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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ozone source apportionment during peak summer events over southwestern Europe" *by* Maria Teresa Pay et al.

Anonymous Referee #3

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The paper gives important contribution to address the source apportionment study regarding ozone episode occurred in Spain. The paper is well structured and presents a complete analysis of the modelling results. However, there are some major points that should be addressed before recommended for publication. Besides that, English should be revised along the manuscript, there is some inconsistencies and grammatical errors. See below major and minor comments.

Major changes - Abstract; Line 15 (Page 4/Line 2): there is recently studies that showed that source-apportionment methods are not adequate to investigate plans and mitigation measures, in particular for non-linear pollutants like ozone, and that for that purpose "scenario analysis" based on "brute-force" are recommended. Authors should revise the text along the manuscript where it is mentioned the purpose of "designing

plans", which should not be the final objective of this source-apportionment study. (see Clappier, A., Belis, C., Pernigotti, D., Thunis, P. Source apportionment and sensitivity analysis: two methodologies with two different purposes. Geosci. Model Dev. Discuss. 10, 4245-4256 (2017)). - Page 4/Line 7-9: please review this sentence according to what has been commented before - Page 5/Line 26: the authors should comment about the representativeness of the 2009 emissions to the 2012 SA study presented. From 2009 to 2012 several changes happened in society and economy which was reflected in emission data. - Page 7, Line 9: SNAP2 activity can be a particular important source for ozone precursors. Authors should comment about that when they mentioned that SNAP2 is aggregated with other activity sectors. - Page 7, Lines 25-30: in the scope of FAIRMODE – Forum for Air Quality Modelling in Europe – tools were developed, namely the DELTA-Tool, to evaluate air quality models and conclude about their suitability to be used for legislation purposes. The authors should consider the application of this tool to evaluate model performance instead of calculating the traditional statistical indicators. In any case, authors should justify why they decided not using this tool. - Page 13, Lines 16-17: this information (model performance in terms of o3 peaks) should be presented and discussed in the model validation section - Page 13, Line 22: this sentence should be completed with information about the area where this impact (up to 8%) is verified. - Page 15, Lines 4-5: The authors should quantify how "model reproduces reasonably well" - Please clarify the sentence "The NO2 overestimation correlates with the highest road transport contribution" - Please explain why: "The results point towards a poor representation of the vertical mixing during the stagnant conditions" - Page 16, Lines 4-10: this should be placed in the model validation section - Page 16, Lines 13-14: how can the authors conclude that the model is able to reproduce all these different processes? Can the authors support better this statement? - Page 18, Line 4: since only one rural station is analysed, the authors should not generalize as "In rural background areas. . ." - Page 18, Lines 30-33 to Page 19: the authors analyse the vertical profile in a single point, but this will be not representativeness of the all study domain. Authors should change the text according to this limitation and

comment it, or increase the number of points analysed. - Figure 2: please review the figure caption “Number of days exceeding the O3 target value (120 ug.m-3) by each day of the episode”

Minor changes: - Page 1/Line 20: write 4x4 km2 instead of 4x4 km (please correct this along the manuscript) - Authors should refer the modelling system (CALIOPE) in the abstract - Page 3, Line 4: The following reference should be added, since it is the biggest ozone episode occurred in IP region: “Monteiro A., Gama C., Candido M., Ribeiro I., Lopes M. (2016) Investigating ozone high levels and the role of sea breeze on its transport. Atmospheric Pollution Research 7, 339-347. - Page 7, Line 23: please indicate how many stations measure both O3 and NO2 pollutants - Page 10, Lines 17, 24, 29: please add “average” when mentioning “hourly O3” (the values presented are an average of different locations and not an “hourly O3 data” - Page 12, Lines 2-7: the following reference should be added to support this part: Borrego C., Monteiro A., Martins H., Ferreira J., Fernandes A.P., Rafael S., Miranda A.I., Guevara M., Baldasano J.M. (2016). Air quality plan for ozone: a case-study for North Portugal. Air Quality, Atmosphere & Health 9 (5), 447–460. - Page 14, Line 30: please review the English - Page 17, Lines 19-24: authors should consult and use the following reference that compares the different shipping emission inventories mentioned: Russo M.A., Leitão J., Gama C., Ferreira J., Borrego C., Monteiro A. (2018) Shipping emissions over Europe: a state-of-the-art and comparative analysis. Atmospheric Environment 177, 187–194. - Page 18, Line 22: please replace “These O3. . .” by “The results presented before. . .” - Figure 3: Please review the units used along the manuscript, like “m/s”

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