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Sensing methane emissions from space - An improved retrieval version from SCIAMACHY onboard ENVISAT

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Methane is the second most important anthropogenic greenhouse gas and, although the global budget is relatively well constrained, partitioning among sources remains highly uncertain. SCIAMACHY from its vantage point in space offers the unique opportunity to sense methane globally with high sensitivity towards the surface. Recent retrievals of methane column averaged mixing ratios using short wave infrared nadir spectra obtained by SCIAMACHY are presented. An improved retrieval version using ECMWF pressure and temperature profiles as prior input is presented.

Furthermore, laboratory measurements of methane have been used to improve spectroscopic parameters in the short wave infrared, thereby minimizing previously existing systematic biases in the SCIAMACHY retrievals. We present retrieval results from 2003 through 2005, focussing on global long-term and seasonal averages as well as timeseries over specific regions of interest.

Large scale methane enhancements due to man-made (e.g. rice agriculture) as well as natural (e.g. wetlands) emissions can be clearly identified and their temporal evolution be followed. Further, we present a comparison of the satellite retrievals with atmospheric models optimized for ground based methane measurements. Especially

in tropical regions, which are not well constrained by the ground based network, large discrepancies still exist, pointing to high tropical methane emissions.

As an example of the potential of the global methane dataset, some first results of emission inversions using a four- dimensional variational (4D-Var) data assimilation system are presented.