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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "GROMOS-C, a novel ground based microwave radiometer for ozone measurement campaigns" *by* S. Fernandez et al.

**S. Fernandez et al.**

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We would like to thank the referees for reading the manuscript, giving positive feedback and suggestions to improve it. Below is a detailed answer to all the comments made by the referee $\#2$.

**- Comment 1:**
Section 2, line 9 $\&$ Fig 1: It would be helpful to have the location of the (faint) CO emission line at 115.271GHz identified on Fig. 1 using a box or similar.

**Response:**

Thanks for the suggestion. We have added the CO emission line in Fig 1.

**- Comment 2:**
Section 2.1.1, line 21: "GRASP simulations 2.1.1..." Some acknowledgement of the suppliers of GRASP software (TICRA) would be appropriate. The "2.1.1" text appears to be a typo.

**Response:**
Thanks for pointing this out. It is a typo indeed, in the original manuscript a reference was provided instead of the "2.1.1", being the reference: "GRASP9: Technical Description, Tech. rep., TICRA, 2010". It has been corrected.

**- Comment 3:**
Section 2.1.2, line 20-23: No explanation of the slope in each panel of Figure 7 is provided.

**Response:**
The slope is due to the small asymmetry in the scanning direction seen in Fig. 5, which rotates with the azimuthal shifting (the sun is seen as an oval). Simulations with GRASP confirm the relation of the slope with the size of the ellipsoidal mirror. We have added a sentence in section 2.1.2, line 21:
*The slope is due to the asymmetry in the scanning direction observed in Fig. 5*

**- Comment 4:**
Section 2.3, equation 4: Tb should be stated to be the sky brightness temperature.



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**Response:**
We have added the explanation of Tb, sky brightness temperature, in equation 4.

**- Comment 5:**
Section 3, equation 11 & 12. Tw should be approximately equal to the external ambient temperature, whereas Tenv should be equal to the temperature inside the instrument; external-reflected sky radiation will not contribute to the measured brightness temperature, whereas internally-reflected radiation from the instrument will.

**Response:**
The microwave window of GROMOS-C is heated by air blowers to prevent snow accumulation, therefore the temperature of the window is warmer than the external ambient temperature. Tenv is actually the temperature of the environment inside the instrument, which is very close to the window temperature. We have clarified this in line 21:
*...and* $T_{env}$ *the temperature of the environment inside the instrument.*

**- Comment 6:**
Section 4 lines 5-9 & Fig. 16. The features at approximately 110.76GHz and 110.91GHz are not discussed. Presumably these are data-processing artefacts or a dead spectrometer channel(s).

**Response:**
Exactly, these features correspond to spurious channels of the spectrometer. We blank them before the retrieval and they are not of relevance for the performance of the instrument.



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**Additional modification**

Section 3, page 3019, lines 3-5 and equation 15 has been modified. New text:

*It is noticeable that the noise level is higher for the ozone spectrum calibrated with the noise diode. This is expected because the noise diode spectrum itself is noisier than the spectrum of the other calibration targets, and because the errors are amplified by the extrapolation towards the colder atmosphere.*



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