Comment on acp-2021-1092
Anonymous Referee #2

Referee comment on "Long-term visibility variation at the Ebro Observatory (1960–2020)" by Juan José Curto and Nicolás Tacoronte, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1092-RC2, 2022

It is nice to see a long time series of visibility data analyzed. In general, it is an interesting topic of interest. However, the manuscript lacks in various aspects listed below. his reviewer is not at all sure if can be accepted for publication in ACP even after major revision. the last comment below is the most important one.

Lines 33 – 40: Don’t forget to mention that the visibility can also be measured with a whole suite of instruments. Even if they are not applied at the Ebro Observatory, they need to mentioned. They come with big advantages (continuous measurement, no errors from human physiology).

Lines 42 – 45: This list is far from being complete or updated.

Line 57: Please provide more precise coordinates. You are offering a +/- 10 km resolution, you should rather provide 4 decimals of the full degrees of latitude and longitude.

Lines 68 – 69: "The last sixty years of these records have been digitized". Why didn’t you digitize more data, dating further back?

Lines 109 – 111: "The criterion used consists in eliminating those values greater than 1.5 times the interquartile range below the first quartile and above the third for each hour of the day." The criterion is not clear to this reviewer. Please elaborate.

Lines 133 – 134: Please elaborate how the correlation between visibility and wind direction (polar coordinates) was computed.
Fig. 2 - 9: Graphs should not have headlines.

lines 163 – 165: “The results shown in Figure 3 indicate that, in general, the maximum average visibility was found during the winter months and the minimum in July, August and September, except for the last period of time measured.”. No, the observation also does not apply to the period 1991 – 2005 either.

Lines 167 – 169: No good English, unclear. Please fix the wording.

Figure 4: The type of presentation is confusing. It would be much better to present stacked graphs (similar to those used in Fig. 5)

Line 197: What is the “upper part of the region” and the “lower part” (line 199)? Are authors talking about topographic altitudes?

Fig. 5. There is something wrong with the wind directions. What means “C” in the x-axes? There is no data for direction N. Direction NNW and NNE seem not to connect well to each other.

Line 206. Please say low wind speeds instead of soft wind speeds.

Figure 6: Thank you for the test. Please say “Relative frequency of” instead of “Visibility variation for”. Please take away the parentheses around the word “sector”. Again, what means “C” on the x-axis. Please take out these data points.

Figure 7: Same comment for the x-axis as for Fig. 6.

Data presented in Fig. 7 are not referred to in section 4.2 (except a general remark in line 219).

Lines 239 – 240: You mean “when its magnitude is greater than 0.1453”, correct?
Lines 243 – 246: This hypothesis seems to make sense. However, it is also highly speculative, because it is not at all based on any analysis or data presented so far. This section needs to be considerably weakened or moved further down within the manuscript.

Lines 251 – 257 and Table 2: It not clear, how the correlation war computed (see comment on lines 133, 134 above), and what exactly is shown in Table 2. This section needs extensive re-write.

Lines 267 - 268: This statement needs to be supported much better. There is an ongoing discussion about this topic in the literature, authors should not ignore that or simply comment it with a very short comment.

Line 272: “SSE-SSW” This reviewer does not agree. It should be said ESE – SSE instead, see Fig. 7. Also, WSW – N is more appropriate that W – NW. Note that the visibility data (Fig. 6) have another maximum than the wind direction data. Overall, the presented data analysis is not sufficient. Likely, it would be helpful to show visibility roses.

Lines 283 – 284: How do you arrive at this conclusion? Please refer to the data and respective discussion in the manuscript.

Lines 285 – 294: In lines 79 – 81, authors mentioned that the Ebro observatory “has never ... experienced significant changes in its surroundings from 1910 onward”. Interestingly, this is supported by a reference dated 1987. Here, authors claim “that from the year 2000 onward there has been a large increase in the population of the town of Roquetes where the Ebro Observatory is located”. Note that this is highly contradictory. If man-made pollution is claimed to be one of the drivers of visibility trends, man-made pollution data measured at a site within or nearby the observatory need to be shown. Data shown in Figure 9 are by far not sufficient. Once the data is presented, a novel data analysis will have to be made to test the hypotheses presented here. The regional representativity of the Ebro visibility data will also have to be carefully discussed then.