

# **ATS/CIRA Colloquium**

**Tao Li**

**NASA NPL**

## **Lidar observed inter-annual variability in the middle atmospheric temperature**

**February 14, 2008**

**ATS room 101; Discussion will begin at 3:30pm**

**Refreshments will be served at 3:00pm in the coffee lounge**

As a key instrument of the Network for the Detection of Atmospheric Composition Change (NDACC), the Jet Propulsion Laboratory Rayleigh-Raman lidar located at Mauna Loa Observatory (MLO), Hawaii (19.5°N, 155.6°W) has been measuring the vertical temperature profiles from 15 to 85 km routinely since 1993. A linear regression analysis including the components of the Quasi-Biennial Oscillation (QBO), El Niño-Southern Oscillation (ENSO), and the 11-year solar cycle, was applied to the deseasonalized monthly mean temperature from January 1994 to June 2007. A significant QBO signal (1-3 K) in the stratosphere and mesosphere, and a strong winter signature of ENSO (-1.5 K/MEI) in the stratosphere were revealed. A response to the solar cycle was observed, characterized by two statistically significant maxima of ~1 K/100 f10.7 unit in the upper stratosphere (annual mean). Finally, a statistically significant signature of ENSO in the middle mesosphere was observed for the first time, consistent with the findings of recent model simulations, and further confirmed by the calculation of temperature gravity wave variances. As an introduction to the long-term study that leads to the above result, I will briefly describe the purpose of NDACC and the associated lidar measurements as well as the nature of the proxies used for the linear regression analysis.