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Future Earth Observation Systems (2)

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A CONSTELLATION OF SMALL SATELLITES FOR THE MONITORING OF GREENHOUSE GASES

Abstract

The Space CARBon Observatory project (SCARBO), is a project funded by the European Union's H2020 research and innovation programme, which aims at solving one of the key challenges of anthropogenic greenhouse gases (GHG) monitoring from space, by increasing significantly the temporal revisit over the various sites of interest while meeting the accuracy and spatial resolution requirements. This is envisaged by implementing a novel miniaturised static spectrometer concept on a constellation of small satellites, coupled with aerosol sensors and high-end reference instruments. The 3-year project started in December 2017. It is coordinated by Airbus Defence and Space, and handled by a consortium of 10 European organisations, including scientific institutes, SMEs and industry.

The challenge of the project is to overcome the current technological and economical roadblocks of existing GHG missions: measurement uncertainties due to aerosols, provision of both high accuracy measurements and high temporal frequency of GHG measurements within a reasonable cost envelope. SCARBO will address both CO2 and CH4 species.

The SCARBO project consists of the detailed design, analysis and modelling of the miniaturised NanoCarb instrument concept, based on user need requirements and supported by performance simulations of the science data retrieval chain. NanoCarb is complemented by collocated ultra-compact aerosol sensor and CO2 reference instruments in order to deliver high accuracy measurements. The overall measurement concept will be experimentally validated through a dedicated airborne campaign featuring instrument prototypes. A market analysis will also be performed to assess the commercial perspectives of the SCARBO mission services at global, regional and local scales. The SCARBO mission added-value will be demonstrated through the analysis of real-life use cases representative of CO2 and CH4 related issues.

From the technological development of a miniaturised static spectrometer to an innovative mission concept based on a constellation of small satellites, SCARBO will pave the way for Europe to trace

anthropogenic CO2 and CH4 emissions offering unprecedented measurement repetitiveness over the entire globe for the price of two mid-sized satellites. In complement to incumbent high-performance space missions, the SCARBO mission and sensors concept based on novel technological developments maturation aim for an operational implementation by 2030. The paper will provide an overview of the project and will present the first results.