Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-1183-RC1, 2020


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Modulation of radiative aerosols effects by atmospheric circulation over the Euro-Mediterranean region" *by* Pierre Nabat et al.

**Anonymous Referee #1**

Received and published: 25 February 2020

This manuscript investigates the links between aerosols variability modeled by CNRM-ALADIN64 regional climate model with and synoptic atmospheric circulation over the Euro-Mediterranean region, including analysis with respect to the variability of North-Atlantic Oscillation as well as to weather regimes based on persisting meteorological patterns. It is well structured and written and illustrates original and interesting results. I suggest acceptance of the manuscript for publication after taking into consideration the following comments.

Comments 1) Page 2, lines 15-16: The authors may also consider that Mediterranean cyclones developing in winter and autumn could also affect the dust transport at the



Printer-friendly version

Discussion paper

Eastern Mediterranean (Flaounas et al., 2015; Georgoulias et al., 2016). 2) Page 2, line 18: Please, add a relevant reference 3) Page 2, line 19: add a reference. This shift of dust load from Eastern Mediterranean in spring to western Mediterranean in summer has been also shown in a recent study by Marinou et al. (2017) using a satellite pure dust product based on CALIPSO. 4) Page 10, lines 0-10: I would suggest to discuss shortly the biases in a quantitative manner with respect to MODIS and MISR. Maybe the authors could think of adding a field of the biases in Figure 6, but this is optional. Of course, in the following section, the authors discuss the AOD biases with respect to station data. 5) Page 12, lines 2-3: The NAO index used for the analysis would be more consistent if it would be based on ERA-interim which drives ALD-AER rather than the NAO-index provided by NOAA. Could the authors comment on this issue and justify the use of NOAA instead calculated from ERA-interim? 6) Page 12, lines 16-18: The justification provided by the authors is very reasonable. I think that a strong support on all this discussion would be provided by plotting near surface wind vectors along with model AOD separately for the positive phase and the negative NAO phase. This is, however, a suggestion which could be only optionally considered by the authors. 7) Page 13, lines 19-20: Here it is mentioned that less rainfall is noted in summer under the positive phase of NAO but according to Blade et al. (2011) during high NAO summers, when strong anticyclonic conditions and suppressed precipitation prevail over the UK, the Mediterranean region instead is anomalously wet (see for example their Figure 10). Could you check in your analysis the regions that less rainfall is noted in summer under the positive phase of NAO? 8) Page 20, lines 15-18: Could you make a course estimate of the impact of using monthly instead of daily AOD climatology in RCM simulations? I guess this can have a stronger impact on SSR but the impact on near surface temperature is maybe trivial. 9) Figure 1: Please describe in figure caption the numbering. 10) Figure 2: QuikSCAT is presented here but not described. Please add in Section 2 a description of QuikSCAT dataset used here for model evaluation of sea winds. Discuss also how the spatial resolution of the model and observation data compares. You may also think also of presenting a comparison

of ALADIN surface wind with ERA-Interim for consistency with the SLP comparison. 11) Figure 3: The low cloud and total cloud differences plot is of pure quality and not really informative because of the gaps. Discuss also how the spatial resolution of the model and observation data compares.

Minor Corrections 1) Page 2, line 9: Please, specify which season. 5) Page 12, lines 17: easterly winds instead of eastern winds.

---

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-1183, 2020.