

ATS/CIRA Colloquium

**Z. Johnny Luo**

Visiting ATS from the City University of New York

## Use of Trace Gas Measurements to Quantify Convective Transport Time Scales and Pathways

Hosted by Sue van den Heever

Friday, Jan. 25, 2019

ATS room 101

Discussion will begin at 11:15 a.m.

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

Convective transport from the marine boundary layer (MBL) to the upper troposphere (UT) is investigated using airborne in situ measurements of chemical species over the tropical western Pacific (TWP). Using 42 trace gas species with photochemical lifetimes ranging from shorter than a day to multiple decades, we derive a transit time spectrum  $G(t)$  and the associated modal and mean transit times for the UT air mass sampled over the convectively dominant TWP region.  $G(t)$  describes relative contributions of air masses transported from the MBL to the UT via all transport paths with different transit times (see the schematic illustration below). We further demonstrate that the tracer-derived transit time scale is broadly comparable to that estimated from convective mass flux. The observation-based transit time spectrum not only provides insights into convective transport pathways, but also has the potential to serve as an effective diagnostic or metric for evaluating the representation of convective transport in global models.

