

Interactive comment on “Analysis of an event of short term ozone variation using a Millimeter-Wave Radiometer installed in subpolar region” by Pablo Facundo Orte et al.

Lucas Vaz Peres (Referee)

lucasvazperes@gmail.com

Received and published: 23 March 2019

Orte et al., 2019:

“Analysis of an event of short term ozone variation using a Millimeter - Wave Radiometer installed in subpolar region”.

General comments:

The authors present a study about an atypical event of polar vortex and ozone hole influence over Río Gallegos during November of 2014. This event was detected from the Millimeter Wave Radiometer (MWR) measurements at 27 and 37 km and the advected

C1

potential vorticity (APV) was calculated from the high-resolution advection model MI-MOSA (Modélisation Isentrope du transport Mésoéchelle de l’Ozone Stratosphérique par Advection) at 675 and 950 K to understand and explain the atmospheric dynamic related to ozone rapid variation during the passage of the polar vortex. In addition, the MWR dataset were compared for first time with Microwave Limb Sounder (MLS) to 27 km, 37 km and 65 km and with the Differential Absorption Lidar (DIAL) installed in Observatorio Atmosférico de la Patagonia Austral (OAPA) between October 2014 and 2015. This work is a useful representation of the important contribution made by the Millimeter Wave Radiometer (MWR) at Río Gallegos and certainly, understand the ozone hole influence over Río Gallegos is of fundamental importance in many environmental processes which can lead to increases in the UV radiation on the surface. This increase in the UV radiation related to ozone reductions can be dangerous to life on earth and it represent a significant scientific advance. It should be published after some modification as present clearly objectives, if it’s the comparison multi-instrument or the ozone reduction study case and precisely discuss the results with the literature (This is the worst article failure). I believe there was a mistake in section 5 Discussion. Because of these I would recommend to accept with Major Revision this manuscript.

Specific comments:

ĩŸ In the abstract: The abstract must clearly highlight the most significant scientific result, besides first present the main results of comparison between the data sets and after explain the occurrence of the event.

ĩŸ The 1. Introduction have a good structure but needs to improve the “historical” contextualization of the scientific problem "ozone transport", documenting it better in the literature.

WAUGH 1993; can be of great value to help in the contextualization of the subject, since that, indirectly, the Ozone Hole can influence the ozone content of medium- and low-latitude regions through the release of polar filaments, which carry air masses of

C2

ozone-depleted from the Antarctic polar vortex, causing a temporary decrease in the total ozone column over these regions.

WAUGH, D. W. Subtropical stratospheric mixing linked to disturbances in the polar vortices. *Nature*, v. 365, p. 535–537, 1993.

Moreover, KOCH et al., 2002 explain that the extreme anomalies in the total ozone content in mid-latitudes of the stratosphere are associated with the southern transport of regions where the climatological concentrations are lower or higher.

KOCH, G.; WERNLI, H.; STAEHELIN, J.; PETER, T. A Lagrangian analysis of stratospheric ozone variability and long-term trends above Payerne (Switzerland) during 1970–2001. *J. Geophys. Res.*, v. 107, n. D19, p. ACL 2-1–ACL 2-14, 2002.

Objectives should highlight the scientific advance that the article want produces

- Pg 2, line 6. Missing reference in this sentence. - Pg 2, line 8. Short paragraph, may be part of the previous paragraph. - Pg 2, line 12. Missing reference in this sentence. - Pg 2, line 17. In the sentence “Its will remain for decades in the atmosphere, destroying ozone on the Antarctic pole” the Artic pole can be inserted. - Pg 3, lines 8 - 10. “The transport of polar air masses may take the form of “filaments” and “tongue”, which induce anomalies on the ozone and UV observations over mid-latitudes”: Define filament and language in literature. Referring the paragraph in the literature. - Pg 3, line 12. Short paragraph, may be part of the previous paragraph. - Pg 3, lines 21 - 28. This paragraph seems to me to be better positioned in the methodology.

İÇŸ In the 2. Materials and methods:

- 2.1.1 Pg 5, line 3. Define “Glass Dewar”.

Pg 5, lines 5 – 6. Short paragraph, may be part of the previous paragraph.

- 2.2 It is necessary to show the potential vorticity equation and their terms.

Define filaments and tongues observed in the MIMOSA PV fields.

C3

- 2.3 What is the criterion used to identify the occurrence of the polar vortex and ozone hole influence over Río Gallegos? Reduction in ozone and PV values? which? About what?

Pg 9, line 2: How was the opacity calculated?

Explain better why the heights of 27, 37 and 65 km were chosen to make the comparison. İÇŸ In the 3. Inter-comparison of MWR with DIAL system and MLS observations

- This section should be within the results

- Pg 9, line 18. Check the figure number. I think this is 3.1.

- “This is because the DIAL measurement campaign becomes more intense in those months when the ozone hole approaches southern Argentina.” should be replaced by: “This is because the DIAL measurement campaign becomes more intense in those months when the ozone hole is active and approaches over the southern Argentina”. Referring the sentence in the literature.

- 3.1 Figure 3.1 should be 3.2.

Values of tables 3.1 and 3.2 may be in said figures in order to optimize space.

What criteria are used to call the correlations of considerable (pg 10, line 6), acceptable (pg 10, line 9 and pg 10, line 23), moderate (pg 10, line 10), and very good (pg 10, line 13)?

“The MBE was calculated to analyse the bias between satellite and ground-based data. We obtained a value of +5% indicating an MWR overestimation with respect to the MLS”. Validation is usually done from satellite equipment in relation to ground-based equipment, not the reverse as was done here.

Pg 10, line 9. 11% difference is reliable in the literature.

Pg 10, line 12. Which represent the slope and intercept values?

C4

The results of this section should be discussed in the literature. This is a major flaw of this article.

- 3.2 Figure 3.5 should be 3.3. The results of this section should be discussed in the literature. This is a major flaw of this article.

• In the 4. Results

- 4.1, 4.2 and 4.3. Results are well described but need to be discussed in the literature.

- 4.2. Remove "trend" in pg. 11, line 12 and 21. If you use this term you need to explain how the trend was calculated

• In the 5. Discussion

- This section, in my opinion, should not exist. The results should be discussed as they are described. - I as a reader was anxious for discussion in literature, but I had an unpleasant surprise at seeing only one reference. The way it is, it's not a discussion.

- Much of what is written in this section can enrich the conclusions.

• Conclusions - What scientific progress was made in the study? - As tip I suggest to merge what is written in the "Discussion".

• References - Put in alphabetical order.

• Figures:

- Figure 2.2. Explain in the text why MWR fall data between March and April and July and August. - Figure 5.1 should be in the methodology

Please also note the supplement to this comment:

<https://www.ann-geophys-discuss.net/angeo-2019-17/angeo-2019-17-RC1-supplement.pdf>

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-17>, C5

2019.