UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
2525 Correa Road, HIG 350; Honolulu, HI 96822 ☎956-8775

SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

Department of Atmospheric Sciences Seminar Announcement

Moisture variability observed from radars and lidars

Dr. Ya-Chien Feng
Earth Scientist
Department of Atmospheric Sciences & Technology
Pacific Northwest National Laboratory (PNNL)

You are invited to our weekly online Atmospheric Sciences Spring 2022 seminars via Zoom meeting.
When: March 9, 2022 at 3:30PM HST
Meeting admission: 3:15PM HST

Register in advance for this meeting:
https://hawaii.zoom.us/meeting/register/tJcof--qqjMiEtXX9J8yHV3K8NrAjdJsakyN

After registering, you will receive a confirmation email containing information about joining the meeting.
Please save this information for future seminars.

Abstract:

The development of clouds and convection are highly sensitive to the small change of the water vapor in both observations and numerical simulations. Quantifying the natural variability of the moisture at mesoscales is challenging but is needed for data interpretation, data assimilation and future observation network development. This study aims to advance the understanding of the finer horizontal variability and vertical structures of water vapor in both clear and storm conditions from ground-based remote sensing instruments, weather radars and lidars.

Weather radars can provide high resolution refractivity retrievals of near-surface air, in addition to the standard reflectivity, radial velocity and dual-polarimetric observations. Radar-retrieved refractivity depicts the near-surface moisture distribution at the meso-gamma scale. This study presents a novel examination of moisture variability in a moisture-rich summertime tropical coastal region in Taiwan. Refractivity analyses demonstrate how a moisture field varies with the different synoptic-scale flows, complex local physiography, and various storm types.

MicroPulse Differential absorption lidar (MPD) provides high spatiotemporal resolution of water vapor in the lower atmosphere. A network of MPD was deployed in Oklahoma during the spring and summer of 2019. The difference of water vapor between 1 to 4 km height above the surface among the five MPDs about 40-100 km apart is examined under pre-storm and clear weather environments. The characteristics of moisture variability and its spatiotemporal representativeness are analyzed and integrated with the vertical wind and temperature observations from 3-hr resolution radiosondes, ground-based GPS integrated water vapor and the storm locations revealed from radars.