The background of the slide is a high-angle aerial photograph of a large, densely populated urban neighborhood. The area is filled with a variety of multi-story residential buildings, primarily constructed from red brick. Interspersed among the buildings are several larger, modern-looking apartment complexes and clusters of green trees. The streets below are visible as a network of grey asphalt roads. In the far distance, a bridge spans a body of water under a clear blue sky.

Urban Boundary Layer Observations & Analysis Research Update

Presented: 09/20/2021

Project Overview

- Objective: address gap in literature concerning the atmospheric boundary layer in urban areas
- Methods:
 - (1) synthesize observations from various sources to compile data on surface, surface layer, and mixed layer properties;
 - (2) use analytical methods to obtain derived quantities
- Outcome:

Project Schedule



Objective

- Identify research gaps

Status

- Completed

ECD

- 08/20/2021

Research gap(s)

- Sea-breeze effects during heat waves
- Effects of soil moisture on UBL in heat waves
- Nocturnal UBL properties during heat waves
- Effect of surface forcings on eddies
- BL height during heat waves

Objective

- Construct xArray Dataset (Python structure)

Status

- In process

ECD

- 09/22/2021

Data sources

- NYS Mesonet
- CCNY flux tower, lidar, microwave radiometer
- UHMT
- AMDAR

Objective

- Stability grouping
- Heat wave identif'n
- Wind direction

Status

- In process

ECD

- 10/08/2021 (iterative)

Objective

- Spectral analysis (eddy analysis)
- Statistical analyses (surface forcings → UBL properties)
- Turbulence parameters

Status

- To be completed

ECD

- 10/29/2021 (iterative)

Data Synthesis (in process)

- Objective
 - Unify all data into singular dataset for ease of access, analysis, visualization
- Methods
 - Collect data from all sources
 - Create collection of scripts to process and clean data to ensure high quality
 - Synthesize into xArray Dataset (Python data structure)
- Outcomes
 - Single data structure containing all data as a function of time, height, and location (see Figure 1)

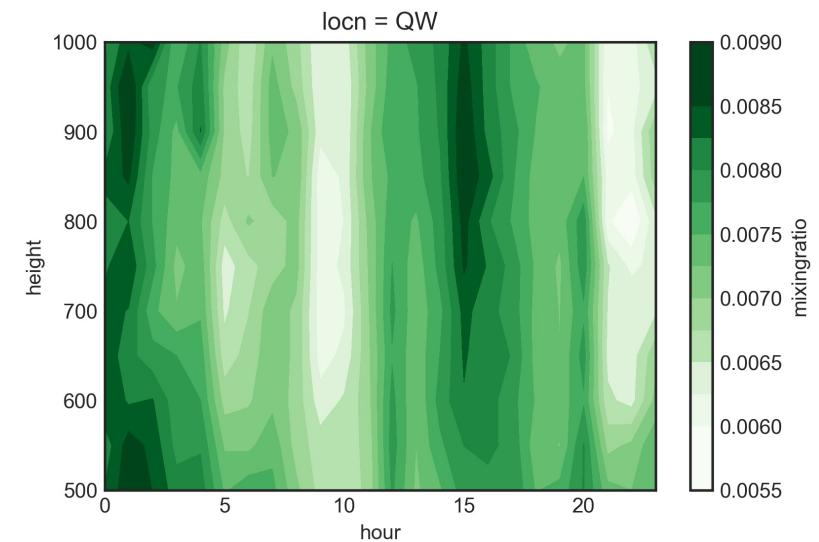


Figure 1: Hour-averaged mixing ratio in the UBL at Queens in June 2021. Plot labels and formatting to be improved.

Data Synthesis (in process, continued)

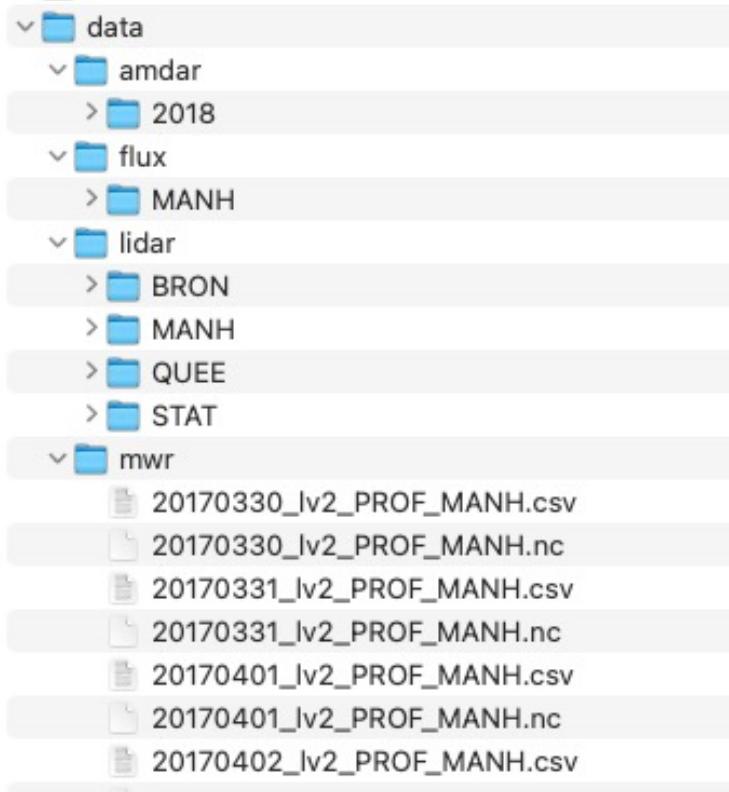


Figure 2: External hard drive file structure following downloading of Mesonet, CCNY microwave radiometer and lidar data (~600 GB)

	mr-gabrielrios	Added functionality for accessing WLS200S lidar data and downloading it.
..		
	access.py	Added functionality for accessing WLS200S lidar data and downloading it.
	amdar.py	Addition of spectral.py for performance of spectral analysis for eval...
	flux_tower.py	Added data clipping to proper timestamps to flux tower processor.
	mwr.py	Creation of script to process CCNY microwave radiometer data. Signifi...
	scintillometer.py	Added scintillometer processing script and sensible heat flux calcula...
	spectral.py	Improved data concatenation on main.py, improved spectral analysis me...

Figure 3: GitHub repository storing scripts for data management, downloading, access, and analysis. Link: https://github.com/mr-gabrielrios/urban_boundary_layer_obs/tree/main/dev/bin