

## ***Interactive comment on “A Fourier transform spectroradiometer for ground-based remote sensing of the atmospheric downwelling long-wave radiance” by Giovanni Bianchini et al.***

### **Anonymous Referee #2**

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#### **General comments**

This paper describes the optical setup, some aspects of the performances and exemplary data products of the ground based REFIR-PAD far infrared FTS instrument. During the last 15 years the instrument has been deployed on various missions ranging from a stratospheric balloon flight, installations in alpine sites to the current installation in the CONCORDIA Antarctic station. The principal technical design, a comprehensive performance analysis and results of previous missions have already been published elsewhere. The present article gives an overview of the current status of the instrument. Some performance issues like instrumental line shape and radiometric offset are rediscussed without highlighting the added value to the already

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published analysis (Bianchini, 2008b). The paper does not provide and/or explain a new scientific data set.

The theme of the article fits well within the scope of AMT and the article is clearly written, but the current scope does not provide enough new information as compared to already existing literature. No substantial new concept or data is presented. Therefore I recommend to publish the article only after major extension/revision. In particular the performance analysis part has to clearly state the new insights gained in comparison to earlier papers and the data section needs to present a more comprehensive overview of the Antarctic dataset.

#### **Specific comments**

Section 3 discusses instrument lineshape. Please highlight the new insights gained relative to the information provided earlier (Fig. 4 of the current paper and Fig. 17 of the Bianchini, 2008b paper seem to be identical).

Section 4 discusses detectors and data acquisition electronics. What is different to the analysis performed in section 2.1 of the abovementioned paper (Figure 6 of the current paper and fig. 3 and 5 of the 2008 paper seem to convey the same information)?

Section 5 discusses radiometric performances. A statistical analysis of offset values in one atmospheric window region is presented. Again the value of this analysis in the context of the existing radiometric performance analysis needs to be stated more clearly. Instrument offset will be wavenumber dependent. An analysis of the radiometric offset in other spectral regions is of interest.

Section 6 states to discuss spectroscopic performances. It then describes qualitatively the agreement between an analytical instrument model and laboratory measurements. The model is not detailed and there is no quantitative discussion of the discrepancies between model and measurement. No attempt is made to derive figures of merit and compare them with requirements. The title of the section is misleading and the description of model and results is not sufficing to provide insights. The section should either be omitted or renamed and significantly extended.

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Section 7, last sentence: I do not think that one offset measurement at 835 cm<sup>-1</sup> is sufficient to derive a relative uncertainty for the whole wavenumber region from 200-667 cm<sup>-1</sup>. The deduction could possibly be made with the help of the instrument model, but then this needs to be demonstrated.

Section 8 shows an exemplary L2 data set. Yet no comprehensive data set is presented (e.g. a time series of measurements), no scientific interpretation is provided and no quality assessment (e.g. validation through other data) is made. There is no supplement with data or information about where the data could be accessed. It is mentioned in section 8 / L2 products that the retrieval of methane requires a hardware modification of the instrument. In the conclusions section, Methane is mentioned as provided data product, though.

Section 9 (conclusions) reiterates the properties of the instrument without providing real conclusions or an outlook.

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