

Reply to

Interactive comment on “The radiative impact of desert dust on orographic rain in the Cevennes–Vivarais area: a case study from HyMeX” by C. Flamant et al.
from Anonymous Referee #2

We thank the Referee for his time and his constructive comments. We have complied with the proposed changes. In the revised version of the manuscript, we now thank the referees explicitly in the Acknowledgement section.

In the following, our point by point replies to the Referee’s comments are in red.

General comments:

The radiative impact of dust on atmospheric circulation and precipitation is always uncertain because of huge temporal and spatial variation of regional distribution and complex interactions of dust-cloud-radiation-precipitation. In this study, the authors tried to study radiative impact of a dust plume on convective precipitation forecasts by combining the high-resolution simulation and all kinds of measurements during the HyMeX SOP 1. Finally, they found that the rainfall amounts and location were only marginally affected by the dust radiative effect, which is different from many measurement and simulation studies in the past, increasing or decreasing rainfall amounts. I believe that the full validation of numerous measurements on mesoscale model Meso-NH and comprehensive analysis will ensure the reliability of results. The manuscript is well written and turns out an appropriate conclusion.

So I suggest accept this paper after minor revision. The specific suggestion as follows.

Specific comments:

1. P22461, line 5, delete ~~use~~;

Corrected.

2. P22461, line 27, ~~south easterly flow~~ should be the same format as ~~south-easterly flow~~ in other places;

Corrected.

3. P22489, ~~white box~~! ~~black box~~;

Corrected.

4. P22490, ~~B~~! ~~T~~;

Corrected.

5. In order to deeply understand the possible radiative impact of dust on precipitation for readers, I think the direct, indirect and semi-direct effect of dust on radiation, cloud and even precipitation should be told firstly in the introduction section. If so, readers would understand the focus of this paper is only radiative impact. The related content please read and cite the following papers, (1)Huang, J., P. Minnis, B. Lin, T. Wang, Y. Yi, Y. Hu, S. Sun-Mack, and K. Ayers, Possible influences of Asian dust aerosols on cloud properties and radiative forcing observed from MODIS and CERES, Geophysical Research Letters, 33 (6) (2006), L06824, doi:10.1029/2005GL024724. (2) Huang, J., B. Lin, P. Minnis, T. Wang, X. Wang, Y. Hu, Y. Yi, and J. Ayers, Satellite-based assessment of possible dust aerosols semi-direct effect on cloud water path over East Asia, Geophysical Research Letters, 33 (19) (2006), L19802, doi:10.1029/2006GL026561. (3) Huang, J., Q. Fu, J. Su, Q. Tang, P. Minnis, Y. Hu, Y. Yi, and Q. Zhao, Taklimakan dust aerosol radiative heating derived from CALIPSO observations using the Fu-Liou radiation model with CERES constraints, Atmospheric Chemistry and Physics, 9 (12) (2009), 4011-4021. (4) Huang, J., T. Wang, W. Wang, Z. Li, and H. Yan,

2014: Climate effects of dust aerosols over East Asian arid and semiarid regions, Journal of Geophysical Research: Atmospheres, 119, 11398-11416, doi:10.1002/2014JD021796.

Thanks for the suggestions. All papers are now referenced in the paper and added to the reference list.

6. As authors explanation in the paper, rainfall amounts from orographic rain are only forced by orography and exclude the impact of other large clusters such as front. So if the dust plume was embedded into orographic and convective-induced precipitation, the rainfall amounts and locations will be affected by multiple factors such as dust, orography, MuCAPE and so on. Therefore, the conclusion rainfall amounts and location were only marginally affected by the dust radiative effect is made before, authors would better evaluate or illustrate simply their relative contribution to the rainfall amounts and location. If so, we could further understand the marginal is only from the impact of dust, rather than the co-impact of dust and other factors.

Two simulations were made, one including the dust radiative effect, the other one without any radiative effect. The difference in rain between the two simulations is small. This result explains why we consider that the dust radiative effect was marginal on the rain amounts.