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Characterization of methane retrievals from the IASI space-borne sounder

A. Razavi¹, C. Clerbaux^{1,2}, C. Wespes^{1,*}, L. Clarisse^{1,*}, D. Hurtmans¹, S. Payan³, C. Camy-Peyret³, and P. F. Coheur^{1,*}¹Service de Chimie Quantique et Photophysique, Université Libre de Bruxelles (U.L.B.), Brussels, Belgium²UPMC Univ. Paris 06; Université Versailles St-Quentin; CNRS/INSU, LATMOS-IPSL, Paris, France³UPMC Univ Paris 06, CNRS UMR7092, LPMAA/IPSL, Paris, France

*They are, respectively FRIA researcher, Scientific collaborator and Research Associate with FRS-FNRS, Belgium

Abstract. Although the global methane (CH₄) concentration has more than doubled since pre-industrial times, local emission sources are still poorly identified and quantified. Instruments onboard satellites can improve our knowledge about the methane global distribution owing to their very good spatial coverage. The IASI (Infrared Atmospheric Sounding Interferometer) instrument launched on the European MetOp-A platform is a Fourier transform spectrometer which measures the thermal infrared radiation emitted by the Earth and its atmosphere. In this paper, we present the first global distribution of methane total columns (mostly sensitive to the middle troposphere) from the IASI spectra using the methane ν_4 absorption band. The retrieval spectral range was set in order to minimize possible spectroscopic issues. Results are discussed in terms of error budget and vertical sensitivity. In addition, we study the gain of information on surface methane concentrations provided by using the ν_3 band, which is partly covered by IASI on the short-wave end of the spectra (extending to 2760 cm⁻¹), where solar reflection contributes significantly.

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