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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol-induced changes in the vertical structure of precipitation: a perspective of TRMM precipitation radar" *by* Jianping Guo et al.

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The paper entitled "Aerosol-induced changes in the vertical structure of precipitation: a perspective of TRMM precipitation radar" by Guo et al. is nicely written and presenting a good quality work on the response of vertical features of precipitation to aerosol in the PRD region of China using TRMM observations. Author used a long data series consisting of 6 years of data and it is really a good for statistical analysis on aerosol-precipitation interaction and there is scope for further extending the work on aerosol-induced changes in inner dynamics of precipitation in future. However, some results are not properly discussed.

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Discussion paper

1. Page 16 line 4: Regarding the results of “An invigoration (suppression) effect for convection (stratiform) precipitation types can be observed”, the authors may consider to add the following discussion in Manuscript:

When the tropical convection systems developed and matured, its precipitating cloud cluster consists as follows: 1) deep precipitating convective towers characterized by vigorous updrafts; 2) stratiform precipitating cloud connected to the deep convection exhibiting weaker, mesoscale vertical motions; 3) non-precipitating thick anvils attached to either the stratiform or convective precipitating areas (Houze 1993; Li and Schumacher, 2011;Yang et al., 2015). Because the samples are mainly restricted to local-scale precipitation (non large-scale precipitation) in the present work, the selected stratiform precipitation samples are mainly connected to the deep convection in tropical PRD regions. High-concentration aerosols over PRD easily tend into these deep convection under strong upward moment with enough water vapor, which will favor the development of convective precipitations, while for vertically weaker motion stratiform precipitation, high-concentration aerosols and non-abundant water vapor are supplied to suppress the development of stratiform precipitation.

Houze, 1993:Cloud Dynamics. International Geophysics Series, Vol. 53, Academic Press, 573 pp. Li, W., and Schumacher, C. (2011). Thick Anvils as Viewed by the TRMM Precipitation Radar. Journal of Climate, 24(6):1718–1735. Yang Yuan-Jian, Da-ren Lu, Yun-Fei Fu, et al., 2015.Spectral Characteristics of Tropical Anvils Obtained by Combining TRMM Precipitation Radar with Visible and Infrared Scanner Data, Pure and Applied Geophysics., 172, (6), 1717-1733 DOI:10.1007/s00024-014-0965-x.

2. Page 16 line 4: Regarding the inferrence of aerosol radiative effect in “which may be partly due to the aerosol radiative”, key reference is missing, for example, Liu et al. GRL 2018

Liu Z., Yim S.H.L., Wang C., Lau N.C. (2018). The impact of the aerosol direct radiative forcing on deep convection and air quality in the Pearl River Delta region. Geophysical

Research Letters, 45(9), 4410-4418”

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