Answer to the referee #2 comments on the paper "Ozone zonal asymmetry and planetary waves characterization during Antarctic spring" by I. Ialongo et al.

The authors are thankful to the referee for the useful and constructive comments. The referee's comments are shown in italics.

This paper describes the zonal asymmetry in spring-time ozone over Antarctica using OMI, GOMOS, and MLS data over the 6-year period from 2005-2010. The asymmetry is characterized primarily by the stationary and total wave 1 and 2 amplitudes, examined using time-series Hovmoller plots and montly and tri-monthly average plots. The results should be of interest to the atmsopheric science community due to the impact of zonal anomalies on climate modeling. The paper presents some good results, but in my opinion still lacks some "big picture" discussion. The specific comments below will hopefully help guide the authors in revising the manuscript to give it a larger scientific impact.

In the revised manuscript we highlight in the section Discussion and summary the main results of our paper and their importance for ozone/climate research. This will help in understanding the general impact of this study for future research in the same field.

Specific Comments:
1. Please define "N" in Equation 1.
This variable is defined in the revised manuscript

2. I'm not sure why Fig. 2 used October mean, but Fig. 3 used Sep-Nov mean. Why not be consistent?
Fig. 2 shows examples of the total ozone asymmetry, which is clearly visible when every month is considered separately; Fig. 3 shows the maxima and minima for the spring seasons, in order to obtain an overall picture of the year, avoiding the differences between different months in different years.

3. If you decide to make Figs. 2 and 3 consistent, you could put dots on Fig. 2 to indicate the min/max locations.
Please, see point 2.

4. P32344, First paragraph: This discussion is a bit confusing. I'm not sure what the point is that you're trying to make here. I think it's that you're making trend-like comments based on 6-years, but this is likely simply interannual variation.

The sentence is modified as follows according to the referee's comment: "During the last 6 yr, the zonal minimum remained below 250 DU, showing the largest values during 2009 and 2010.
The position of the zonal minimum at 65°S ranged from 40°W (2009) and 40°E (2010). The zonal maximum was usually located between 150°E and 170°W; in 2006, when a low ozone maximum (less than 300 DU) was observed (see green point in Fig. 3 labeled with 06), the longitude of the maximum was about 170°W."

5. Time-series plots of the OMI W1 and W2 amplitudes may help augment your discussion of Figure 4. Some of the points you're making are a bit difficult to see in the Hovmoller diagrams.
The comments given after figure 4 about the time period when the zonal asymmetry patterns are visible in daily data were not repeated in Fig. 5, where only monthly means are shown. For that reason we would prefer to keep the description as is, to avoid confusion between the daily time evolution of the phenomenon and the monthly averages.

6. I'm not sure I'm getting the take-home point on Figure 5. Yes, there is a lot of interannual variability, but what is the "big picture" here?
The quantitative information given on the monthly stationary and travelling wave amplitudes, for both wave number 1 and 2, provide information on the planetary wave patterns in ozone, as obtained from observations. In the revised manuscript, we emphasize the large wave amplitudes, dominated by quasi-stationary wave-1 pattern, and extended over the whole stratosphere (please, see the section Discussion and summary in the revised manuscript).

7. You say several times that GOMOS and MLS show asymmetry up to 60-65 km. Yet the MLS plot only extends to ~50 km, and the amplitudes based on MLS mixing ratios are quite small above 30 km. Was there a plot with MLS-based number density in an earlier version of the manuscript? Please explain.
Our original "draft" figures were extended to upper altitudes, and then they were edited for a better visibility. In the revised version, we resolve the inconsistency by adding the clarification that the MLS figure with mixing ratio perturbations are shown up to 50 km for a better visibility, while visible perturbations in number density extend up to 60 km.

8. P32347, L23-25: It looks like there are strong year-to-year variations in September and October, too.

The sentence is removed

9. Characterization of planetary wave amplitudes is often done with geopotential height. I was curious why you didn't argument your analysis with analysis of the height field to show the dynamical influence. Maybe this would be redundant with the air density and temperature plots.

You are absolutely right. The characterization with geopotential height would repeat that of the temperature/air density. The air density and temperature plots are presented, because they are directly linked to mixing ratio representation and ozone distribution.
Technical Corrections:
1. P32339, L14: "planetary waves activity" should be "planetary wave activity"
corrected
2. P32343, L22: "respect to the South Pole" should be "with respect to the South

Pole"
corrected
3. P32347, L16: Strange wording, please look at this.
The sentence is modified as: “Similarly to GOMOS data (Fig. 7), the wave amplitudes decay with the altitude, with maxima below 30 km. MLS profiles of mixing ratio perturbations are shown up to 50 km for a better visibility, while visible perturbations in number density extend up to 60 km.”
4. P32347, L16: You say 60 km, but plot only reaches ~50 km. Amplitudes look small above 30 km.
Please see point 3.
5. P32348, L10: "is" should be "are" to match noun "amplitudes"
corrected
6. P32348, L15: You didn’t show MLS ozone asymmetries extend up to 60-65 km.
Please see point 7 from the specific comments
7. In the manuscript title, shouldn’t "planetary waves" be "planetary wave"?
Corrected