Geophysical Research Abstracts
Vol. 20, EGU2018-17565, 2018
EGU General Assembly 2018

Evaluation of the repeatability and the stability of an operational Absolute Quantum Gravimeter

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The Absolute Quantum Gravimeter (AQG) is an industry-grade commercial gravimeter measuring g with laser-cooled atoms [1] that has been developed in close collaboration with RESIF (the French Seismologic and Geodetic Network, [2]). This paper offers to review the latest characterizations of the first unit of the AQG, that have been conducted by the scientific teams of both RESIF and Muquans.
We will discuss the performances of the AQG in terms of sensitivity, stability and repeatability of the measurements provided by the first unit. In particular, we will report on a sensitivity to gravity better than 1 μGal in various types of environment and on stable month-long continuous measurements. The first unit of the AQG has been transported several times over the past two years and we will particularly focus on the recent studies and comparisons with other gravimeters that were carried at the H+ Observatory operated in France by Geoscience Montpellier, member of RESIF.
This ensemble of results today validates the feasibility to operate a quantum gravimeter as a mobile turn-key device but also the ease of use and the robustness of the AQG. This work paves the way to practical investigation of both spatial and temporal gravity variations at the μGal level in both laboratory and field conditions [3].

[1] F. Pereira dos Santos, S. Bonvalot, "Cold-atom absolute gravimetry", Encyclopedia of Geodesy, pp 1-6 (2016)
[2] http://www.resif.fr/
[3] M. Van Camp, O. de Viron, A. Watlet, B. Meurers, O. Francis, C. Caudron, "Geophysics from terrestrial time-variable gravity measurements", Rev. Geophys. (2017)