

## ***Interactive comment on “Saharan dust event impacts on cloud formation and radiation over Western Europe” by M. Bangert et al.***

**M. Bangert et al.**

max.bangert@kit.edu

Received and published: 10 April 2012

We thank the reviewer for the valuable comments and suggestions. We followed each of them in our revised version of the manuscript.

» While the emphasis of the paper is on the impact of dust on liquid and ice clouds, the interaction of radiation is also included. I believe that an additional simulation including only dust-radiation interactions compared to the simulations already included in the paper would be helpful for the community to further understand the local semi-direct effect feedback of dust on clouds. The simulation presented in the paper including dust-radiation interaction also includes the impact on clouds and only at the end of the manuscript it is described in terms of total perturbation to the incoming fluxes and 2m temperatures. Besides the direct effect, dust absorption changes the thermal struc-

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ture of the atmosphere, its dynamics and cloud properties. The authors may consider including a brief analysis of the separate effects of radiation on clouds. «

Excellent idea. We have added new results (extended Fig. 11 and Fig. 12 [Fig. 13 and 15 in the revised manuscript, respectively]) and a brief discussion (Sect. 4.4 and Sect 4.5 §4) of an additional simulation including only dust-radiation interactions to highlight their impacts during the event.

» - Page 31939, lines 17 to 28: Please include as well other more seminal references on the transport of dust towards Europe and the Mediterranean. Also the order of the references should be chronological. With respect the improvement of weather forecasts, in the text extend its application to dust affected areas (not only where there are sporadic events). For example in North Africa, although the background levels may be well represented by climatologies, there are strong dust storms affecting the radiation balance which are significantly underestimated by climatologies. «

We added new references and followed the suggestions concerning the improvement of weather forecast. (Sect. 1 §3)

» - Page 31941, line 17: IN instead of ice nuclei «

We changed it.

» - Page 31947, line 14: introduce a comma in “. . .COSMO-ART, the measured. . .” «

We added a comma.

» - Page 31948, Radiation: Given the uncertainties in the optical properties of dust, please include a brief summary about the ones used here. «

We added a description of the dust optical properties and their parameterization. (Sect. 2.5 §3)

» - Page 31951 line 28: “a coarse comparison (to verify) if the. . .” «

We changed it.

» - Page 31952, line 17: "...the dust particle(s). . .", line 27: ". . .is favorable (for) heterogeneous. . ." «

We changed it.

» Table 2 caption should define if, ic, jf. . . (which is included in table 1 caption). . . «

We changed it.

» - All the figure captions lack of details about the subfigures. Please explicitly list and give more details about all the subfigures. «

We extended the description of the subfigures.

» - Figures 5, 11 and 12 cannot be clearly seen in my printed copy «

The figures are designed for single column and full text height and therefore were unfortunately only half size in the discussion format.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 31937, 2011.

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