

ATS/CIRA Colloquium

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Visiting ATS from Nagoya University, Japan

**Radiative Regulation of Tropical Convection
by Preceding Cirrus Clouds**

Hosted by Chris Kummerow

Friday, Oct. 13, 2017

ATS room 101

Discussion will begin at 11:15 a.m.

Refreshments will be served at 10:45 a.m. in the weather lab

Radiative-convective feedbacks are known to constitute a key element of the climate system, whereas the underlying processes have yet to be understood at a fundamental level of the convective dynamics. This work seeks evidence for convective-radiative interactions in satellite measurements, with focus on the variability over the life cycle of tropical convection. To this end, the vertical profiles of cloud cover and radiative heating from the CloudSat-CALIPSO products are sorted into a composite time series around the time of convective occurrence identified by the TRMM PR.

The findings are summarized as follows. Cirrus cloud cover begins to increase, accompanied by a notable reduction of LW cooling, in moist atmospheres even 1-2 days before deep convection is invigorated. In contrast, LW cooling stays efficient and clouds remain shallow where the ambient air is very dry. To separate the radiative effects by the preceding cirri on convection from the direct effects of moisture, the observations with enhanced cirrus cover are isolated from those with suppressed cirrus under a moisture environment being nearly equal. It is found that rain rate is distinctly higher if the upper troposphere is cloudier regardless of moisture, suggesting that the cirrus radiative effects may be linked with the subsequent growth of convection. A possible mechanism to support this observational implication is discussed using a simple conceptual model.

Link to colloquia page: <https://www.atmos.colostate.edu/colloquia/>