

# ***Interactive comment on “Time Series Analysis of Ground-Based Microwave Measurements at K- and V-Bands to Detect Temporal Changes in Water Vapor and Temperature Profiles” by Sibananda Panda et al.***

**Sibananda Panda et al.**

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Received and published: 24 October 2016

Please find attached the response as well as updated paper.

Please also note the supplement to this comment:

<http://www.geosci-instrum-method-data-syst-discuss.net/gi-2016-16/gi-2016-16-AC4-supplement.pdf>

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2016-16, 2016.

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[Discussion paper](#)



*Response to Short Comments by Dr. J. Vivekanandan*

The authors would like to thank Dr. J. Vivekanandan for the comments. These comments have been very helpful to the authors in increasing the clarity of the paper to the reader.

*Expand all of the acronyms e.g. SAPHIR-MADRAS, NN, AMSU, FLORA, MP-3000A...*

**Response:** This has been fixed in the paper.

*Page 2, line 2: add to the reference list the following: Spuler, S. M., Repasky, K. S., Morley, B., Moen, D., Hayman, M., and Nehrir, A. R.: Field-deployable diode-laserbased differential absorption lidar (DIAL) for profiling water vapor, Atmos. Meas. Tech., 8, 1073-1087, doi:10.5194/amt-8-1073-2015, 2015. Page 2, line 10: Brogniez, et al.2013 does not show any retrieved humidity or temperature profile. Add an appropriate reference.*

**Response:** The reference (Spuler et. al., 2015) suggested by the reviewer has been added to Section 1 page 2 line 5 of the paper. In addition to that (Brogniez, et al.2013) has been replaced by Rao, T. N., Sunilkumar, K., and Jayaraman, A.: Validation of humidity profiles obtained from SAPHIR, on-board Megha-Tropiques, Special Section: Megha-Tropiques, Current Sci. 104(12), 1635-1642, June 2013 on page 2 line 14.

*Page 2, line 13: What is meant by 'window frequency'?*

**Response:** The window frequency here means the frequency range between the absorption lines (or the peaks) where the atmosphere is transparent to microwave radiation and allows the microwave radiation to pass through without significant attenuation. For example frequency ranges of 30-45 GHz, 70-110 GHz and 125-150 GHz are usually referred to as the window frequency ranges. The window frequencies are still affected by water vapor content and oxygen absorption but are not as sensitive to as the absorption line peaks.

*Page 3, line 18: Define 'oxygen complex.'*

**Response:** The details of the oxygen complex have been added to Section 3.1 line 29 of page 4.

"Similarly, microwave radiation from oxygen at the 60 GHz absorption complex can be used for retrieving temperature profile information because atmospheric absorption in the 50-75 GHz range is primarily due to oxygen molecules. The absorption due to oxygen molecule is due to magnetic moment 33 spin-rotational lines between 51.5-67.9 GHz. These spin-rotational lines blend together at lower altitude due to the pressure broadening of the lines. This blended absorption lines has a shape similar to an absorption band centered at 60 GHz. However, the absorption line intensity is not the simple addition of isolated line intensities but the "overlap interference" which gives rise to a very complex absorption band called the oxygen complex. As a result the opacity at the 60 GHz is significantly higher than that at 50 GHz, so the radiometer just observes the radiation emitted close to the ground surface. To

Fig. 1. Response to Comments