

## ***Interactive comment on “Measurement of the water vapour vertical profile and of the Earth’s outgoing far infrared flux” by L. Palchetti et al.***

### **Anonymous Referee #1**

Received and published: 4 January 2008

#### Overall merits:

The paper reports on mid to far-IR infrared spectroscopic measurements of the outgoing radiative flux in the tropics. From the measurements profiles of water vapor and temperature of the underlying atmosphere are inferred. The latter profiles are compared with corresponding analysis from ECMWF fields. The authors conclude that the major achievement of their study is (a) to have used an un-cooled detectors detector providing a peak-to-peak noise of  $\pm 0.3$  K and (b) that, the measured total radiative flux was found to agree by  $2.8211 \pm 3.5$  W/m<sup>2</sup>  $\pm 0.4$  W/m<sup>2</sup> with corresponding ECMWF predictions. While I find such measurements extremely important to monitor the impact of green-house gases on the radiative budget of the Earth atmosphere, I doubt that the authors put enough emphasis on demonstrating the scientific relevance of their study. I

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

therefore recommend a major revision of the manuscript with more details given below.

Major comments:

(1) In the study the authors inter-compared inferred temperature and H<sub>2</sub>O profiles with corresponding ECMWF predictions with the results that systematic departures are found among both data sets, c.f., for T around in the UT and TTL and for water vapor around 10 km and 2.5 km. Several questions arise which should be addressed in each relevant scientific study: - What are the reasons for the systematic discrepancies (modeled vs measured)? - Are the discrepancies due o to deficits in the ECMWF data o to instrumental artifacts o or to deficits in water vapor line parameters, or in the continuum model? If feel that by including an investigation of potential reasons would much improve the scientific content of the present the manuscript. Furthermore I have more specific questions: - Why are the inferred T-profiles and humidity profile not being inter-compared with corresponding profiles measured on-site by meteorological sondes? - Or, what is impact of various water continuum models (the different CKDs, Tipping et al., 8230;.) on the systematic departures found for H<sub>2</sub>O around 10 km and 2.5 km ? - Or, what is the reason to adopt a modified Voigt and Van Vleck-Weisskopf water line shapes? - What are the impacts on (sub-visible) cirrus clouds frequently found in the tropics on the reported measurements? - et cetera (2) Moreover I see no particular reasons to strongly argue in favor for or against using an un-cooled detector as long as the detector noise is much smaller than the photon electron shot-noise. In a scientific paper this can once be shown to be true, but as a fact does not particularly justify a scientific study to be relevant for a wider scientific community, and thus be worth to be published.

Minor comments:

1.) In order for any reader to get a flavour on the quality of the measured and modelled spectra, I miss a Figure where both type of spectra are plotted on the same scale (and probably shifted by a certain constant offset) for bare eye inspection. 2.) At many

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

places, the English does not meet the standard required for a scientific publication. For example, the manuscript contains many sentences that are too long to be understood, and other shortcomings (typos, usage of wrong words, et cetera8230;). Therefore I largely recommend proofreading of the manuscript by a native English speaker before resubmitting. 3.) In equation (1), the l-dependence is missing ! 4.) Explain all acronyms (ECMWF, IPCC, .) and abbreviations (OLR, BT, TOA, NESR ?) 5.) Citation from the paper: The FIR spectral region from 0 to 600 cm8722;1 is here considered in detail because in this spectral region new observations are obtained by REFIR-PAD and low altitude clouds have a negligible effect on the TOA radiance. This statement is certainly incorrect for all considered wavelengths! 6.) Citation from the paper: The Fig. 9 shows that the OLR flux differences in the FIR are in the range of 28211;3.5W/m2, larger for the warmer atmosphere. Problem 1: Larger as compared to what? Problem 2: The sentence is in conflict c.f. with your statement on page 17750, c.f., Since the atmospheric state is sufficiently uniform in time and location along the flight, the retrieval standard error8230;.. 7.) page 17750: Citation from the paper: This allows to consider the mean standard error of the mean measurement, which resulted to be less than 0.5 K for temperature mean profile, and about 38211;58.) page 17744: In this contest, in June 2005 we performed 8230;..which contest (context) ? 9.) page 17744: The final reduced chi-square close to one indicates the agreement à A reduced chi-square close to unity indicates the agreement 10.) page 17748: rotovibrational band à change to rovibrational band 11.) page 17749: The skin BT is retrieved with an errore of about 0.4 K. à The skin BT is retrieved with an error of about 0.4 K. 12.) page 17750: The evaluation of the OLR by using directional non-spectral measurements, such as satellite single view observations, is affected by an error due to the angular distribution model used for the calculation of the emission anisotropy factor in the radiance-to-flux conversion, see e.g. the ERBE and CERES experiments 8230; this sentence is far too complicated to be understood correctly ! 13.) Conclusion: I see no particular reason to stress that the measured and modeled outgoing radiative fluxes depart by 3.5 W/m2 and8230;.. that is comparable to or even greater than the estimation of the

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

radiative forcing of the CO<sub>2</sub> increases since pre-industrial time (8230); as long as it is not attempted to research on the potential reasons (see above).

11.) References:

- Bianchini et al., 2006: The reference for Bianchini et al., 2006 is incomplete. - European Commission 2000: I doubt that the European Commission is the first author of a final research report for which you received funding

---

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17741, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper