

# ***Interactive comment on “A study of the influence of tropospheric subsidence on spring and summer surface ozone concentrations at the JRC-Ispra station in northern Italy” by Pavlos Kalabokas et al.***

## **Anonymous Referee #1**

Received and published: 20 June 2019

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.

Main comments

C1

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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.

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.

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.

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.

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

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?

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.

#### 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;

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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.

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

#### Technical comments

1. Page 2, line 7: Remove dot after “are observed.”

2. Page 3, line 6: Replace “if 3.8 days” with “of 3.8 days”.

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

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”.

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

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.

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

8. Page 5, line 6: Replace “charts for” with “charts of”.

9. Page 5, line 7: Replace “for the atmospheric” with “at the atmospheric”.

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

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

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

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

## 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.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-438>, 2019.

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