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Remote sensing of methane : global distributions using thermal infrared spectroscopy

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Methane (CH_4) is the second most important anthropogenic greenhouse gas after carbon dioxide. It also plays an essential role in tropospheric chemistry regarding to its reaction with the OH radical. A better understanding of its distribution and emission sources is needed to determine its correct impact on climate change. Measurements from satellites provide global distribution in a short laps of time and therefore allow us to detect spatial and temporal variation of atmospheric methane concentrations.

The new Infrared Atmospheric Sounding Interferometer instrument (IASI) has been launched in October 2006 onboard the METOP platform and will soon release its first measurements. We have developed retrieval tools (based on the Optimal Estimation Method and a Neural Network) in order to analyse these new collected data. After some discussion on what to expect from the IASI mission on information about the methane sources and spatial variability, we show that CH_4 vertical profiles can be retrieved with good accuracy using satellite measurements in the thermal infrared spectral region. Using the nadir soundings observations made by the Interferometric Monitor for Greenhouse Gases (IMG) during 10 successive days in April 1997, global distributions in the troposphere and stratosphere with some vertical information have been determined. We present the IMG global distributions for this time period as well as a characterization of the profiles in terms of vertical sensitivity and errors.