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Interactive comment on "A multi-model comparison of meteorological drivers of surface ozone over Europe" *by* Noelia Otero et al.

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In different parts of this manuscript the authors mention that the largest discrepancies between modelled and observed MDA8 O3 are found for the Balkans. They attribute that to the low number of stations interpolated into the 1x1 degree grid cells in the dataset by Schell et al. (2014). I agree that is problem for the Balkans and for other "external regions", as correctly indicated by the authors, but our experience also shows that there are some inhomogeneities in that ozone dataset over the Balkans.

First, in Ordóñez et al. (2017) we examined the impact of high-latitude and subtropical anticyclones on surface ozone. That work found (i) upward ozone trends in that dataset over the Balkans and (ii) did not establish a clear impact of anticyclonic sys-

tems on ozone over the same region. Consequently, we omitted the Balkans from our regional analyses. Later on, Carro-Calvo et al. (2017) carried out a much more detailed evaluation of the quality of the ozone dataset before analysing the synoptic drivers of summer ozone in Europe. Figure S1 in the supplement of that paper displays the regions with some inhomogeneities prior to 2004. There is a small region with inhomogeneities over Scandinavia which should hardly affect your results and a much larger area covering most of your Balkan region. In Carro-Calvo et al. (2014) we decided to remove all O3 data over those regions before 2004.

Note that both Ordóñez et al. (2017) and Carro-Calvo et al. (2017) used a longer ozone dataset created by Jordan Schnell for a 15-year period (1998-2012). However, I have had a quick look at the shorter dataset used here and still see very low ozone mixing ratios in the Balkans during the first years. That might at least partly explain the high model biases (Figure 2) and low correlations (Figure 3) reported by this manuscript for that region. That could also have important implications for the results of the multiple linear regression models. As an example, the observation-based models suggest a very strong impact of ozone persistence in the Balkans, while that impact is not so strong for modelled ozone (Figure 7).

I would recommend the authors to plot the full time series of MDA8 O3 (daily values) averaged over that region and see if there is any break-point (I guess that around 2004) with a clear shift in the data. Then I would remove the data before that break-point and repeat all the analyses for that region.

In the last paragraph of page 14, the authors speculate on the reasons for the relatively low skill of the models in northern Europe: "Moreover, in the case of the external regions of northern Europe, it could also be explained due to the dominance of transport processes such as the stratospheric-tropospheric exchange or long-range transport from the European continent, rather than local meteorology, particularly in AMJ (Monks, 2000, Tang et al. 2009, Andersson et al. 2009)". According to the results of Carro-Calvo et al. (2017), I believe that is the case not only for spring but also for the

summer months (JJA in that paper).

Finally, I have read the manuscript with interest. I understand the reviewers' concerns but still think that some of the findings will be relevant for the community. As pointed out by one of the reviewers, "it is difficult to fully diagnose the potential issues within each model without further sensitivity simulations". The analysis of the results for the ensemble mean/median, as suggested by another reviewer, will not be sufficient to understand all the reasons for those discrepancies. However, that could help summarise some of the results and identify the meteorological drivers and processes (e.g. relative humidity, dry deposition?) which should be investigated in more detail in the future, through (i) careful evaluation of model parameterisations and (ii) sensitive simulations. Having that in mind, I am confident this manuscript will be a good contribution to the field. Some of its findings will hopefully raise our awareness about some processes which need to be better investigated in air quality models.

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