

Interactive comment on “Influence of atmospheric dynamics during events Secondary Effect of the Antarctic Ozone Hole on southern Brazil” by Gabriela Dornelles Bittencourt et al.

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We thank the Anonymous Referee #2 for fruitful comments and the question/doubts on the paper. All the questions/doubts will be replied point by point just below. NOTE: The new inserts in the paper are in blue color. NOTE2: All corrections can be checked in the attached file.

REFeree COMMENTS/QUESTIONS AND REPLIES:

Title: The title is unclear and confusing and has to change. An alternative title could be “Investigation of the Secondary effect of the ozone hole at Southern Brazil” or some-

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thing similar. Answer: We understand that the referee could find the title a little confused, but we are analyzing the influence of the atmospheric dynamics (what are the main characteristics/behavior of the atmospheric) when it occurs the Secondary Effect of the Ozone Hole in South Brazil. So, we tried to re-phrase the title in order to be clearer: 'Investigation on the behavior of the atmospheric dynamics during occurrences of Ozone Hole's Secondary Effect at Southern Brazil'

P1, I17: "Antarctica" instead of "Antarctic" Answer: The suggestion was accepted.

P1, I22: "besides ... observations". This phrase is very unclear. I recommend re-writing it. Answer: The suggestion was accepted, and can be seen on page 1 line 20-22.

P1, I23: define AOH at line 20 before using it here – or use the full phrase. Answer: The definition of the term was made at the beginning of the abstract, line 16.

P1, I26: "ECMWF reanalysis products" instead of "ECMWF reanalysis". Answer: The suggestion was accepted.

P1, I29: "analysis" instead of "analyzes". Please correct this error throughout the manuscript. Answer: The suggestion was accepted.

P1, I30: "region of study" instead of "study region" Answer: The suggestion was accepted.

P2, I35: I suppose that the authors mean here, that UV is more harmful than visible radiation. However this information is inaccurate. The biological significance of UV radiations is of course very high, but UV is both beneficial and harmful. Furthermore, the cited literature here does not discuss the biological effects of UV radiation (it is probably at a wrong place?). Since a huge amount of bibliography is available describing the biological effects of UV, I recommend that the authors should search more carefully and add some appropriate references. Answer: Indeed the text was out of context and does not justify the importance of the study in relation to ultraviolet radiation. The text

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has been corrected and can now be viewed on page 3 on lines 57-60.

P2, I39: What is the “southern transport”? Do the authors mean “meridian transport”?

Answer: The correction has been made, and is in blue color, on page 2 line 39.

P2, I51: “discussing” instead of “with respect to this” Answer: The suggestion was accepted.

P2, I52: Delete “in this period” Answer: The suggestion was accepted.

P3, I77-78: “This. . . mm/year” Is this information necessary or useful for the study? If no, I suggest removing this sentence. Answer: The information would only be to complement the description of the region of study, but it has already been taken from the text and is not very related to the subject.

P3, I80: Lines 81-87 are written very badly. I suggest trying to re-write more carefully and in a clearer way, and add the appropriate references. For examples, I suggest replacing “The. . . #167” with: “Ground based measurements of the total ozone were performed using the Brewer (type MKIII) with serial 167, now on referred as MKIII #167” or something similar. Furthermore, either discuss the reliability and uncertainties in the total ozone measurements from brewer and OMI, or at least provide the appropriate references. Answer: Corrections have been made and text has been fixed, now on pages 2 and 3 on lines 87 – 110.

P3, I85-87: Brewer has two operational modes. It can either measure – nearly simultaneously – the irradiance at the referred wavelengths (306.3, . . . , 320.1 nm) or scan the solar spectrum with a step of 0.5 nm in a particular wavelength range for MKIII Brewers it is usually 290 – 363 nm). I am also pretty sure that NO₂ cannot be retrieved from spectral measurements in the UV-B region as author’s state (although the MKIII type Brewers such as the one used here also provide measurements in the UV-A region where it is possible to retrieve NO₂). Please investigate the relative bibliography and add more accurate information, as well as the appropriate references. Answer: Cor-

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rections have been made and text has been fixed, now on pages 2 and 3 on lines 87 – 110.

P3, I89: OMI is not a satellite. It is an instrument on board on Aura satellite. TOMS (total ozone monitoring instrument) is also not a satellite, but a satellite instrument. Please be more careful and add the appropriate references. Answer: The correction has been made.

P3, I89-95: Although authors discuss the retrieval of many different products from OMI (without however citing the appropriate literature), they do not provide any information or reference about the retrieval of total ozone. Since there are many studies regarding the validation of the OMI total ozone product, I also suggest adding some relative discussion in order to highlight the reliability of the total ozone measured by OMI. In all cases, please add the appropriate references. Finally, please specify if TOC is the total ozone column. Answer: The discussion about the OMI data has been corrected, and more references have been added regarding the data used, corrections are on page 8, lines 223 – 231. Total ozone column was defined on page 5, lines 147-148.

P4, I103: Please add “were used” after “sea level”. Answer: The correction has been made.

P4, I114: Please add “were used” after “velocity model”. Answer: The correction has been made.

P4, I124: “İAş is” Answer: The correction has been made.

P4, I128-129: “After ... made”. This sentence is unclear. Please re-write it. Answer: The sentence has been rewritten and is now on the page 5 line 135.

P6, I171: geopotential height? Answer: The geopotential height represents the altitude above sea level at which a certain pressure level, for example here 500 hPa. Thus, geopotential height data are used for tropospheric analysis.

P6, I186: “subtracted” instead of “decreased”? Answer: The correction has been made.

P6, l192: Again, OMI is not a satellite. Answer: The correction has been made.

P6, l199-200: I do not agree that a strong correlation is enough in order to allow merging the ground-based and satellite datasets. The authors should also discuss the average as well as the maximum differences between the two datasets. If for example there is –even a small – offset this would directly introduce a bias in the results of the analysis. Furthermore, if there are differences of 5-10 DU between the satellite and ground-based measurements (even for a very limited number of days), then how the authors know that they are not affecting the results? I suggest discussing the above issues here in order to prove that the merging does not affect importantly the results of the present study. Answer: The correction has been made, available on page 8, lines 223 – 231.

P7, l229: Delete “(absolute PV)”. Answer: The correction has been made.

P8, l246: Delete “for the analysis of the tropospheric dynamics” Answer: This sentence has already been corrected in the previous version for Reviewer 1.

P8, l252: Replace “who” with “which” Answer: This sentence has already been corrected in the previous version for Reviewer 1.

Figure 4: The PV, and not the absolute PV is presented in the figure. Please correct the caption. Answer: The caption has been corrected.

Figure 5: Define on the figure caption that the anomalies of the PV are presented here. Answer: The caption has been corrected.

P9, l300: What is the meaning of “photovoltaic” here? Is it a typo? Answer: The correction has already been made. The word was wrong.

Please also note the supplement to this comment:

<https://www.ann-geophys-discuss.net/angeo-2019-104/angeo-2019-104-AC2-supplement.pdf>

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-104>, 2019.

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