CARIOQA-PMP

Newsletter N°3

November 2024

Discover the latest news
from the CARIOQA-PMP project !

TABLE OF CONTENTS

1. CARIOQA-PMP consortium gathers in Brussels for EM Critical Design Review and reporting review

CARIOQA-PMP consortium during the Reporting Review in Brussels

The Critical Design Review (CDR) and the Reporting Review of the CARIOQA-PMP project took place at the European Commission headquarters in Brussels from 7 to 11 October 2024. This key milestone brought together consortium members, the project officer, and three external evaluators to assess the project's progress and address its most important challenges.

2.CNES Experts Present the Quantum Space Gravimetry Pathfinder mission at IAC

Christine Fallet, Pascal Prieur and Thomas Leveque, from the Centre National d'Etudes Spatiales (CNES), the coordinator of both CARIOQA-PMP and CARIOQA-PHA projects, have published a significant paper in the International Astronautical Congress (IAC).

The paper highlights the work on CARIOQA mission project which aims to develop a Quantum Space Gravimetry Pathfinder Mission.

The project focuses on using quantum sensors, specifically atom interferometry, to improve the accuracy of satellite-based measurements of Earth's gravitational field. This technology offers high-precision observations crucial for tracking global climate changes, such as rising sea levels. Current accelerometers used in gravimetry missions are limited in accuracy, but quantum sensors could overcome this barrier.

Funded by the EU under Horizon Europe programme, the CARIOQA project will demonstrate the feasibility of using quantum sensors in space, paving the way for future high-precision gravimetry missions. This advancement shall enhance our ability to monitor and understand the impacts of climate change.

3.CARIOQA-PMP Post-Pathfinder Roadmap presented in Brussels

The CARIOQA-PMP Post-Pathfinder Roadmap Workshop successfully took place on 11 October 2024 at the Covent Garden Building, Brussels. The event gathered key stakeholders to review the roadmap's status and discuss next steps.

This workshop marks an important step in shaping the future path towards a European quantum space gravimetry mission after the launch of a CARIOQA pathfinder mission around 2030. In the workshop, key risks and recommendations for a post pathfinder mission were identified from technical, programmatic, economic and societal perspectives.

The participation of different European stakeholders contributes to harmonise the roadmap within the European programmatic framework.

The workshop featured presentations from EU and ESA, group discussions on the basis of a draft summary roadmap, and concluded with a summary of the discussion results.

4. The CARIOQA mission highlighted through the Quantum Flagship initiative

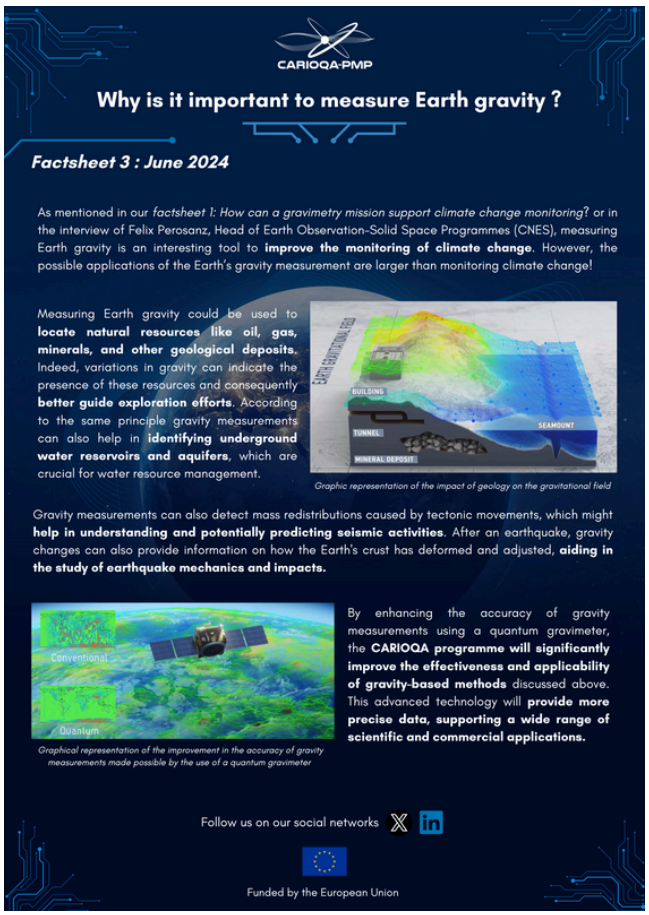
The Quantum Flagship is a major European initiative aimed at advancing quantum technologies. Launched by the European Commission, it supports research and innovation in areas such as quantum computing, communication, and sensing. With a 10-year roadmap and significant funding, the initiative brings together academic institutions, industry, and research centres to drive breakthroughs in quantum science, fostering Europe's leadership in the global quantum race. It aims to transform a wide range of sectors, from cybersecurity to high-precision measurements, through cutting-edge quantum solutions.

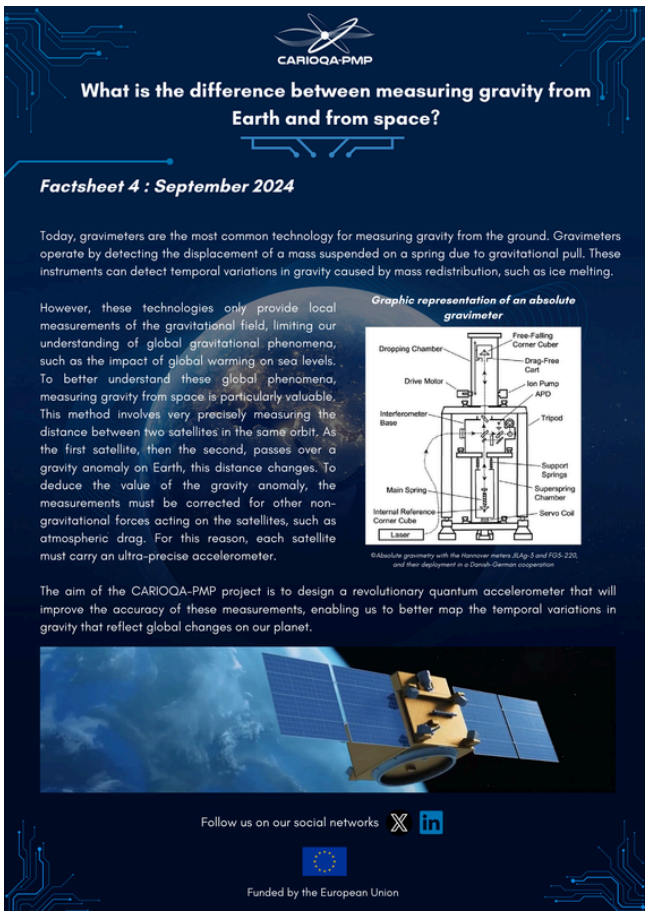
After meeting between the Project Coordinator Christine Fallet and the Communication Team, the quantum flagship team has decided to highlight the CARIOQA-PMP project by publishing a news about the impact of the overall mission.

The article discusses the development of quantum space sensors by the CARIOQA consortium, aimed at improving climate monitoring. These sensors, using quantum accelerometers, will measure subtle changes in Earth's gravity with unprecedented precision, offering better data on glaciers, sea-level rise, and groundwater levels. By leveraging quantum technologies, the project hopes to overcome the limitations of traditional gravimetry, providing clearer, more accurate insights into global climate changes. Supported by the European Commission’s Quantum Flagship initiative, CARIOQA seeks to position Europe as a leader in quantum space technology for climate action.

Let’s discover the CARIOQA-PMP Article and other news of the Quantum initiative by clicking **here**.

5. Discover the latest CARIOQA-PMP factsheets





The CARIOQA-PMP consortium recently launched a series of factsheets aimed at disseminating knowledge about the CARIOQA-PMP project. To date, four factsheets have been published, with two new additions since our last newsletter.

The latest factsheet highlights how the shift to gravivity space-based measurements compared to ground measurment opens up exciting new possibilities for scientific exploration and the third factsheet focuses on the pratical application of earth gravity measurement.

If you're interested in gravity measurement, Earth observation, or want to learn more about the technologies behind CARIOQA-PMP, we encourage you to explore our factsheet series. You can find them on LinkedIn, Twitter, or directly on the CARIOQA website in the "Publications" section.

Stay tuned for our upcoming factsheet, which will delve into previous gravity field measurement missions that have laid the groundwork for CARIOQA !

6. Discover the project partners ONERA and SYRTE

ONERA (Office National d'Études et de Recherches Aérospatiales) is France's national aerospace research centre. It plays a key role in advancing scientific research and technological innovation in the fields of aerospace, defence, and security. With expertise ranging from aerodynamics to space technologies, ONERA conducts cutting-edge research, develops advanced technologies, and supports both industry and government in improving aircraft, spacecraft, and defence systems. In the frame of the CARIOQA-PMP project, ONERA provides its expertise in the field of cold atom interferometry and space accelerometry. The involved team is today at the forefront of the developments regarding onboard quantum sensors with main activities focused on airborne and marine cold atom gravimetry. Providing the electrostatic accelerometers of the last space gravimetry missions, ONERA is also a major actor regarding space applications of accelerometers. The team also participates to the scientific development of the CARIOQA mission with a particular attention dedicated to the exploration of the hybrid sensor concept, combining the advantages of both quantum and electrostatic technologies.

SYRTE (Systèmes de Référence Temps-Espace) is a leading French research laboratory specialising in time and space reference systems. Part of the Paris Observatory, SYRTE focuses on precise timekeeping, atomic clocks, inertial sensors and fundamental physics. It plays a key role in developing technologies for navigation, geophysics, and space science, contributing to global standards in time and frequency and gravimetry measurements. In the CARIOQA-PMP project, SYRTE is involved in the definition of the key specifications of the quantum accelerometer and its subsystems, and provides the industrial consortium with his expertise in the realization and characterization of high performance quantum sensors based on atom interferometry. In particular, SYRTE is in charge of the modelling of the atom interferometer, a key component of the full mission simulator. SYRTE will also take an active part in the testing and validation of the sensor after the integration phase.

Future events related to CARIOQA-PMP

Upcoming events :

- Publication of the fourth factsheet detailing previous gravity field measurement missions that led to the CARIOQA initiative.
- Release of an interview with Simon Silvio Conticello, CARIOQA-PMP Project Officer, on the project's YouTube channel.

- Publication of an expert profile on Rene Fosberg, Professor at the National Space Institute, Technical University of Denmark.

CARIOQA-PMP

The CARIOQA-PMP team thanks you for your interest in the project !

Funded by the European Union

Follow us :

cnes

DLR Deutsches Zentrum für Luft- und Raumfahrt

AIRBUS

Leibniz Universität Hannover

DTU Technical University of Denmark

SYRTE l'Observatoire de Paris | PSL
SYstèmes de Référence Temps-Espace

LP2N Laboratoire Photonique Numérique & Nanosciences

ONERA THE FRENCH AEROSPACE LAB

Technische Universität München

POLITECNICO MILANO 1863

FORTH

LCAR Laboratoire Collisions Agrégats Réactivité

exail

teletel

G.A.C. GROUP

LEONARDO