Atmos. Chem. Phys. Discuss., 13, C1282–C1285, 2013
www.atmos-chem-phys-discuss.net/13/C1282/2013/


Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Radiative effects of desert dust on weather and regional climate" *by* C. Spyrou et al.

**C. Spyrou et al.**

kallos@mg.uoa.gr

Received and published: 15 April 2013

Response to Anonymous Referee #2

The manuscript is aimed at modeling the direct radiative effects of desert dust on weather over the large region including North Africa, the Mediterranean Sea, and Europe. The obtained results are based on two sets of daily model simulations during the six-year period from 2002 – 2007: the ïňĄrst set of simulations included dust radiative effects, while simulations in the second set were without these effects. The obtained results are interesting. I recommend the manuscript for publication.

[REPLY]The authors would like to thank the reviewer for the very constructive comments he indicated. As follows, we discuss the comments step-by-step:



The authors may consider the following critical aspects: 1. As the current study is based on model simulations, the title should be updated in order to represent correctly the obtained results. I recommend the following one: Modelling of radiative effects of desert dust on weather and regional climate.

[REPLY]The title has been changed as suggested by the reviewer: "Modeling the radiative effects of desert dust on weather and regional climate."

2. The important part of this study is the evaluation of the dust impact on modeled air temperature. In particular, using temperature data from approximately 600 stations, the authors discussed a significant improvement in modeled air temperature when the dust-radiation feedback is included. To represent the more convincing proof of the above conclusion, it is essential to show (at least for the dusty spring season) maps of space distributions of model bias, root mean square error (RMSE), and correlation coefiňĄcients over the model domain. Such maps will provide the reader with precise information about regions where the improvement in modeled air temperature was more significant (or less significant) after incorporating dust-radiation effects. Just to declare that the improvement is attributed mostly to the stations near dust sources is definitely not enough (see page 1337, lines 11-12).

[REPLY]In order to show that that the improvement is attributed mostly to the stations near dust sources we calculated the statistical scores for the spring period (MAR-APR-MAY) for all the years over 2 sub-domains: One located over Northern Africa and the other over Europe. We present these results in a new figure added to the manuscript. The results that confirm our original hypothesis are presented below.

3. Section 8 (Conclusions): in page 1342, line 5, the authors concluded that "Therefore, variations of dust particle production can have impacts on radiative properties, cloud formation, and water budget". However, the effects of dust on cloud formations and water budget were not studied in the current paper. References are needed.

[REPLY]An example of impact on cloud formation is given in section 6, where the dust

effects on radiation caused the formation of a cirrus cloud over the measuring station at Crete. We agree with the reviewer that reference on the effects of dust on water budget cannot be included here as it is not discussed in the current paper, so we deleted the phase “water budget” from the text.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1327, 2013.



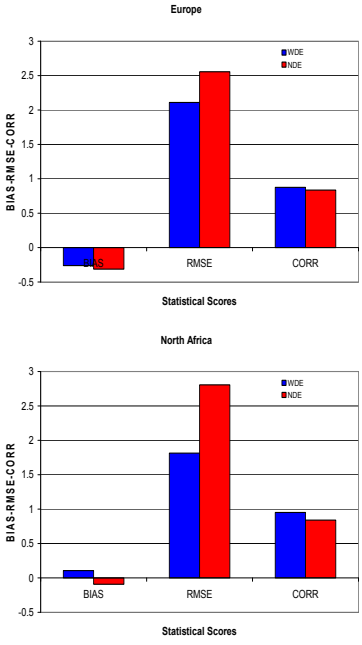


**Fig. 1.** Statistical parameters for the spring period of the simulations (with dust effects - WDE and without dust effects - NDE) for Europe and North Africa