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Interactive comment on "2-D mineral dust radiative forcing calculations from CALIPSO observations over Europe" *by* Maria José Granados-Muñoz et al.

Anonymous Referee #1

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The manuscript by M.J. Granados-Munoz et al. 2019 aims to retrieve the radiative effects together with the heating rate along the atmospheric column during a dust outbreak. The work well fits within the journal scope and it is generally well written. However some points should be clarified by the authors before publication

First of all, "effect" and "forcing" are not interchangeable words and should be correctly employed. "Forcing" is referred to computations with respect to the "pre-industrial" era. For this reason, the term "effect" should be used in this manuscript.

It cannot be inferred from the text how the authors retrieved both the heating rate and dust radiative effects. It looks like that the authors assume the whole extinction

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Discussion paper

profile as dust, while surely in the boundary layer dust (if present) will blend with local background aerosols, i.e. urban aerosol. To calculate then the DRE, it should be considered the extinction profile as mixed, with respect to the altitude. I would say that g, SSA should be different in the boundary layer (polluted dust) with respect to the free troposphere (pure dust).Computations using range independent g and SSA values (as those retrieved from AERONET) will produce different results than considering two range dependent aerosol layers (with different SSA and g values).

In the manuscript it is stressed that two different parameterizations are used, i.e. one for EARLINET and one for CALIPSO. However, the different parameterizations reduce just to the different retrieval of the atmospheric extinction profile by the two different lidar system. Some section titles are then misleading and it worths to better explain the so-called "different parameterization".

The radiative transfer computations are computed up to 20 km. At this altitude, the effects of stratospheric ozone is not taken into consideration. Moreover, how the radiative calculations are carried out? Atmosphere with aerosol minus pristine atmosphere? Please advise.

Specific comments can be found in the attached file.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2019-440/acp-2019-440-RC2-supplement.pdf

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Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-440, 2019.