CH_4 TOTAL COLUMNS FROM SCIAMACHY – COMPARISON WITH ATMOSPHERIC MODELS

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ABSTRACT
A detailed comparison of global atmospheric CH_4 retrievals from the space-borne spectrometer SCIAMACHY onboard the European environmental satellite ENVISAT is presented with the atmospheric transport models TM4 and TM5.

INTRODUCTION
Considerable improvements have recently been achieved for retrievals of atmospheric CH_4 from SCIAMACHY [*Frankenberg et al.*, 2005]. These retrievals are based on absorption spectra of solar radiation in the near-infrared, and are therefore very sensitive to methane in the lower atmosphere. Simultaneous measurements of CO_2 have been used as proxy for the light path, in combination with modelled CO_2 column abundances [*Frankenberg et al*., Satellite cartography of atmospheric methane from SCIAMACHY onboard ENVISAT: Analysis of the years 2003 and 2004, submitted to *J. Geophys. Res.*, 2005].

Here we present a detailed comparison of retrieved column averaged CH_4 mixing ratios with simulations using the atmospheric transport models TM4 and TM5. The TM5 model allows to zoom in over source regions of interest with 1^ox1^o resolution [*Krol et al.*, 2005].

RESULTS AND DISCUSSION
On the global scale the most pronounced CH_4 signal arises from source regions over India and South East Asia, broadly consistent with model simulations (Fig. 1). SCIAMACHY retrievals, however, indicate higher CH_4 total columns over tropical regions of Africa and America during part of the year, suggesting higher CH_4 emissions from wetlands or biomass burning than assumed in the emission inventories of the atmospheric models.

A more detailed comparison will be presented for some major source regions (e.g., Fig. 2 shows a comparison for Asia), using 1^ox1^o zoom simulations.

Very high correlations between observed and simulated CH_4 total columns are calculated for the whole year 2003, both for the global (Fig. 3) and different regional domains (e.g., Asia). Globally, the average standard deviation between observations and simulations is in the order of 30 ppb (Fig. 3), indicating a precision of the SCIAMACHY retrievals of ~1.5 %.

REFERENCES
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Krol, M.C., S. Houweling, B. Bregman, M. van den Broek, A. Segers, P. van Velthoven, W. Peters, F. Dentener, and P. Bergamaschi, The two-way nested global chemistry-transport zoom model TM5: algorithm and applications, *Atmos. Chem. Phys.*, *5*, 417-432, 2005.

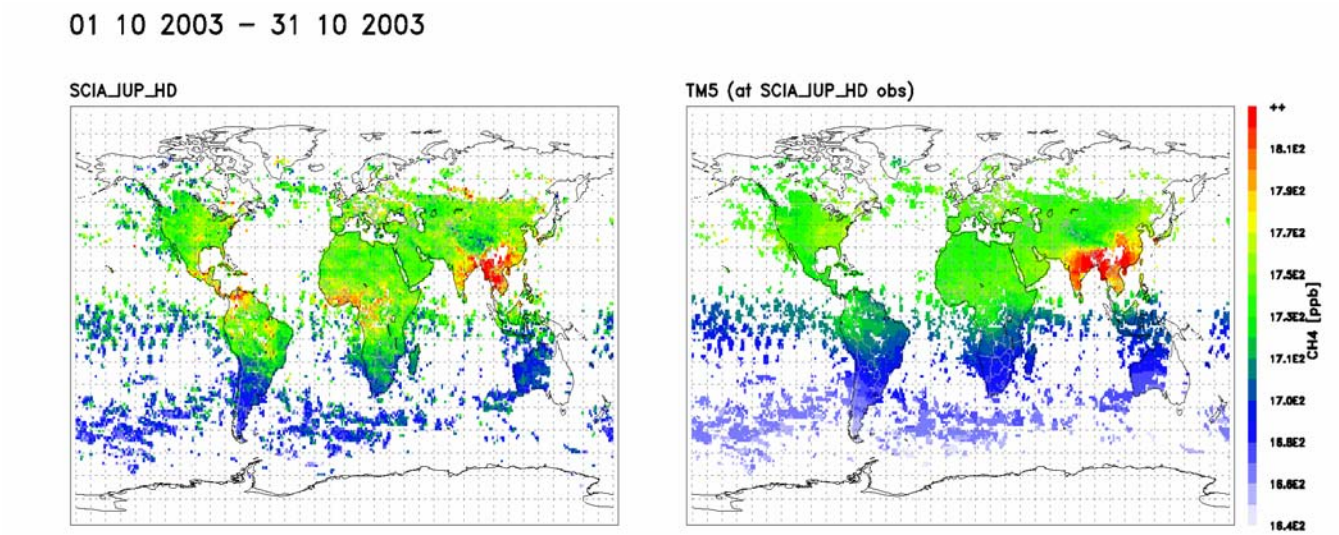

Fig. 1. SCIAMACHY CH_4 retrievals vs. TM5: Monthly composite values (here shown for October 2003).

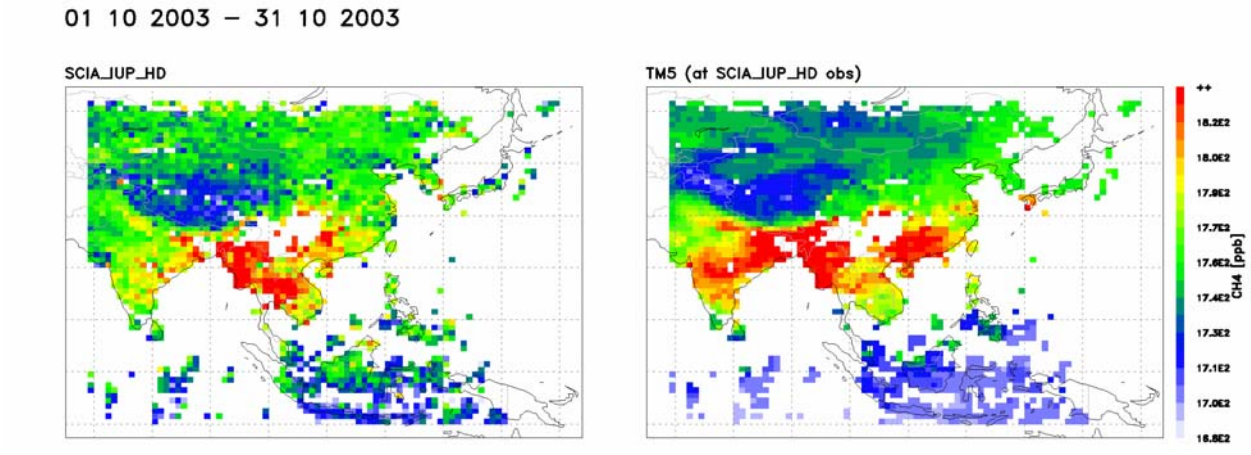

Fig. 2. Regional comparison: SCIAMACHY CH_4 retrievals vs. TM5 over Asia (1^ox1^o zoom simulations): Monthly composite values (here shown for October 2003).