

## **On the role of convective aggregation in climate: observational and modeling perspectives**

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Tropical convective systems exhibit a wide range of spatial organizations, and different levels of aggregation. Using long time series of satellite observations we investigate, for given domain sizes and large-scale forcings, statistical relationships between the degree of convective aggregation at meso or synoptic scales and the mean atmospheric state. We show that more aggregated situations are associated with a drier free troposphere, a reduced cloudiness in the middle and upper troposphere, and substantial changes in the energetics of the atmosphere: the outgoing longwave radiation and the tropospheric radiative cooling are enhanced, the planetary albedo is reduced and, for large domains, turbulent fluxes at the ocean surface are strengthened. The ability of cloud-resolving models to reproduce these observations, and the implications of the observed relationships for climate sensitivity, the large-scale atmospheric circulation and climate modeling will be discussed.