First results from the Copernicus CO2 Monitoring (CO2M) mission product developments

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Poster

As part of the Copernicus Programme of the European Commission, the European Space Agency (ESA) and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) are expanding the Copernicus Space Component to include measurements for anthropogenic CO2 emission monitoring. CO2M will support well-informed policy decisions for assessing the effectiveness of strategies for CO2 emission reduction, as well as the reduction of uncertainties associated with current anthropogenic emission estimates at national and regional scales. Satellite measurements of atmospheric CO2, complemented by in-situ measurements and bottom-up inventories, will enable the transparent and consistent quantitative assessment of CO2 emissions and their trends at the scale of megacities, countries, and at global scale, by using advanced (inverse) modelling capabilities.

This presentation will show first results from the CO2M operational processing system developments ongoing at EUMETSAT. This will include first results for the dedicated CO2M aerosol, cloud, and NO2 products, as well as from the innovative three-algorithm GHG (XCH4, XCO2) retrieval approach. We show how the measurements from the three instruments on-board CO2M (the CO2/NO2 push-broom grating spectrometer (CO2I/NO2I), the Multi Angle Polarimeter (MAP), and the Cloud Imager (CLIM)) are combined into one “hyper-instrument” processing system including a centralized and harmonized provision of auxiliary and a priori information to all level-2 processors to ensure maximum consistency between all of parts of the processing system. The results are based on simulations of realistic orbits for a constellation of three platform, including one of which continuously pointing towards the sun-glint spot.

CO2M will require co-located ground-based reference measurements, not only of XCO2 and XCH4, but also of aerosol optical depth and NO2 at the same locations, both for polluted (close to the sources) and for background conditions, and at a representative set of locations around the globe. We will present an update on that status of preparation and planning of product commissioning and their operational monitoring throughout the operations phase. The continuous and timely provision of ground-based reference data from all relevant networks (including TCCON, COCCON, Pandonia, NDACC, and Aeronet) will play a key role in all activities concerning product validation and monitoring. We will summarize the status and the way forward following the dedicated workshop held on CO2M and MicroCarb Cal/Val at IWGGMS-19, and following subsequent iterations with network data providers, as well as in the context of the WMO G3W initiative.

Keywords: CO2M, CO2, CH4, SIF, Aerosol, NO2, monitoring, products, processing, validation

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