

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 #2

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The paper presents an analysis of far-IR atmospheric emission measurements made with a balloon-borne Fourier transform spectrometer. The authors use these measurements to infer atmospheric state in the troposphere (profiles of T and H₂O VMR and surface BT). These profiles are used for the calculation of the outgoing radiation flux. A comparison with correlated ECMWF analysis shows that temperature profiles are in good agreement, while significant departure are observed for water vapor. The discrepancy in the water vapor profiles reflect in a significant departure of the computed radiation flux. The authors conclude that the usage of spectrally resolved wideband measurements is adequate for a better characterization of the Earth outgoing radiation flux. The measurements analyzed in this paper are of extreme interest for atmospheric studies. The main interest resides in the spectral region studied, ranging from 100 to

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1400 cm^{-1} . In this spectral interval few atmospheric measurements have been made and spectroscopic uncertainties still exist in the water vapor line parameters and continuum models. The authors have the merit of pointing out the need to better characterize the far-IR region. In fact the radiative cooling associated with water vapor emission in this spectral region is still a source of systematic uncertainties in the climate models. Owing to the originality of the measurements and the relevance of the considered topic this paper meets the standard for publication on ACP. However the paper could be significantly improved by extending the discussion on the results and by reviewing the English. Therefore I recommend to consider the comments listed below before resubmitting.

Specific comments

Many questions that arise during the data analysis are not fully explained or sufficiently discussed. I collect some example below.

Page 17747, line 1; 'Voigt profile...'; the usage of the Van Vleck-Weisskopf model for the water vapor line-shape is not explained, a sentence should be added here to justify the adopted model.

Page 17749, line 26; 'The differences for...'; here a discussion should be made, why you see these discrepancies in the water vapor profiles? The authors should discuss more in-depth their results and propose an explanation; is it due to thin cirrus clouds, to a problem in the ECMWF data, or to uncertainties in the water vapor continuum?

Page 17750, line 11; 'isolated exceptions...': a discussion should be made at this point, why you have these isolated peaks in your residuals? An explanation should be proposed to the reader, e.g: around 590cm^{-1} there is a strong N_2O band and maybe something is missing in modeling N_2O emission.

Technical Corrections

Page 17743, line 3; The sentence 'Even if its main...' is too long and should be

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rephrased Page 17744, line 14; 'contest'; change to 'context' Page 17745, line 11; '(European-Commission,2000..'; who is the author of this reference? Page 17746, line 15; 'the software devoted'; change to 'the software used for the' Page 17746, line 16; 'The main features...'; rephrase this sentence Page 17747, line 27; 'exported by the program'; change to 'provided by the...' Page 17748, line 5; 'found a drier atmosphere'; change to 'drier atmosphere with respect to ECMWF' Page 17748, line 14; 'The degree of freedom..'; the sentence is too long and should be rephrased Page 17748, line 18; 'rotovibrational'; change to 'ro-vibrational' Page 17748, line 26; 'The second effect...'; the initial sentence is too far away for the reader, I propose to restart by specifying which effect you are talking about, e.g.: 'The calibration uncertainty...' Page 17749, line 1; 'An in-deep...'; change to 'An in-depth...' Page 17749, line 1; 'errore'; change to 'error' Page 17749, line 27; 'in particularly'; change to 'in particular' Page 17750, line 2; 'less that'; change to 'less than' Page 17751, line 4; 'for the best...'; change to 'in the best...' Page 17751, line 11; 'an horizontal'; change to 'a horizontal' Page 17751, Eq 1; The dependency of FOLR is missing in the equation Page 17751; 'J2 are the jacobian matrix'; change to 'J2 are the jacobian matrix defined as:' Page 17752, line 16; 'calculated for'; change to 'calculated from' Page 17752, line 19; 'are less that'; change to 'are less than' Page 17752, line 23; 'calculated for'; change to 'calculated from' Page 17752, line 28; 'larger for the...'; larger than what? Please specify Page 17753, line 8; 'The instrument performed..'; rephrase the sentence Page 17753, line 15; 'differs of about'; change to 'differs by about' Page 17753, line 16; 'The difference allows...'; rephrase the sentence

Reference; Bianchini et al., 2006; the reference is incomplete Reference; European Commission, 2000; the reference is incomplete Reference; Remedios et al., 1999; the reference is incomplete

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

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