

SEMINAR NOTICE

Department of Physics and Engineering Physics
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TOPIC: *Tropical cold-point variability and trends*

DATE: Tuesday November 4th, 2025

TIME: 3:30-4:30 p.m.

PLACE: *Physics 103*

Abstract:

The tropical tropopause layer (TTL) controls the transport of water vapor and trace species into the stratosphere, exerting a strong influence on radiative forcing and climate feedbacks. Using a coordinated multi-dataset approach, I investigate recent changes in tropical cold point temperatures and their implications for TTL structure and stratospheric moisture. Satellite observations (GNSS RO, MLS v5, SWOOSH v2.7, 2002–2022) show a weakening of the seasonal cycle in both temperature and water vapor near the cold point, consistent with reduced dehydration efficiency and a weakened tape recorder signal. Incorporating homogenized radiosonde records and reanalysis products back to 1980 reveals a shift in cold point temperature trends around the year 2000, transitioning from cooling (1980–2001) to warming (2002–2023), linked to changes in tropical upwelling. To provide a transport-based perspective, I introduce a new Lagrangian Cold Point (LCP) trajectory dataset, which reveals a significant narrowing of the tropical belt at cold point level. These results indicate structural and dynamical changes in the TTL with emerging consequences for stratosphere–troposphere exchange and long-term moisture trends.