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TOWARDS AN EUROPEAN CO2 MONITORING MISSION

Abstract

Europe pioneered the remote sensing of the greenhouse gases CO2 and CH4 with SCIAMACHY on ENVISAT. This time series on greenhouse gases from space was and is continued by Japanese (GOSAT), US (OCO-2) and Chinese (TANSAT) space based greenhouse gas sensors. Especially w.r.t. CO2 non of these missions allows for the quantification of anthropogenic emissions in a systematic way. As part of Europe's Copernicus Program, the European Commission (EC) and the European Space Agency (ESA), together with the support of the scientific community, Eumetsat and the European Centre for Medium-range Weather Forecasts (ECMWF), are planning to expand the capabilities of the first generation Sentinel satellites for measurements of anthropogenic CO2 emissions. The atmospheric measurements made by a combination of new satellites and insitu networks would be assimilated in the ECMWF operational system and combined with inventories. Inverse modelling techniques would then allow the transparent and consistent quantitative assessment of CO2 emissions and their trends at the scale of megacities, regions, countries, and the globe. Such a capacity would provide users and policy with a unique and independent source of information, which can be used to inform on the effect of policy measures, and to track their impact enroute towards decarbonising Europe and meeting national emission reduction targets. The space system activities for the European CO2 monitoring system have recently entered their feasibility phase and will study the implementation of a multiple (LEO) satellite constellation providing a 3day revisit at midlatitudes, at 4 km2 sampling and a precision better than 0.7 ppm in XCO2. In order to limit the systematic error on XCO2, the system activities consider inclusion of a multiangle polarimeter enabling the CO2 retrieval process to better account for cloud and aerosol scattering effects. In addition, the inclusion of measuring NO2 is considered as proxy for anthropogenic CO2 plumes from power plants and cities, which could significantly increase the accuracy of the emission estimates. This presentation will provide an overview of current activities in preparation of the European CO2 Monitoring Mission.