Atmos. Chem. Phys. Discuss., 6, S1902–S1904, 2006
www.atmos-chem-phys-discuss.net/6/S1902/2006/


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "First spectral measurement of the Earth's upwelling emission using an uncooled wideband Fourier transform spectrometer" *by* L. Palchetti et al.

**Anonymous Referee #1**

Received and published: 18 July 2006

Review of "First spectral measurement of the Earth's upwelling emission using an uncooled wideand Fourier transform spectrometer" by L. Palchetti et al.

This paper discusses the first deployment of an interesting and important new measurement capability covering the spectral interval 100-600 cm-1, which has not been consistently treated with previous spacecraft or other remote sensing instruments. The manuscript is more of a short technical demonstration document, or conference proceeding extended abstract, than a research paper with new scientific conclusions. However, it's publication here is appropriate to notify the community of this new measurement capability.

Specific Comments:

1. A major technical demonstration reported here is the use of an uncooled pyroelectric detector. There are no details about this detector given, and a paragraph of discussion might be useful. I'm not familiar with this type of detector, although I assume it works by chopping. For remote ground-based instruments, or aircraft instruments where volume and payload weight is at a premium, there are clearly advantages with an uncooled detector. What is the comparable advantage with a satellite instrument? Other infrared spectrometers (such as AIRS) achieve cryogenic temperatures with passive radiative cooling systems. Does it matter what temperature the pyroelectric detector operates at? Does it matter if there are temperature fluctuations within the instrument housing? Some more detail along these lines might help the reader understand the utility of this technical achievement.

2. The statement on p.4066: "Further improvements of the radiometric performance of REFIR-PAD are possible..." How? In the instrument/detector itself, or in the calibration assembly? Give some details please.

3. The statement on p.4068: "The two instruments have different ground pixels and this difference must be taken into account in the comparison." It's not clear in the paper how this difference is accounted for, or even if it's necessary. With the spectral coverage, the source of the photons detected by the instrument will range from a few meters away from the instrument (right on the fully opaque parts of the emission bands) to the Earth surface (in the atmospheric windows). It does appear that the REFIR-PAD has approximately a 7-degree field of view, while the IASI has a 1-degree field of view. Perhaps detailed angular radiative transfer calculations are required to assess any potential differences between their measurements.

4. The comparison of Figure 5 is an example from the end of the flight. What about earlier in the flight? Was the comparison consistently this good? Also, the two measurements appear to diverge from 1300-1400 cm-1. What could be the reason for



ACPD
6, S1902–S1904, 2006





EGU

this?

5. The Statement on p.4068: "The differences that exist are expected to be due to a possible mismatch in the temperature profile." This can and should be easily demonstrated using a series of radiative transfer calculations that account for measurement uncertainties with the sondes.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4061, 2006.