Atmos. Chem. Phys. Discuss., 3, S987–S989, 2003
www.atmos-chem-phys.org/acpd/3/S987/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Trace gas measurements from infrared satellite for chemistry and climate applications" *by* C. Clerbaux et al.

C. Clerbaux et al.

Received and published: 9 July 2003

We would like to thank both reviewers for their valuable inputs to the paper. These comments were taken into account in order to improve the clarity of the manuscript.

Answer to Referee 1: 1) Although MOPITT and IMG did not measure during the same time period and were not using the same techniques, CO total columns measurements are expected to be retrieved with the same accuracy (as current MOPITT retrievals use the thermal channels only). Spatial coverage is better for MOPITT due to its ability to sound across track, whereas IMG is providing measurements along track only. The MOPITT instrument uses a broader spectral range, centred on the main CO absorption lines, whereas the IMG instrument provides high-resolution measurements. MOPITT products are available at different levels of altitude, but both instruments lack sensitivity to the boundary layer and have their maximum sensitivity in the free troposphere. We added some inputs on MOPITT in the manuscript. In the framework of the EU project

Full Screen / Esc
Print Version
Interactive Discussion
Discussion Paper

POET (coordinator C. Granier), we have started an extended comparison to analyse in detail the global CO distribution as retrieved during 1997 from IMG and between 2000 and 2002 from MOPITT, versus a range of CTM model calculations. Results are currently under analysis.

2) The value reported under 'measurement uncertainty' in the manuscript includes both the bias and the statistical contributions. We have globally found that the bias contribution was negligible, so only the rms values have been provided. We are, however, presently working on providing with a detailed error budget for each species and it will be reported later.

Answer to Referee 2: We agree with the Referee that the error analysis should be discussed more deeply. As we already reported detailed assessment of the impact of errors on temperature profile, surface temperature and water vapour profile in previous publications [Clerbaux et al, 1998 and Clerbaux et al. 2002], this paper was more focused on the capability to retrieve a range of gases. We are presently working on providing with a detailed error budget for each species and it will be reported later. Predicted measurement capabilities are expected to meet the science goals for ozone, carbon monoxide, and to a lower extent for methane for all atmospheric cases. For the lower absorbing species, the detection will only be feasible in case of high pollution levels.

- Band 2, spectral res. 0.07 cm-1, S/N (2150 cm-1) ˜ 100 for a 280 K emitting blackbody - Band 3, spectral res. = 0.11 cm-1, S/N (1100 cm-1) ˜ 150 for a 280 K emitting blackbody But the S/N values can vary by as much as an order of magnitude from one end of the band to the other. The values indicated above are thus only indicative. Similar S/N values are expected for IASI. - HITRAN was used in this work.

- Uncertainty in surface temperature has a strong impact on retrieval accuracy. As this was investigated in detail in [Clerbaux et al. 2002] it is not reported here. Due to channel selection, the uncertainty on water vapour only has a weak (lower than noise)

ACPD

3, S987–S989, 2003

impact on the retrieval.

- From our simulations it appears than in case of volcanic eruption, an important SO2 signature will be observable from the spectra (as reported for example from the AIRS/AQUA spectra). Aerosols plumes could also be detected. These two species do not absorb in the same spectral range as other reported gases and are not expected to provide an important contribution to the accuracy of the retrieval.

- Several teams are working on the possibility to retrieve CO2 from IASI or AIRS data. It is a challenging question, better addressed by other teams. We only provided it for a sake of completeness.

- The results obtained with data assimilation are only summarized here, as details were provided in [Clerbaux et al, 2001]. We tried to add some clarification to the text.

All the technical errors have been corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 2027, 2003.