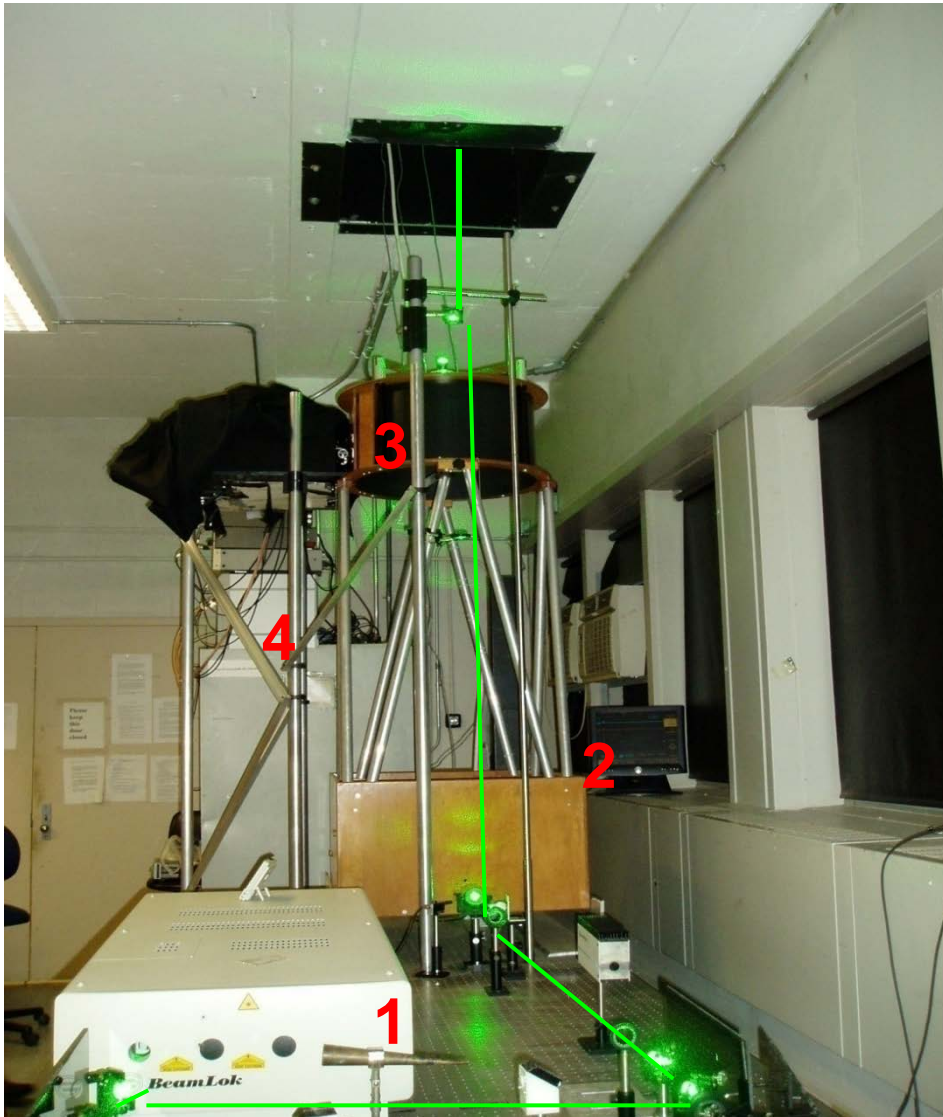


# **Optical Remote Sensing of Atmosphere: Aerosols, Clouds, Mixing-layer-height and Winds**

**Fred Moshary, Yonghua Wu, Mark Arend**

# CCNY elastic-Raman lidar: Aerosols, Clouds, Water Vapor, PBLH



**Transmitter:** ND:YAG Laser (1064-532-355nm)

**Receiver:** Telescope: diameter 500-mm

**Signal detection and Data acquisition:**

Detector: PMTs and Si-APD

Data acquisition: LICEL Transit Recorder  
12-bit ADC and Photon-counting

**Detection range and objective:**

Range or height: 0.5~15 km for aerosols/clouds

Range/time resolution: 3.75 m / 1min ave

Objective: aerosol, cloud, water vapor, PBL

**Working mode:**

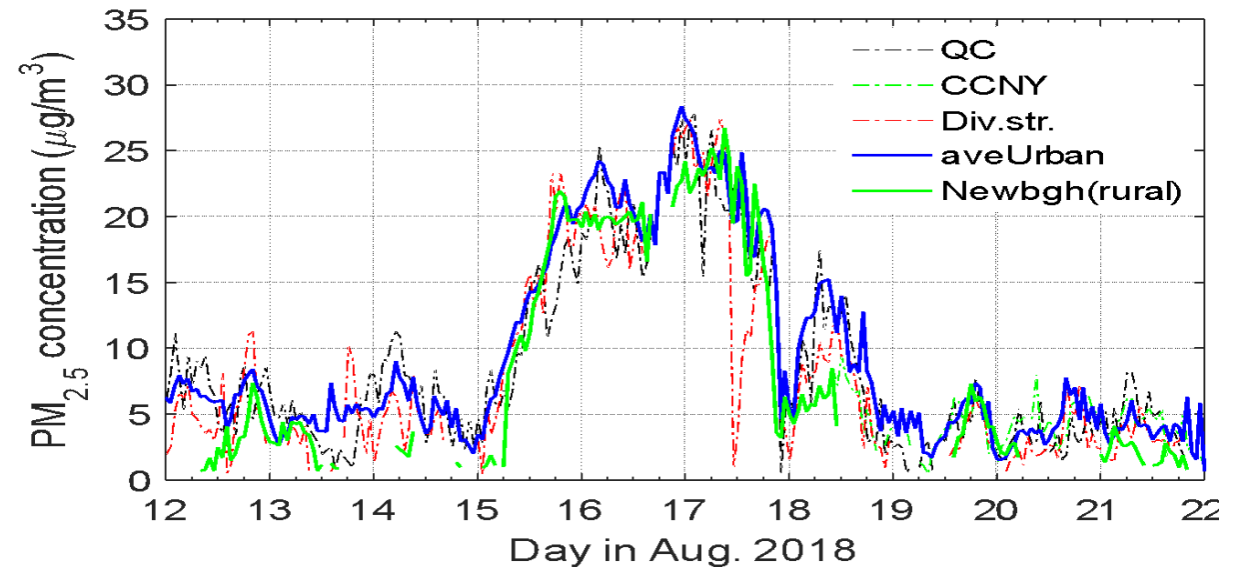
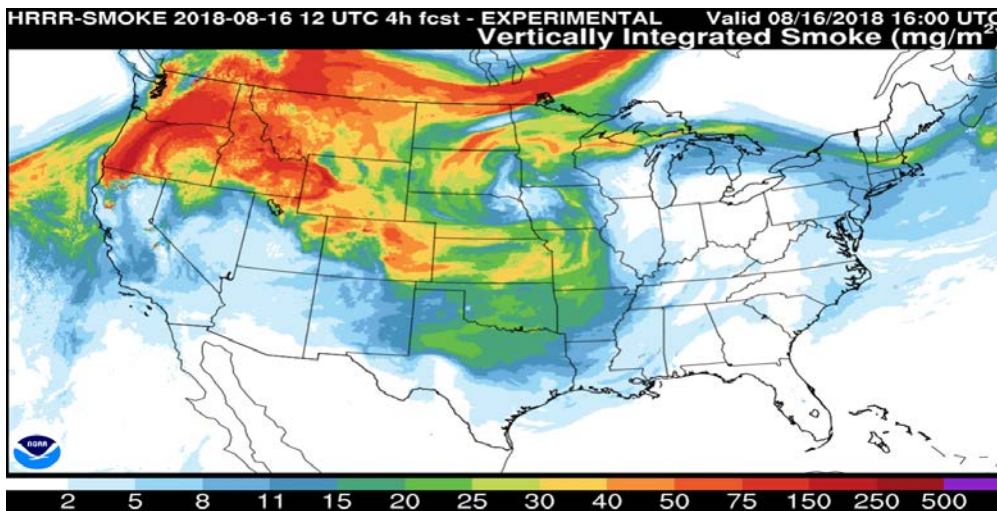
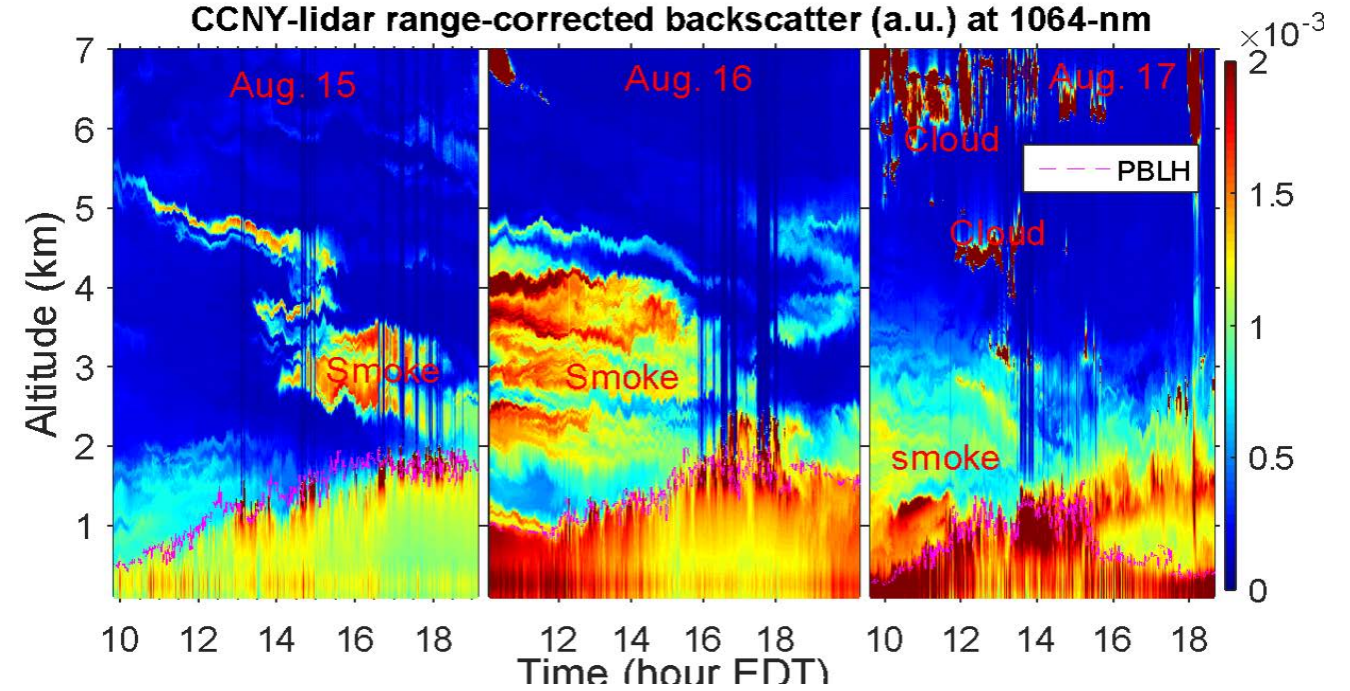
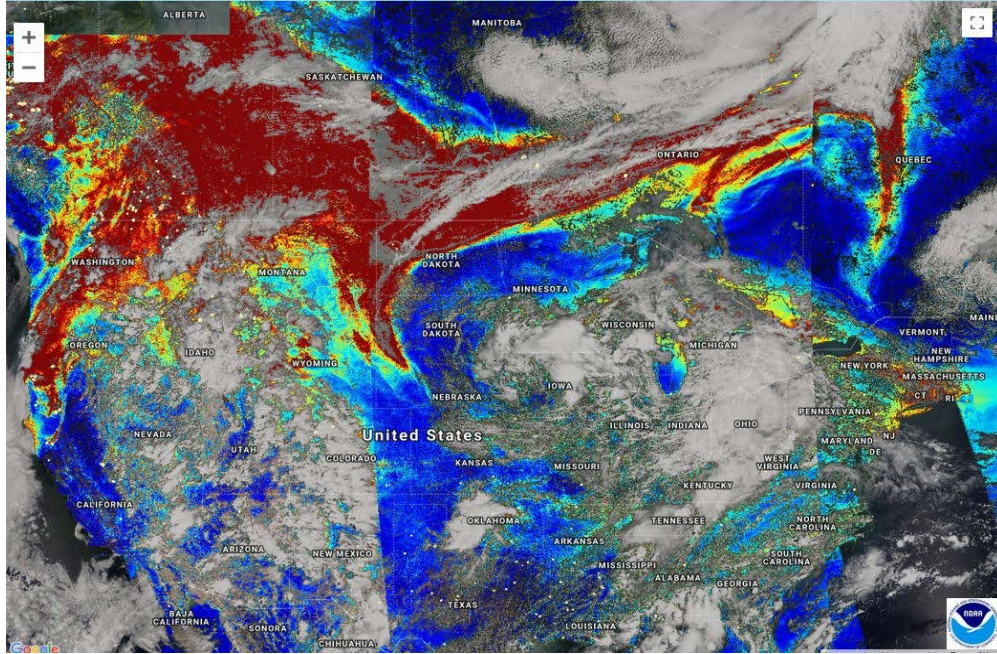
Only vertical pointing in the lab

Anciliary Radar for airplane

(not eye-safe)



# Lidar observation: Wildfire smoke transport and impact on air quality

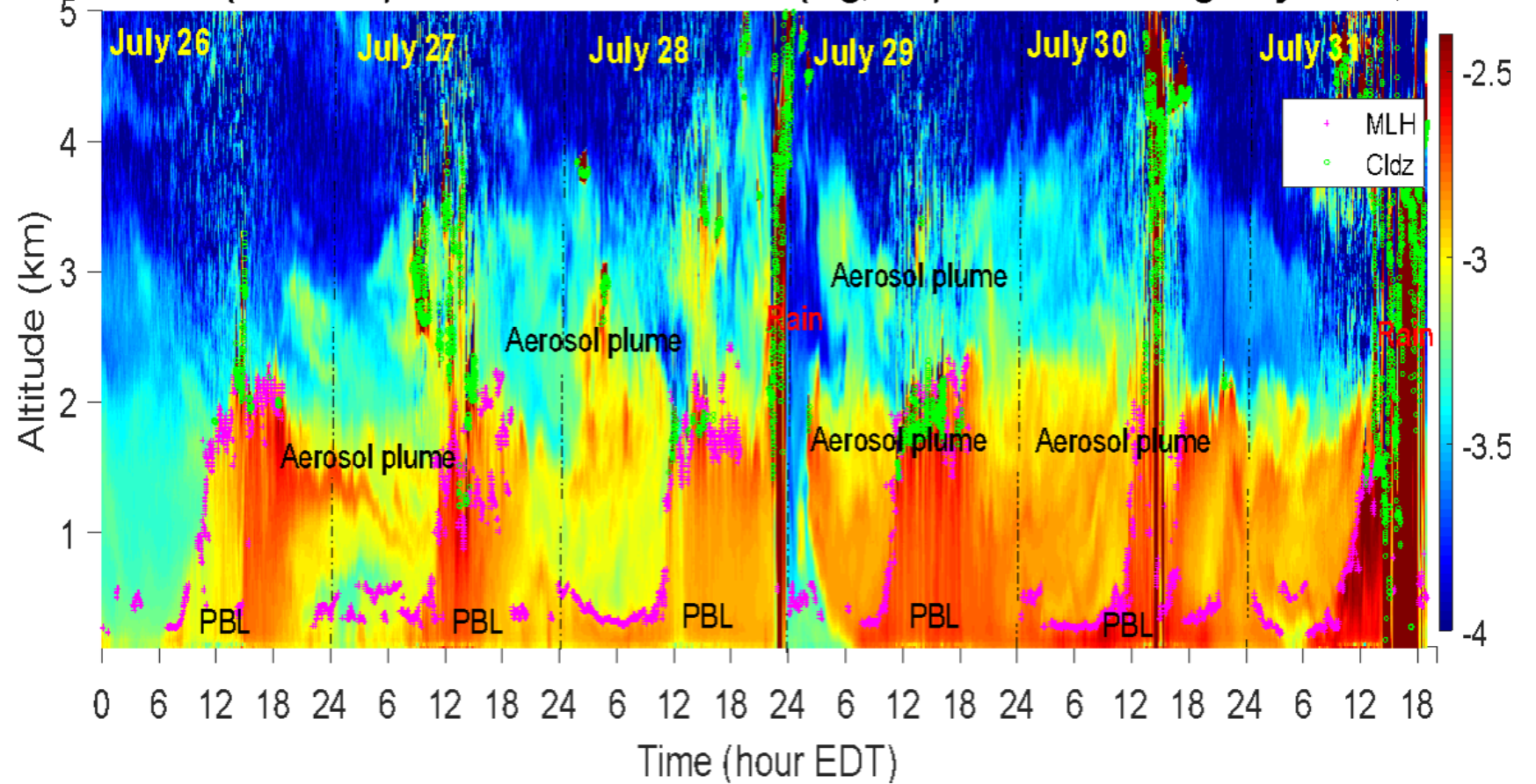




# Ceilometer: Mixing-layer-height diurnal variation / Air quality



Ceilometer (CHM15K) attenuated backscatter (log,a.u.) at CCNY during July 26-31, 2019



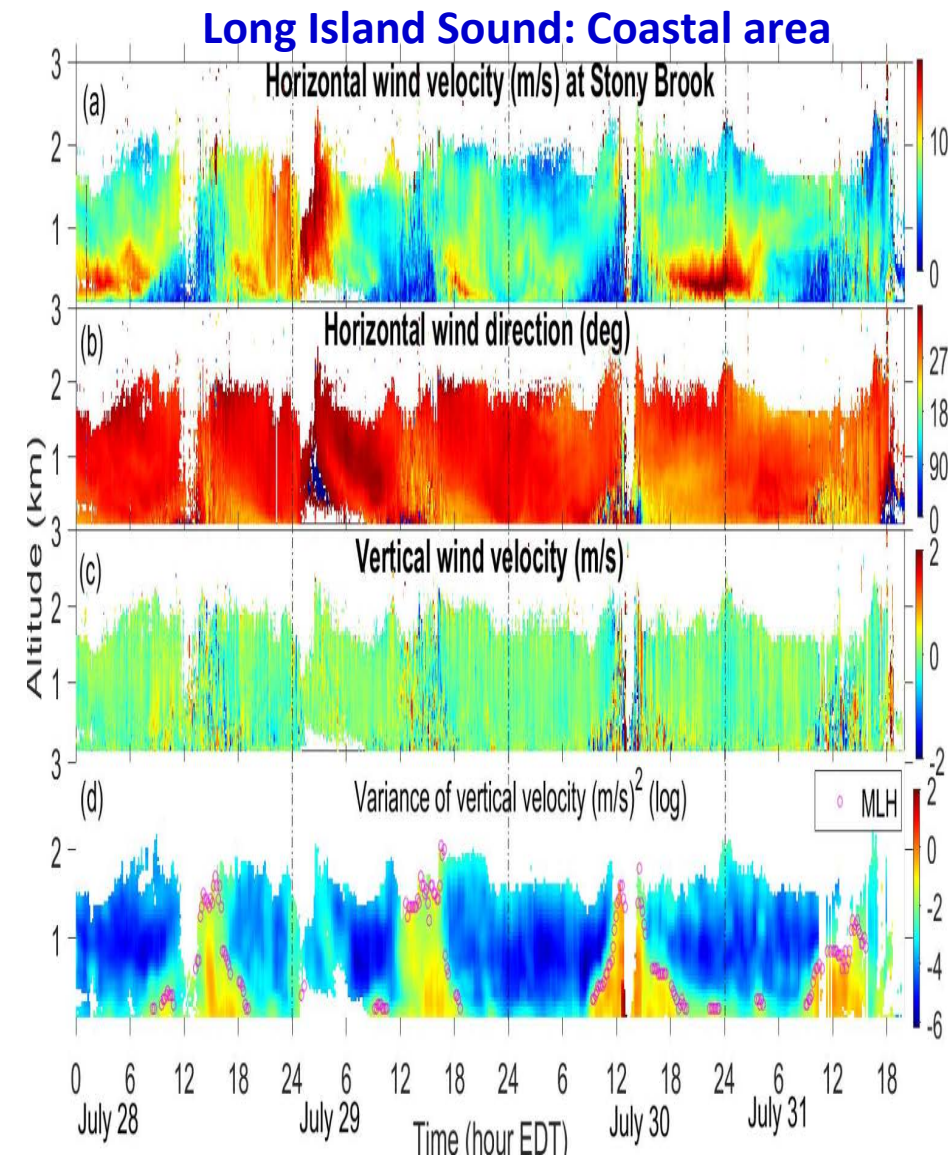
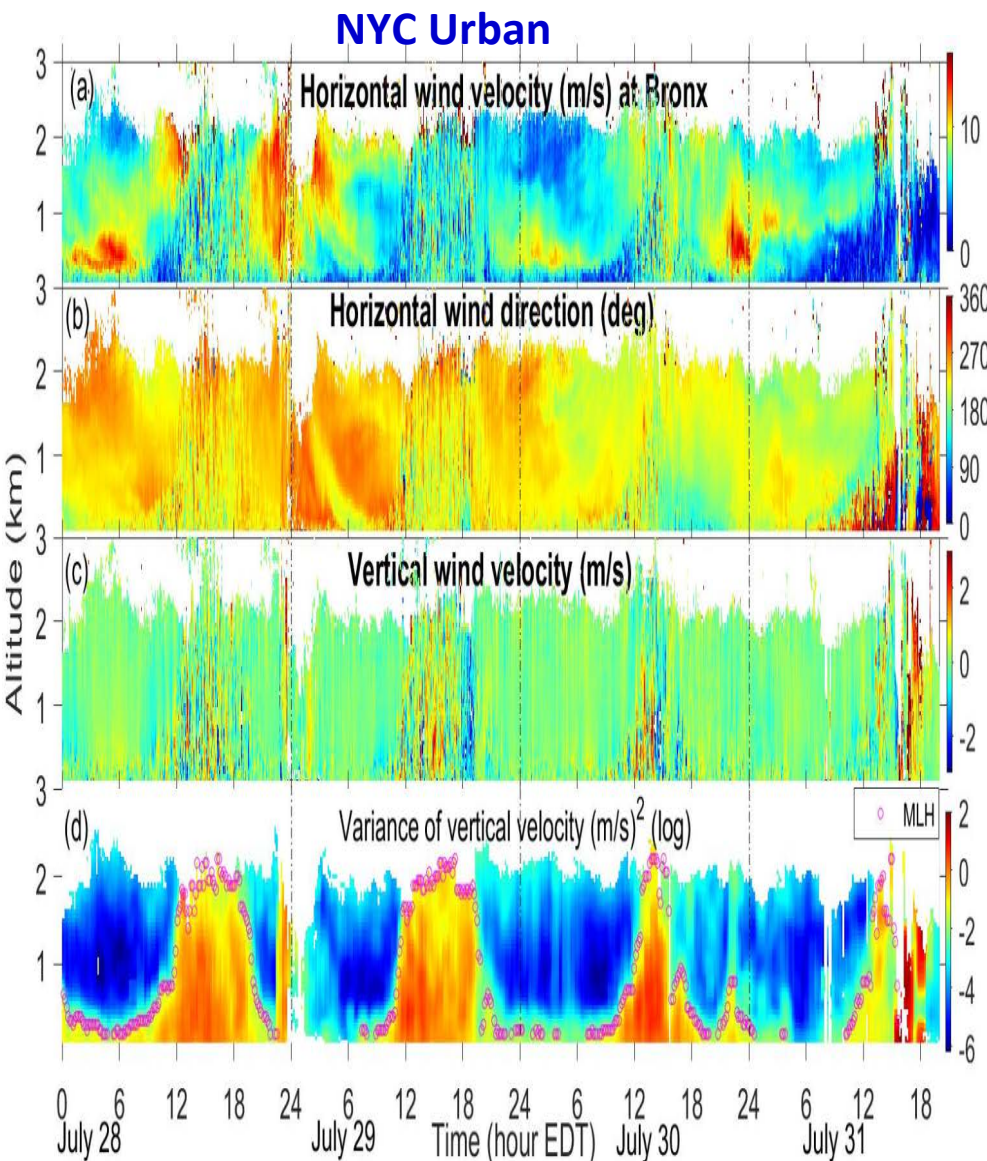
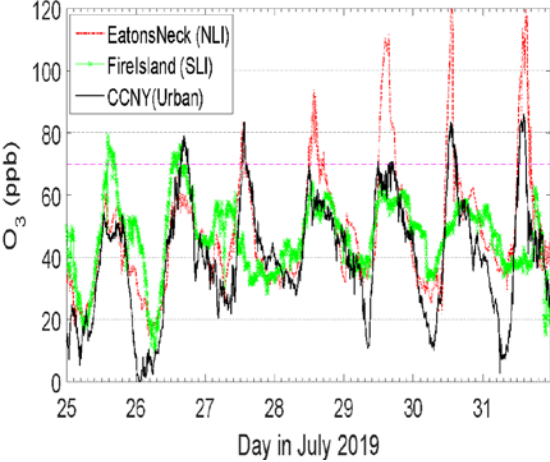


# Coherent Doppler Wind lidar: Wind profiles in the PBL

## Horizontal and Vertical Winds at NYC Urban/Coastal area



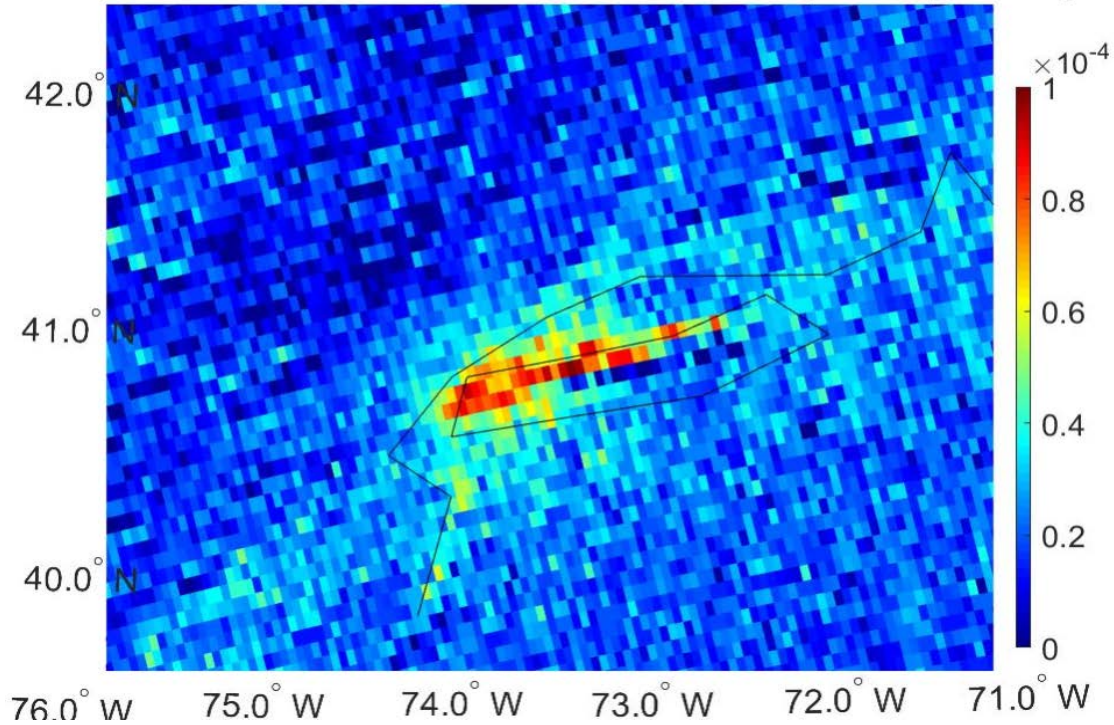
High O<sub>3</sub> in the coastal area





# Satellite remote sensing: Urban emissions/pollutants (Ozone precursors: NO<sub>2</sub>, VOC (HCHO):)

20190728 17:58-17:58UTC TROPOMI/S5P trop-NO<sub>2</sub> (mol/m<sup>2</sup>)



HCHO

