

Interactive comment on “A Global Analysis of Dust Diurnal Variability Using CATS Observations” by Yan Yu et al.

Anonymous Referee #1

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The paper “Global Analysis of Dust Diurnal Variability Using CATS Observations” by Yan Yu et al. investigates the diurnal cycle of dust loading across the global tropics, sub-tropics, and mid-latitudes by analyzing aerosol extinction and typing profiles observed by CATS lidar aboard the ISS. CATS was developed to address three main science objectives; with one of the goals to measure and characterize aerosols/clouds on a global scale and at various local times. The diurnal variability of aerosols consists a significant scientific question. The present study attempts to build on the aerosol diurnal study performed by Lee et al., 2018, focusing on dust aerosols. The idea of the study is of high scientific interest, falls within the scope of ACP, the manuscript is well-structured, the presentation clear, the language fluent.

The authors have addressed the daytime underestimations compared to nighttime ob-

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servations through analyzing separately CATS-ISS daytime and nighttime observations, and removing comments unifying the daytime and nighttime variability. In addition, vertical mean extinction coefficient profiles have been included, a significant advantage of lidar systems. However, the manuscript would substantially improve though including additional information on the profiles of extinction coefficient variability in the figures.

One major comment that is still not addressed corresponds to the implementation of the aerosol extinction coefficient of “dust” and “dust mixture” in the analysis, both interpreted as dust and accounted as DAOD. Although there is the full dust component included, the dust component coexists in the analysis with other aerosol types, contaminating the pure-dust assumption. Thus, the study does not correspond to the diurnal variability of “dust” but to the variability of “dust mixture”. In case the study is not adapted, in both study name and context when referring to "dust" or "DAOD", the study will be misleading to the research community, for the statement that it provides the diurnal variability of dust is very strong and non-onsistent with the content and approach. I strongly suggest the authors to revise the manuscript accordingly, prior proceeding with publication.

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