

Co-Editor Decision: Reconsider after major revisions (02 Jan 2017) by Timothy Bertram
Comments to the Author:

Dear Pavlos-

Having received additional comments on your manuscript, it is my decision that major revisions are still required for publication in ACP. These revisions are specifically related to the figure quality. Please consult with the ACP production team if you have questions or concerns regarding figure quality, resolution, etc.

Following the Co-editor's advice, we consulted the ACP production team so that the updated version of Figs complies fully with the ACP standards

Non-public comments to the Author:

Dear Pavlos-

I have received comments on your revised paper. While I understand that the figure types/quality in this manuscript have been used for prior publications, it is the reviewers (and my opinion) that higher quality graphics would substantially aid in conveying the messages carried in this paper. I would be happy to review the paper again if the following changes to the figures are considered. I understand the time investment, but in the paper's current form, I think much of the discussion and many of the conclusions are not seen in the figures. I will review the scientific merits of the paper again once the following edits are made.

1) Figure resolution: Many of the map figures are too small to be seen without blowing them up and the figures are basically illegible when printed. Figures should be provided as crisp high-resolution tiff or postscript images. As a guide, when the manuscript is printed, all important elements of the figure should be legible to the reader.

2) The pages are full of white space with tiny panels. Place the colorbars underneath the panels and fill the page from the left margin to the right margin with the panels, with just a couple of millimeters between panels. Efficient use of the page will permit the reader to see the figures.

As mentioned above, we consulted the ACP production team regarding the size of Figs, so that the updated version with magnified Figs complies fully with the ACP standards.

3) The wind barbs are difficult to see because they are the same color as the map. White wind barbs are more obvious.

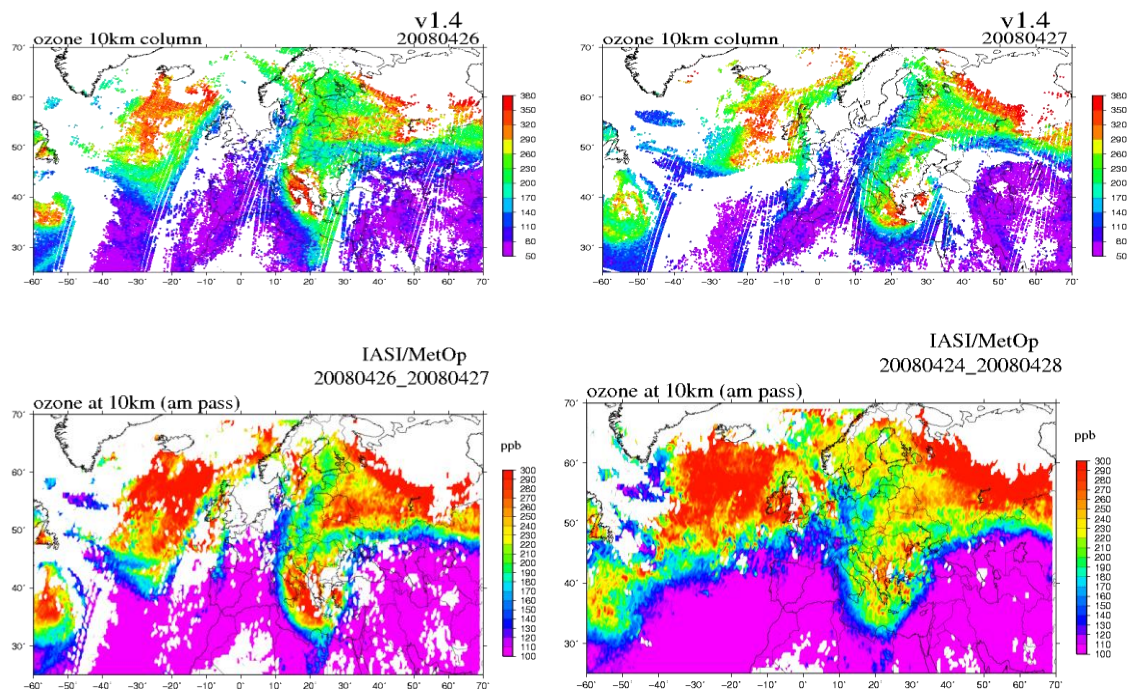
Following the reviewer's suggestion we replaced the black arrows for wind velocity with white ones in Figs 3 and 8, although reviewer 2 had suggested the opposite (replacing white contours with black ones) in the first version of the manuscript submitted last July (Figs 9 and 18).

4) The color scale of the IASI images is not very helpful. Having bright magenta (low ozone) very close to bright, bright red (high ozone) is not intuitive for grasping mixing ratio gradients.

As mentioned above, we consulted the ACP production team regarding the color code of Figs so that the updated version of Figs complies fully with the ACP standards.

5) The 10 km IASI figures are meant to tell me about ozone in the upper troposphere. But the images are provided with a stratospheric color scale with the lowest value being 150 ppb. For me to understand ozone in the UT and the transition to the stratosphere I need a color scale that covers the range 30-150 ppbv. If the coarse vertical resolution of IASI does not effectively detect ozone values at 10 km below 150 ppb, then this is the wrong product to use and another product should be used. OMI provides ozone in the UT in the 300 hPa range.

Our opinion is that IASI measurements are an appropriate tool for the ozone detection in the upper troposphere as well as to the transition to the stratosphere and IASI is perfectly able to detect ozone values below 150 ppb. In fact, we have tried with various scales at both tropospheric levels (3 and 10km). In the following panels we show examples of some scales that we tested for 10 km for the April episode (daily maps as well as composite maps). As mentioned in the text the ozone distribution follows quite well the synoptic atmospheric patterns (high ozone over the low pressure systems, low ozone over the anticyclone). In fact, the scale presented in the manuscript (150-250 ppb) was selected because it presents better the ozone distribution and the concentration gradients observed in the upper troposphere (including possible stratospheric influence) during the examined episodes.



In addition, it should be also mentioned that IASI vertical profiles or distributions over the Mediterranean or over Asia are presented in the following papers (included in the reference list of the manuscript): (Dufour et al., 2012; Doche et al., 2014; Dufour et al., 2015).

6) Figure 7 repeats the specific humidity anomaly panel and omits the vertical velocity.

The specific humidity anomaly in Fig. 7 (lower panel) was replaced by the appropriate vertical velocity panel and we apologize for this mistake.

7) Why use both NCEP and ECMWF? It is suggested that ECMWF be used as these products are of better quality. If both are used, a strong justification should be included.

As we had already mentioned, we tried to do our best to satisfy the comments of reviewer 1 regarding the replacement of NOAA/ESRL maps by the ECMWF maps. So, we produced the corresponding ECMWF maps, by using our own plotting infrastructure (LISA-Paris) which had to be specifically adjusted, for the parameters that we could get from ECMWF (geopotential height, wind speed and vertical velocity) and for the available pressure levels (900 and 800 hPa levels). For the remaining parameters (temperature anomaly and specific humidity anomaly) we plotted new Figs by our own plotting means by using the numerical files provided by NOAA/ESRL at the available pressure level (850 hPa). We think that this combination has the advantage of demonstrating that the argumentation regarding the specific synoptic conditions patterns during the high ozone episodes could be observed at both map types.

8) The ECMWF vertical velocity values are not presented very well. In figure 3 almost everything is white because the color scale ranges from -4 to 4. The color scale should be selected to maximize the information content that is being conveyed. The same color scale for the other vertical velocity panel in Figure 3 should be used? To effectively understand how vertical velocity changes from one day to the next the same color scale is required.

Following the reviewer's suggestion we improved the vertical velocity scales of Fig. 3, by using the same color ranges as in Fig. 8 (-2 to 2).

9) The surface ozone map plots have poor resolution and they have far too much empty space over Scandinavia and Russia. The focus is on the Mediterranean, please focus on this region.

At first, we think that the presentation is improved with the new magnified Figs plotted in the best available resolution. These maps present all available measurements from rural air pollution stations at the AIRBASE database of the European Environmental Agency. We cannot avoid the empty space over Scandinavia and Russia as there are only few available stations there. The focus is on the Mediterranean, of course, but one of the

main points of the paper is that the ozone concentrations measured at a certain rural station are influenced by large synoptic patterns, so we need to examine the extended geographical domain. This is very well shown in the May episode (Fig. 9) where the dense measuring network in Central Europe helps to demonstrate that at the same time that we observe an ozone episode at the Western Mediterranean coast very high concentrations are observed also at Central Europe over the area of strong descending winds at the periphery of the N. European anticyclone.

Unrelated comment: When referring to an ozone measurement of ppb, mixing ratio should be used rather than concentration.

Although many times “concentration” is used also for describing values in ppb, we agree with the reviewer that it is more accurate to use “mixing ratio” instead, so the corresponding replacement has been made.