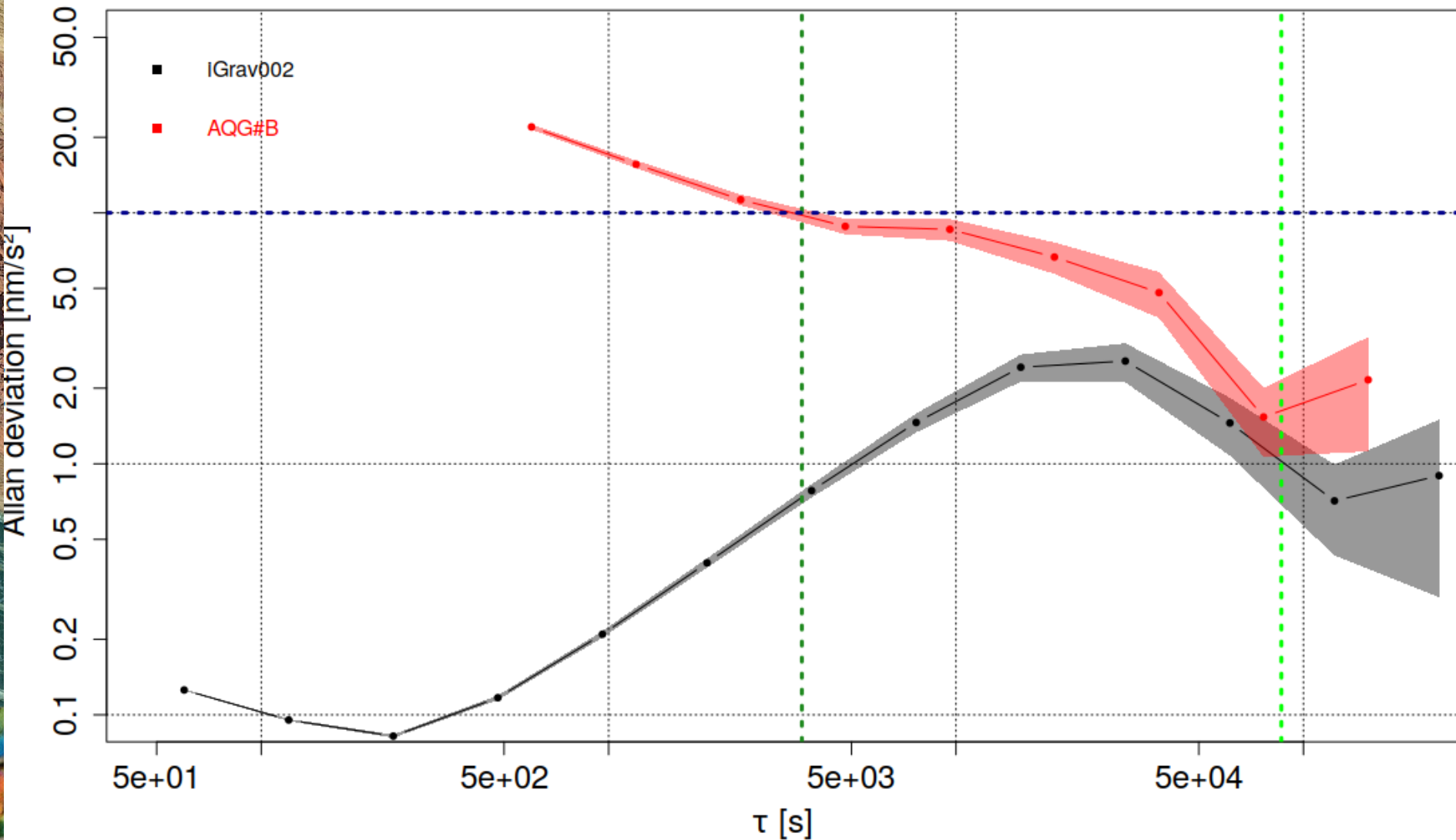


Time line and data availability



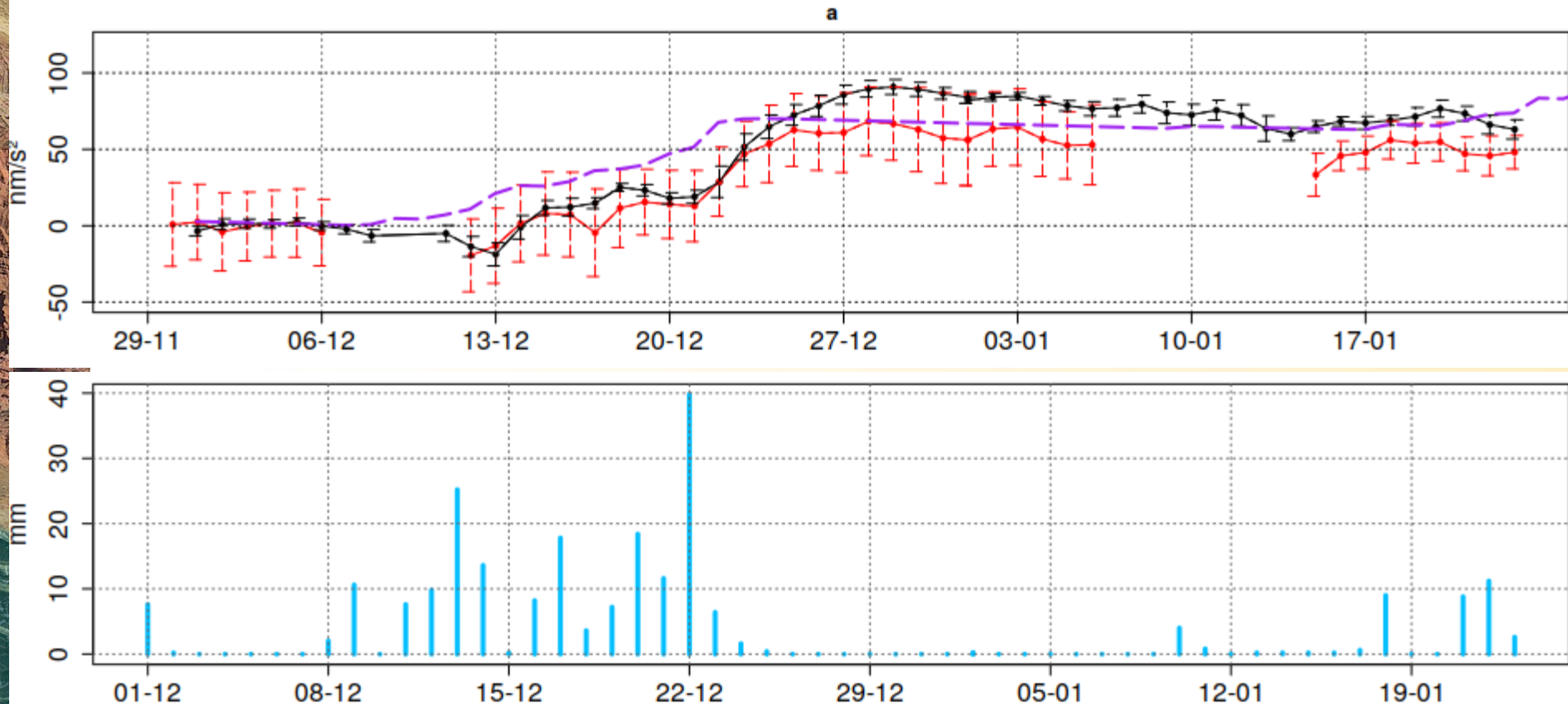
- AQQG-B, FG5 and SG (iGrav) data available
- Precipitation, wind and seismometer data available
- Low noise observatory
- Repeated tilt and temperature experiments

Sensitivity



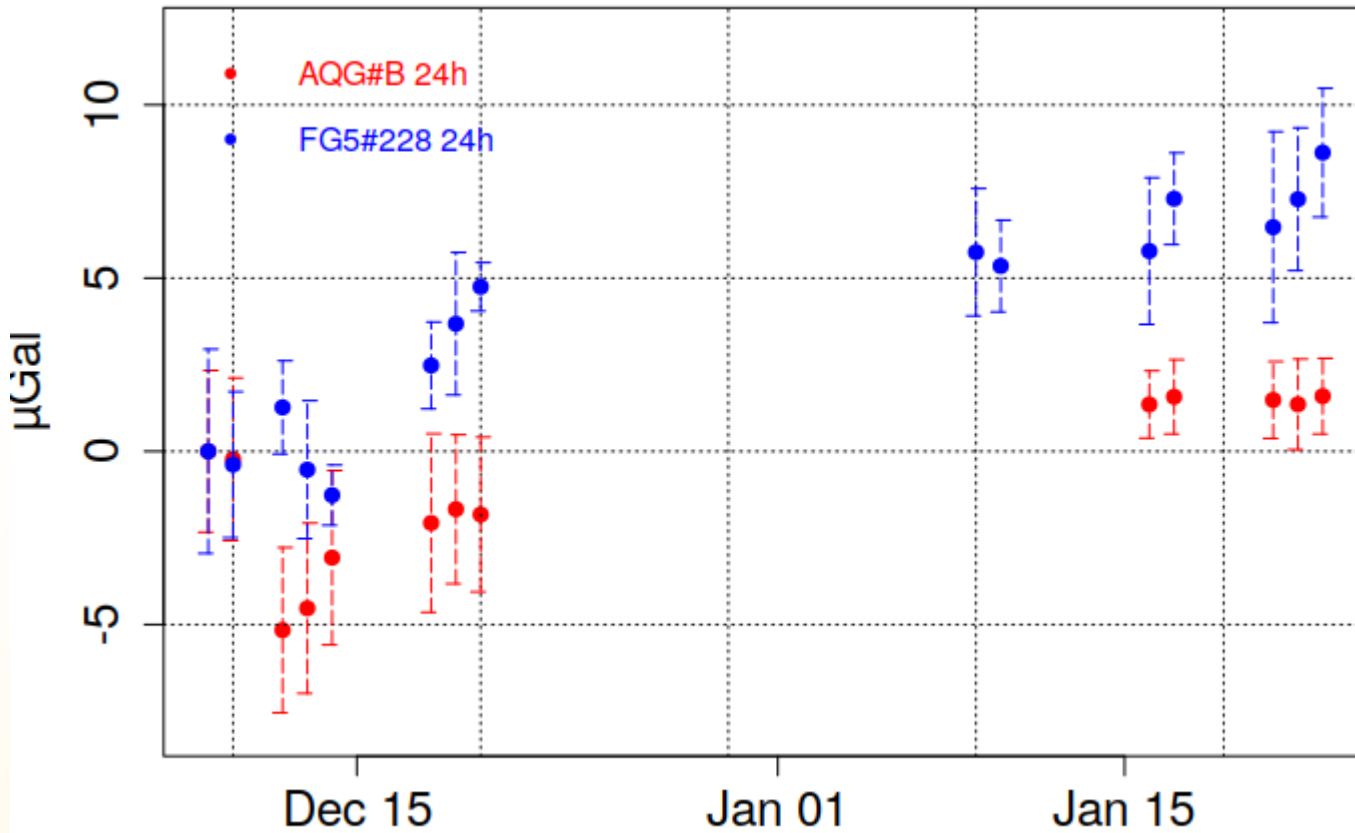
→ 10 nm/s^2 after ~ 1 hour
 → 1 nm/s^2 after ~ 24 hour (as SG)

Hydrogeological gravity changes



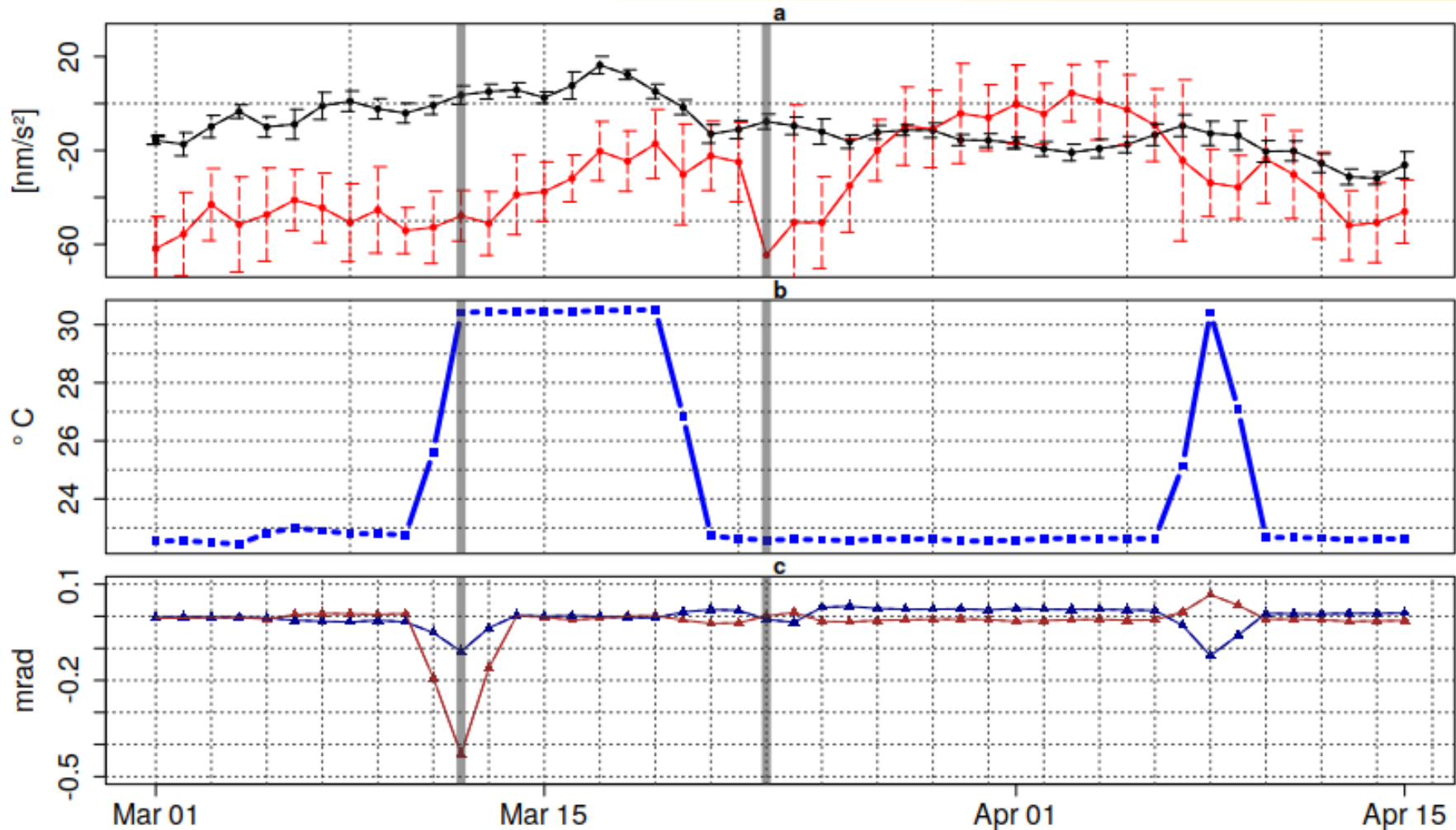
- 100 nm/s² gravity changes in two weeks
- Equivalent gravity measurements between SG and AQQ-B

Drift



→ No significant drift compared to FG5 measurements

Temperature and tilt sensitivity



→ No evidence of the temperature or tilt sensitivity

Conclusion

- No significant drift after a few months
- Transient 100 nm/s² transient gravity signal clearly measured
- Sensitivity ~ 10 nm/s² in 1 hour (low noise environment)
- So far no clear sensitivity to temperature

On going tests

- Coriolis effects
- Accuracy (so far better than 10 nm/s² compared to FG5)
- “Field” measurements (garage without air conditioner)

Thanks for your (virtual) attention



<http://hplus.ore.fr/en/larzac>
<https://data.oreme.org/observation/gek>

