Anonymous Referee #1 Comments (Authors Response in Italics)

This paper investigates the role of tropospheric subsidence on near-surface ozone concentrations of the JRC-Ispra monitoring station. The study is based on the analysis of several observational products (ground measurements, satellite retrievals), reanalysis data and back trajectories. This is an interesting and solid study, with adequate discussion of the results. However, I think that the structure and number of figures should be revised in order to be more reader-friendly. I recommend publication of the paper after the following comments are addressed.

We would like to thank the reviewer for his positive comments on the manuscript. As seen below we revised the paper according to his suggestions.
The corresponding changes in the revised manuscript (in Final Response) are highlighted in yellowcolor.

Main comments
a. The manuscript includes too many figures. For example, the third examined episode is associated with 10 figures, while the first episode with only one. My suggestions on this are the following:
1. Merge Figure 1 and Figure 2 into one Figure. Increase the size of the legends in Figure 1 and Figure 2.

Figs 1 and 2 have been merged into one Figure (new Fig. 1) and the size of the legends has been increased.

2. As Figure 6 and Figure 7 are referring to the same episode you can merge them into one Figure. The same stands for Figure 12 and Figure 13.

Figs 6 and 7 have been merged into one Figure (new Fig. 5) as well as Figs 12 and 13(new Fig. 10)

3. As Figures 16a and 16b are of the same temporal extent they can be combined into one figure with a secondary vertical axis. The same stands for Figure 18a and 18b. Then the new fig.16, fig. 17a, fig 17b, and the new fig18 can be merged into one Figure.

Figs 16a, 16b, 17a, 17b, 18a, 18b, have been merged into one Figure (new Fig. 13)

4. Please use a, b, c... labelling for all your Figures.
5. For every Figure use one caption describing there every a, b, c. . . subfigure.

In the new Figures 1 and 13, presenting the JRC-station measurements, the labels a, b, c, d were used and also one caption was used describing the a, b, c, d subfigures.

6. In Figures 3-11, 14 and 15 remove the surrounding white space to improve both the quality and visibility of the figures.

For the indicated Figs the surrounding white space was removed.

b. Regarding the selection of the episodes the authors state that ". . .the 3 most characteristic of them.." will be presented (page 7, line 32). Most characteristic in terms of what? Can you be more specific on this somehow subjective criterion?

The sentence was rephrased as follows:
"More than ten 7Be - ozone weekly episodes were identified in the whole time series and the three most characteristic of them, for what concerns signs of tropospheric subsidence as observed in the meteorological and air pollution measurements (high 7Be and O3 concentrations combined with positive omega and dry air masses), will be presented in the following paragraphs. The selected episodes were: 3-10 May 2011, 23-29 May 2012 and 28 June – 04 July 2011".

c. I suggest presenting the time period of each of the three episodes at the beginning of Section 3.2. Then every examined episode can be presented as individual Section 3.2.1, 3.2.2 and 3.2.3.

Ok

Comments
1. Apart from tropospheric subsidence influencing near-surface ozone concentrations, there are climatological and case studies of stratospheric intrusions affecting near surface ozone concentrations for the Mediterranean region (Cristofanelli et al., 2006; Gerasopoulos et al., 2006; Akritidis et al., 2010). I believe that the contribution of such events on near-surface ozone for the Mediterranean region should be also included in the Introduction.

The contribution of stratospheric ozone intrusions affecting near surface ozone concentrations for the Mediterranean region has been more stressed in the introduction and the suggested relevant references have been included.
So, the following sentence was added:
Apart from tropospheric subsidence influencing near-surface ozone concentrations,
It has to be mentioned also that there are climatological and case studies of stratospheric intrusions affecting near surface ozone concentrations for the Mediterranean region (Cristofanelli et al., 2006; Gerasopoulos et al., 2006; Akritidis et al., 2010)

2. Page 6, line 18: Please add a reference for the use of the 7Be/210Pb ratio and a small description for the purpose of its usage.

We think that this information is already presented sufficiently in the introduction (Page 3, lines 1-24), where many relevant publications on the use of radionuclide measurements for atmospheric transport are cited. We added also a recent relevant paper, which describes very extensively the use of the 7Be and 210Pb radionuclides in atmospheric transport studiesin its introduction (Brattich et al., 2017). The referenced WMO-GAW report (2004) as well as the cited reference Koch et al., 1996 make also an interesting review on this subject.
In addition, the following phrase was added in the 1st line of the respective paragraph in the introduction:
"and in particular terrigenous 210Pb and cosmogenic 7Be, which are natural radionuclides that are helpful in understanding the roles of transport and/or scavenging in controlling the behavior of radiatively active trace gases and aerosol"

Technical comments
1. Page 2, line 7: Remove dot after "are observed."
Ok

2. Page 3, line 6: Replace "if 3.8 days" with "of 3.8 days".
Ok

3. Page 3, lines 12-13. Please correct the order of references. Also, check for other similar instances throughout the manuscript and correct accordingly.
Ok

4. Page 3, line 32: Replace "during summertime ozone episodes over the eastern Mediterranean and linked" with "during the summertime ozone episodes over the eastern Mediterranean and are linked".
Ok

5. Page 4, line 21 to Page 5 line 4. I suggest including bullets for the description of the measurements.
Ok

6. Page 4, line 22: Replace "Jensen et al., 2017" with "Jensen et al. (2017)". Also, check for other similar instances throughout the manuscript and correct accordingly.
Ok

7. Page 4, line 27: Delete the extra dot.
Ok

8. Page 5, line 6: Replace "charts for" with "charts of".
Ok

9. Page 5, line 7: Replace "for the atmospheric "with "at the atmospheric".
Ok

10. Page 6, line 17: Replace “and of ozone vs” with “and that of ozone vs”.
Ok

11. Page 7, lines 31-32: Replace 10 and 3 with “Ten” and “three”.
Ok

12. Page 11, lines 13-17. This is a rather long sentence. Please rephrase.

The sentence was modified as follows:
“During high 7Be and high ozone episodes, the highest evening ozone values exceeding the standards usually occur within the following 2-3 days after the maximum of regional tropospheric subsidence, as observed also in the analysis of several episodes not presented in this paper. The increase in ozone concentrations usually occurs under the influence of favourable meteorological conditions for photochemical ozone production in the boundary layer, which is added-up on the increased regional background due to tropospheric subsidence and thus occasionally leading to exceedances in ozone air quality standards”.

13. Page 32, Figure 10: Please rephrase the figure caption to be clearer.

The figure caption was rephrased.

References

Akritidis, D., Zanis, P., Pytharoulis, I., Mavrakis, A., and Karacostas, T.: A deep stratospheric intrusion event down to the earth’s surface of the megacity of Athens, Meteorol. Atmos. Phys., 109, 9–18, 2010
Cristofanelli, P., Bonasoni, P., Tositti, L., Bonafe, U., Calzolari, F., Evangelisti, F., Sandrini, S., and Stohl, A.: A 6-year analysis of stratospheric intrusions and their influence on ozone at Mt. Cimone (2165m above sea level), J. Geophys. Res.-Atmos., 111, D03306, https://doi.org/10.1029/2005JD006553, 2006.
Gerasopoulos, E., Zanis, P., Papastefanou, C., Zerefos, C. S., Ioannidou, A., and Wernli, H.: A complex case study of down to the surface intrusions of persistent stratospheric air over the Eastern Mediterranean, Atmos. Environ., 40, 4113–4125, 2006.