EGU24-19937, updated on 14 Dec 2024
https://doi.org/10.5194/egusphere-egu24-19937
EGU General Assembly 2024

CARIOQA-PMP: developing quantum sensors for earth observation

Christian Schubert
Deutsches Zentrum für Luft- und Raumfahrt (DLR), Institut für Satellitengeodäsie und Inertialsensorik, Hannover, Germany (christian.schubert@dlr.de)

For the CARIOQA-PMP Consortium

Due to their performance especially at low frequencies, quantum sensors based on atom interferometry are expected to enhance the capabilities of future missions for earth observation. Atom interferometers, e.g. in a configuration as an accelerometer / gravimeter are routinely operated in laboratories and commercial versions exist. Additionally, payloads with demonstration experiments on cold atoms and atom interferometry were implemented on microgravity platforms including parabola flights, a drop tower, and sounding rockets, significant steps towards a future deployment on a satellite, but each limited in microgravity time.

Both the specific environment of a satellite and the desired performance of a future, space-borne quantum accelerometer imply strict requirements and consequently the need for further technology developments in comparison to the current state of the art. This context sets the scope for the project CARIOQA-PMP (Cold Atom Rubidium Interferometer in Orbit for Quantum Accelerometry – Pathfinder Mission Preparation). Supported by scientists, the main task is the development of an engineering model of a quantum accelerometer for a dedicated pathfinder mission in space. Additionally, the project considers the scientific background, especially in the context of a possible future space mission.

This contribution will present the motivation and the approach of CARIOQA-PMP for enabling future quantum-sensor-enhanced missions for earth observation.

CARIOQA-PMP is a joint European project, including experts in satellite instrument development (Airbus, Exail SAS, TELETEL, LEONARDO), quantum sensing (LUH, SYRTE, LP2N, LCAR, ONERA, FORTH), space geodesy, Earth sciences and users of gravity field data (LUH, TUM, POLIMI, DTU), as well as in impact maximisation and assessment (PRAXI Network/FORTH, G.A.C. Group), coordinated by the French and German space agencies CNES and DLR under CNES lead. Funded by the European Union.