

Interactive comment on “Diurnal cycle of the dust instantaneous direct radiative forcing over the Arabian Peninsula” by S. Osipov et al.

Anonymous Referee #1

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This paper presents a comprehensive study of the aerosol direct radiative forcing (DRF) for two representative locations in Arabian Peninsula. The study analyzed the aerosol and surface (directional) albedo effects on diurnal cycle of shortwave and longwave DRF, with focus on diurnal cycle. The derived broadband surface albedo was found in good agreement with the MODIS values, and computed fluxes at ground and at the top of atmosphere were in good agreement with both ground measurements as well as CERES dataset. The diurnal effects are explained by a combination of a change of surface albedo with solar zenith angle (surface BRDF effect) and aerosol effect. The presented results are important as studies of this region have been missing. I suggest publishing this paper after addressing several minor issues described below.

P.4, Ln 22-23: Dust aerosol is known to be non-spherical. The use of spherical aerosol
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model (Mie) would cause errors for the radiance simulations. I have not studied the effect of spherical assumption on fluxes which may be non-negligible and potentially affecting diurnal cycle (as a function of solar zenith angle SZA). Can you provide an assessment of uncertainty from using spherical aerosol model on computed fluxes?

P.6, Ln 17, 19: Please provide references for the uncertainties unless these are your own assessments.

P.23, Ln. 7 (and in several other places): replace “then” to “than”.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 12301, 2015.