What the work is about

We provide a near-global picture of Aerosol-Cloud-Precipitation-Radiation interactions (ACPRI) apparent signals by employing MODIS Cloud Regimes (CRs) and Cloud Properties. We assess whether AOD changes can be diagnosed by investigating the variation with AM/morning (MODIS or MERRA-2) AOD of PM/aftnoon cloud-affect ed quantities; the results are segregated by AM (Terra) CR.

Papers for Background


PM cloud-affected quantities vs AM relative AOD

Summary

- This work extends Oreopoulos et al., 2017, by accounting for the temporal lag between AM aerosol and PM cloud-relevant observations and by exploring the spatial variability of sensitivities to AOD changes.
- Caveats:
  1. AOD-based analysis, while CCN(2) or IN(2) are more relevant
  2. AOD biases in the neighborhood of clouds
  3. Meteorology not strongly constrained even when breaking by CR.

Sensitivity of PM cloud-affected quantities to AM aerosol

Data sets and Analysis methodology

Cloud Regimes (CRs) : MODIS Level-3 ensemble set of Terra and Aqua joint CTP-COT daily joint histograms from December 2002 to November 2014.
Cloud properties : MODIS C6 Level-3 from Aqua (MYD08) data sets.
Radiation : CERES SYN1deg-3Hour data sets.
Aerosol Optical Depth (AOD) : AM1-AOD from MODIS-Terra (Dark Target) or regridded MERRA-2 for Terra overpass.
Precipitation : TRMM Multi satellite Precipitation Analysis (TMPA-3B42) corresponding to Aqua (PM) overpasses.