"**Surface Ozone: Seasonal cycles, trends and events, a new perspective from the OPE station in France over the 2012 - 2023 period**" by Conil et al. 2025. Atmospheric Chemistry and Physics. Egusphere-2025-148.

General comments.

The introduction is very comprehensive, including highly up-to-date references. Some information has been included as supplementary material that could be interesting to incorporate into the main body of the manuscript, such as the seasonal evolution of CO, CH_4, and the mixing layer height. The seasonal cycles of O_3, NO_x, CO, CH_4, ^7Be, etc., are presented; however, these are actually monthly evolutions based on weekly averages, and in the case of ozone and NO_x, it corresponds to the 0–24 h seasonal evolution.

Many databases, different statistical techniques, and various time periods are used, but the main objective of the study is not clearly defined. The last part of the results section (Section 3.3) was difficult to understand, and perhaps some effort should be made to clarify it. Some methodologies and time periods used are not clearly mentioned in Section 2. This work includes 15 figures, which I believe is an excessive number. The authors should reduce both the amount of information presented in the paper and the number of figures, and they should clearly define the study's objective and scientific contribution. Although the database used has significant scientific value, the study should be more focused and not cover many different topics. Therefore, I encourage the authors to undertake a thorough revision.

Specific comments.

Page 1. Lines 30-31. "…*where it has significant health*...". As a suggestion, it would be helpful to indicate the cause of this impact. Maybe it is simply an oxidant agent that is considered an air pollutant at certain levels.

Page 3. Lines 1-2. "…*contrasted with Asia and China*…". As China is in Asia, maybe the authors mean Southeast Asia.

Page 3, Lines 12-13. "…*is largest in spring and weakest in summer*…". But isn't this statement dependent on the region?

Page 3, Lines 32-35. "*Indeed, ^7Be is produced*…". This information about stratospheric tracers, ^7Be and ^{22}N; is it really necessary for this work?

Page 4, Line 18. "…*regional background station, OPE*, …". Although it has already been mentioned in the Abstract, this is the first time it appears in the manuscript. As a suggestion, I would write its full name here.

Page 4, Line 16. "…*This work contributes*…". Have there been previous studies related to surface ozone measurements at this observatory, or is this the first study on surface ozone at OPE? Perhaps they are referenced later in the manuscript.

Page 4, Line 36. "…*a ground-based weather station operated*…". Can we assume that the wind sensor is positioned at 10 m above ground level, and that temperature, relative humidity, and pressure sensors are at approximately 1–1.5 m? Is this correct?

Page 5, Line 6. "…*ERA5 reanalysis at the grid point*…". What is the spatial resolution of this grid? I assume it is 0.25° × 0.25°. Perhaps providing more information about ERA5 would be useful.

Page 5, Line 8. The database used for O_3, NO_x, etc., contains hourly data. O_3 is mentioned in μg m^{-3}, CO in ppm, and CH_4 in ppb. What units are ultimately used in this work? Additionally, although CO and CH_4 measurements are available at 10 m and 100 m, were both levels used in the analysis?

Page 6, Line 13. "*We used the CCGCRV*…". As a suggestion, could the authors clarify the meaning of CCGCRV?

Page 6, Line 15. "…*the trend component using the Theilsen and STL methods*…". If the authors are referring to the Theil-Sen estimator, perhaps it should be written as Theil–Sen. Also, could the meaning of STL methods be explained?

Page 6, Line 29. After reading section 3.1, a more appropriate title might be "Monthly variations from weekly averages for ozone, ….".

Page 7, Line 5. Figure 1 appears before it is mentioned in the text. What method was applied to normalize the seasonal daily cycles? Is it relative to the daily mean? Since several approaches can be used, how do the authors justify using relative values for comparison with other stations (Page 7, lines 11–14)? Absolute values are more commonly used in such comparisons.

Page 7, Line 6. "…*spring to winter seasons*". Perhaps in Section 2, the months corresponding to each season could be specified.

Page 8, Line 19. "*Figure 2 shows*…". Again, Figure 2 is included before it is cited in the text. My suggestion to the authors is to use the same scale on the Y-axis for all four graphs in Figure 4. This would allow for better comparison. How were the percentiles for each month calculated, from hourly or monthly averages?

Page 8, Line 8. "…*when the boundary layer is larger*…". In reality, there is no strict linear relationship, since beyond a certain height, if the boundary layer is too high, precursors disperse vertically and do not form ozone. In some cases, lower heights are more efficient for ozone production.

Page 9, Line 11. NO_x and O_3 are expressed in μg m^{-3}, while CO and CH_4 are expressed in ppb, meaning concentrations and mixing ratios are being used simultaneously. Is it possible to standardize these units?

Page 9, Line 25 (Section 3.1.3). If the information in Sections 3.1.2 and 3.1.3 is presented in the same Figure 3, why are these two subsections not combined?

Page 10, Line 5. "*Figure 3: Averaged*…". To help identify the graphs in this figure, why haven't the authors used labels such as (a), (b), (c), etc? That might make it clearer. Additionally, the labels in the graphs do not match those mentioned in the text. For example, is the median CH_4 labeled as

“ch410q50” or is the median CO labeled as “co_10q50”? I suggest the authors clarify this for better readability.

Page 11. Figure 4. I suggest improving and making the labels in the graphs more concise. For example, in “…*weekly mean relative humidity (top left panel), temperature*…”, the reader understands that "*RH %*" refers to "Relative Humidity (%)" and "*TM ºC*" to "Temperature (ºC)," but the labels could be improved by adding spaces and placing units in parentheses for better clarity.

Page 12. Line 4. I understand that the aim of Section 3.14 is to identify or associate the occurrence of ozone peaks with STT. Is this correct? This point is not entirely clear.

Page 12. Line 9. “…*afternoon O_3 peak events*…”. I understand that the authors define two types of ozone events, those exceeding 50 and 65 ppb. What criteria were applied to define these values? Perhaps the definition of events should be included in Section 2.

Page 12. Line 20. Figure 5. The graph should include a label explaining the meaning of each coloured line, not just in the caption.

Page 13. Line 20. Figure 6. I suggest that the authors make the Y-axis labels more explicit. Labels should be added to indicate the meaning of each coloured line. These figures are not easy to understand.

Page 14. Line 10. Figure 7. The same comments apply as for Figure 6. What does "RR" stand for Rainfall? The reader should not have to assume meanings to understand the work. As a suggestion, Figures 6 and 7 could perhaps be combined.

Page 14. Lines 27-30. These results were expected.

Page 15. Lines 18-19. “…*the cold period (October to March) is longer than the warm period (April to September)”.* I think the definition of the cold and warm periods should have been presented earlier in the manuscript.

Page 16. Line 8. “…*Having identified two different periods using the correlation analysis*,…”. But which periods are the cold and warm periods?

Page 16. Line 9. “*Using the quantiles 10%, 25%, 40%, 60%, 75%, and 90%. These seven classes*…”. Why were these quantiles selected? What are these seven classes? But there are only six quantiles. It’s a bit confusing.

Page 22. Section 3.5. Is this paper also devoted to extreme events of surface ozone?

Page 22. Line 3. “…*200 µg m^{-3} ever recorded at the OPE regional station*”. This exceeds the threshold defined in the European Directives; perhaps this could be mentioned.

Page 22. Lines 13-16. But the factors that trigger an ozone episode in the Barcelona area may not be the same as in OPE. For example, “…*the foehn effect induced by a local mountain wind regime*”.

Page 23. Line 12. “…*Donon (Figure 2, Figure 15*)…”. Please, correct it. The use of the ozone data recorded in these background stations was mentioned in Section 2? Are the stations part of an air quality network?