Greenhouse gas observations from space: achievements obtained with current sensors and outlook to CarbonSat

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Abstract

Carbon dioxide (CO_2) and methane (CH_4) are the two most important anthropogenic greenhouse gases (GHG) responsible for global warming. Despite their importance, our knowledge on their surface sources and sinks has significant gaps. Atmospheric observations including satellite data combined with inverse modeling help to improve our knowledge on CO_2 and CH_4 surface fluxes (emissions and uptake). IUP leads the GHG-CCI project of ESA's Climate Change Initiative (http://www.esa-ghg-cci.org/). Within this project, algorithms to retrieve atmospheric CO_2 and CH_4 information from past (SCIAMACHY) and present (GOSAT) near-surface-sensitive satellite sensors are being further developed and used to generate long-term consistent accurate and precise atmospheric CO_2 and CH_4 data sets, which are used to infer source/sink information. Phase 1 of GHG-CCI finished end of 2013. GHG-CCI is currently in Phase 2 (2014-2016). In this talk an overview about this project will be given focusing on achievements obtained for CO_2. To also have European satellite-based GHG monitoring capability in the future, IUP has proposed the CarbonSat satellite mission to ESA (http://www.iup.uni-bremen.de/carbonsat/). In 2010, CarbonSat has been selected by ESA to be one of two candidate missions for Earth Explorer-8 (EE-8) to be launched around 2022. Currently, several ESA studies are being conducted, e.g., to consolidate the mission requirements for CarbonSat. In the second part of the presentation an overview about these activities will be given.