



Remote sensing of greenhouse gases using satellites - from SCIAMACHY to GOSAT

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Satellites observations of greenhouse gases with high accuracy and precision have the potential to overcome the limitations of in-situ ground-based measurements by enabling global retrievals of CO₂ and CH₄ column amounts. The SCIAMACHY instrument onboard ENVISAT was the first nadir-viewing earth-observing spectrometer recording near-infrared spectra covering CO₂ and CH₄ absorption bands with moderate spectral resolution. With the launch of the Japanese Greenhouse gas Observing SATellite (GOSAT) on 23 January 2009, the first dedicated greenhouse gas mission is in orbit, recording high-resolution spectra at 750 nm (O₂ A-band), 1600 nm (weak CO₂ and CH₄ bands) and 2000 nm (strong CO₂ and H₂O bands).

This presentation will provide a general overview of greenhouse gas retrievals using SCIAMACHY as well as GOSAT. We will summarize the results and applications of XCH₄ and XCO₂ retrievals first obtained from the SCIAMACHY satellite using single-band retrieval techniques. XCH₄ is taken as an example of how remotely sensed greenhouse gases retrievals are applied in source inversion algorithms on a global scale.

In the meantime, retrieval algorithms by several research groups have matured into full-physics techniques, retrieving atmospheric scattering properties alongside greenhouse gases in a global fit using a combination of multiple spectral regions. A brief introduction into some of those techniques and their difference to single-band and ground-based retrievals will be given. These algorithms are now applied to SCIAMACHY and GOSAT spectra and initial results from different groups will be presented.