



Passive satellite remote sensing of carbon dioxide and methane - from SCIAMACHY towards CarbonSat

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Carbon dioxide (CO₂) and methane (CH₄) are the two most important anthropogenic greenhouse gases causing global climate change. Global satellite observations of CO₂ and CH₄ can provide important missing global information on regional CO₂ and CH₄ surface sources and sinks. A better understanding of the surface sources and sinks and the underlying processes is important in order to reliably predict the future climate of our planet. Such an application requires highly precise and accurate satellite CO₂ and CH₄ retrievals and high sensitivity to near-surface greenhouse gas concentration changes. With passive satellite remote sensing this is possible using reflected solar radiation in the near-infrared/shortwave-infrared (NIR/SWIR) spectral region. SCIAMACHY on ENVISAT is the first satellite instrument performing these type of measurements (launch 2002, still operational). The SCIAMACHY time series is currently being continued with the Japanese GOSAT satellite which has been successfully launched in January 2009. In order to fill a likely observational gap in the post-GOSAT time period and to provide unique high spatial resolution information on CO₂ and CH₄ the CarbonSat mission was proposed to ESA as an Earth Explorer Opportunity Mission and recently selected for a Phase A/B1 study. The CarbonSat mission aims to deliver global data sets of XCO₂ and XCH₄ with at least one order of magnitude higher number of cloud free measurements than OCO and one order of magnitude better spatial coverage than OCO, due to CarbonSat's 500 km swath continuous across track coverage with 2 x 2 km² spatial resolution. In this talk the latest achievements of SCIAMACHY and GOSAT will be summarized and the CarbonSat mission concept will be presented with special emphasis on the quantification of natural and anthropogenic emissions.