Assessing low cost air quality monitors at Rider University

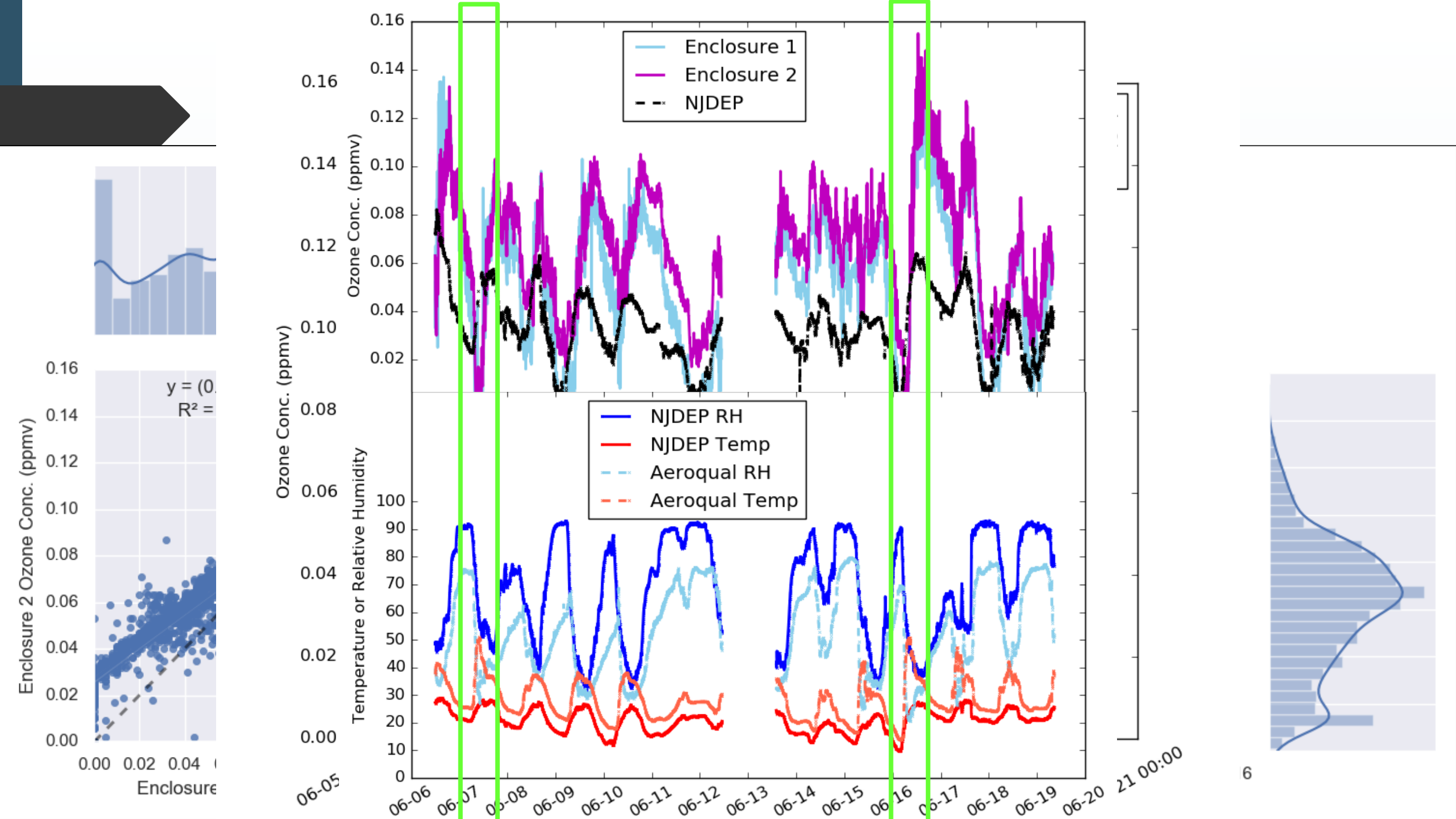
By: Carissa Moore

Overall objectives

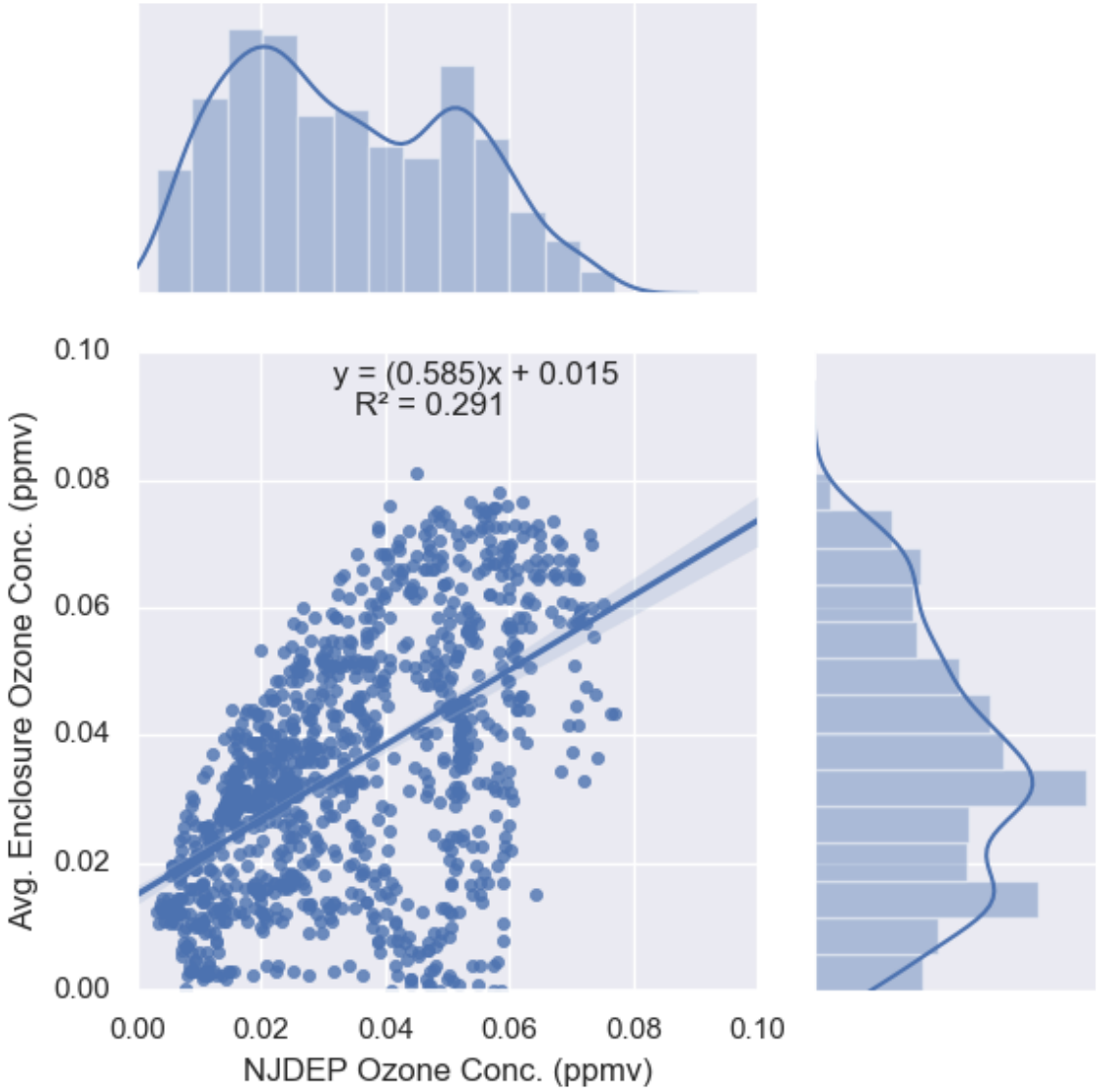
- Engaging the community
  - Advantages of low cost sensors
- Research Objectives
  - Evaluation of Aeroqual Sensors
    - Reproducibility
    - Robustness
    - Precision
    - Bias

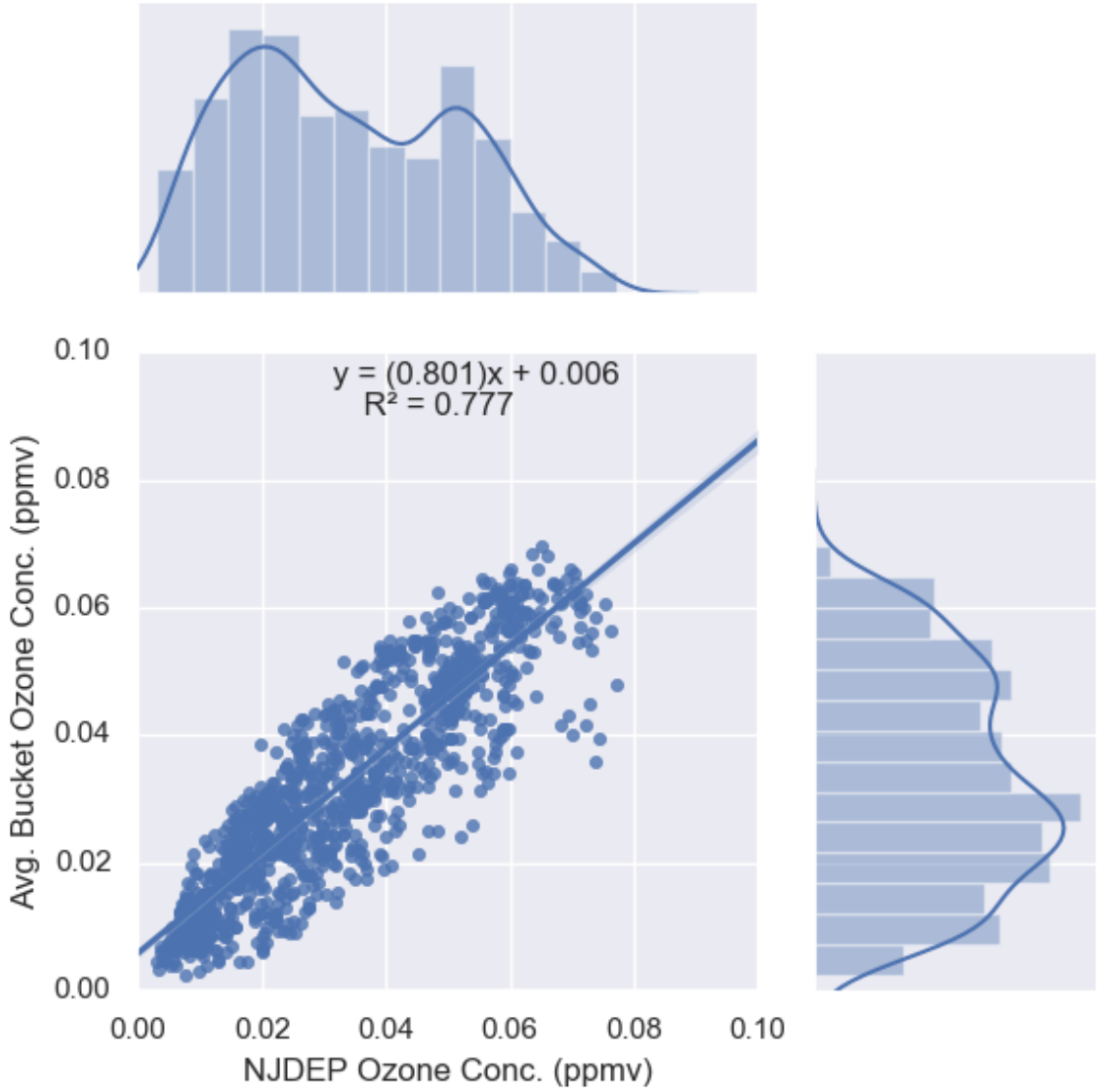
Methods

- Pollutants
  - Aeroqual Portable Ozone Sensor
  - $PM_{2.5}$
- Placement
  - Adjacent to NJDEP Station
- Housing
  - Commercial Aeroqual Enclosure
  - Inverted Buckets
- Sampling
  - 10 min intervals

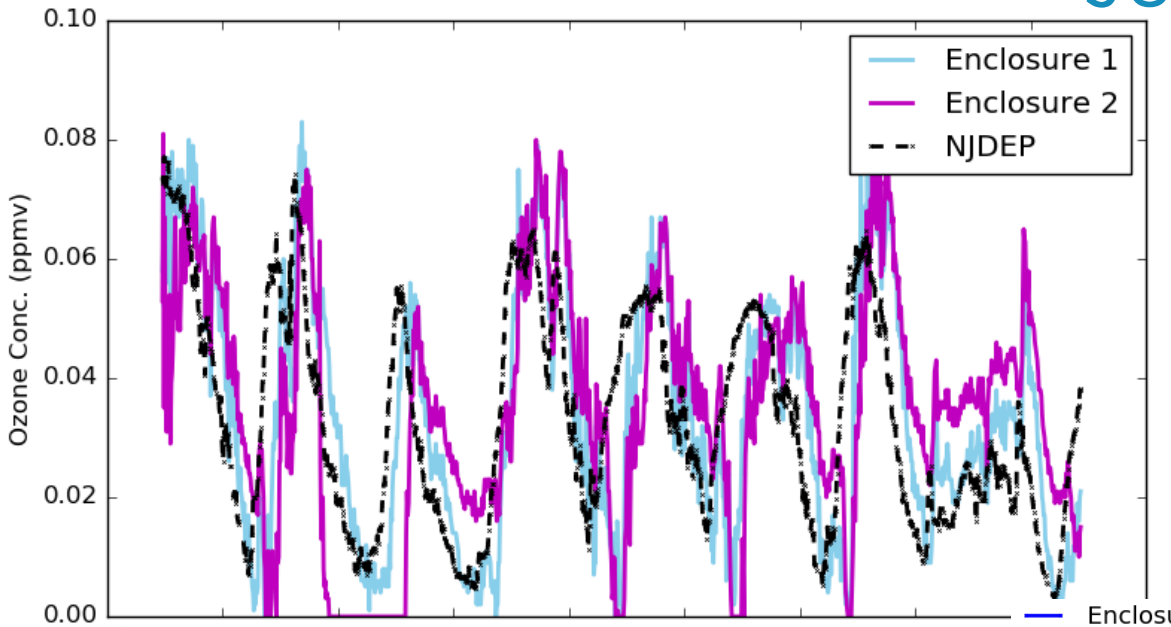

Enclosure 1
Enclosure 2
NJDEP
Ozone Conc. (ppmv)
NJDEP RH
NJDEP Temp
Aeroqual RH
Aeroqual Temp
Temperature or Relative Humidity
Enclosure 2 Ozone Conc. (ppmv)
y = (0
R² =
Enclosure
06-05
06-06
06-07
06-08
06-09
06-10
06-11
06-12
06-13
06-14
06-15
06-16
06-17
06-18
06-19
06-20
21 00:00

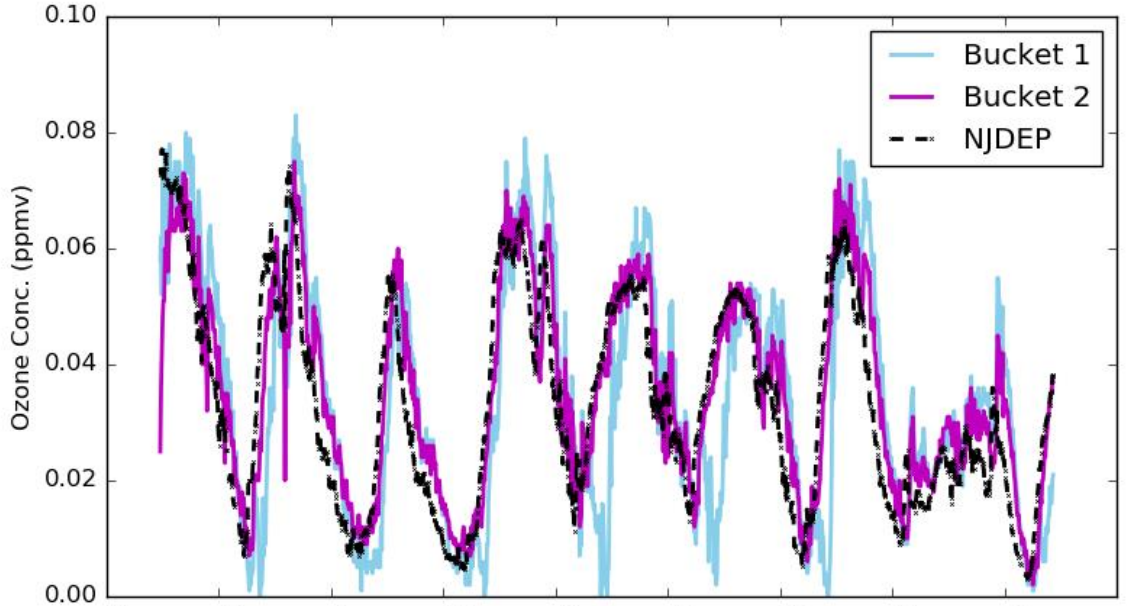
July data

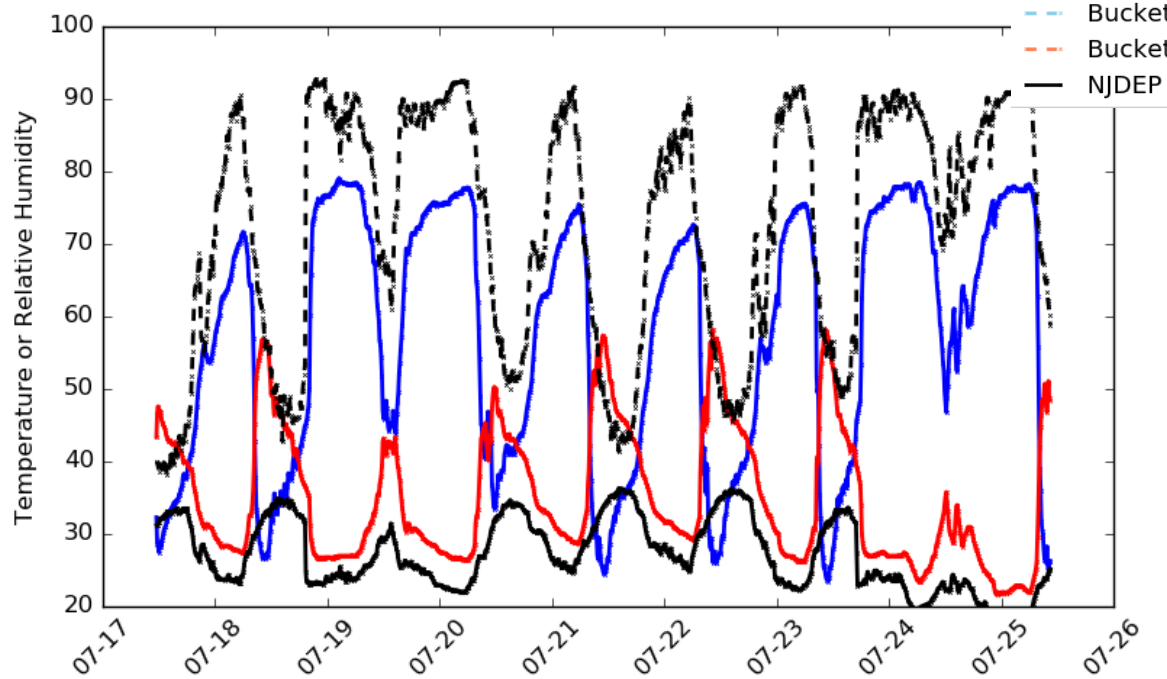

y = (0.585)x + 0.015
R² = 0.291
Avg. Enclosure Ozone Conc. (ppmv)
NJDEP Ozone Conc. (ppmv)
0.00
0.02
0.04
0.06
0.08
0.10

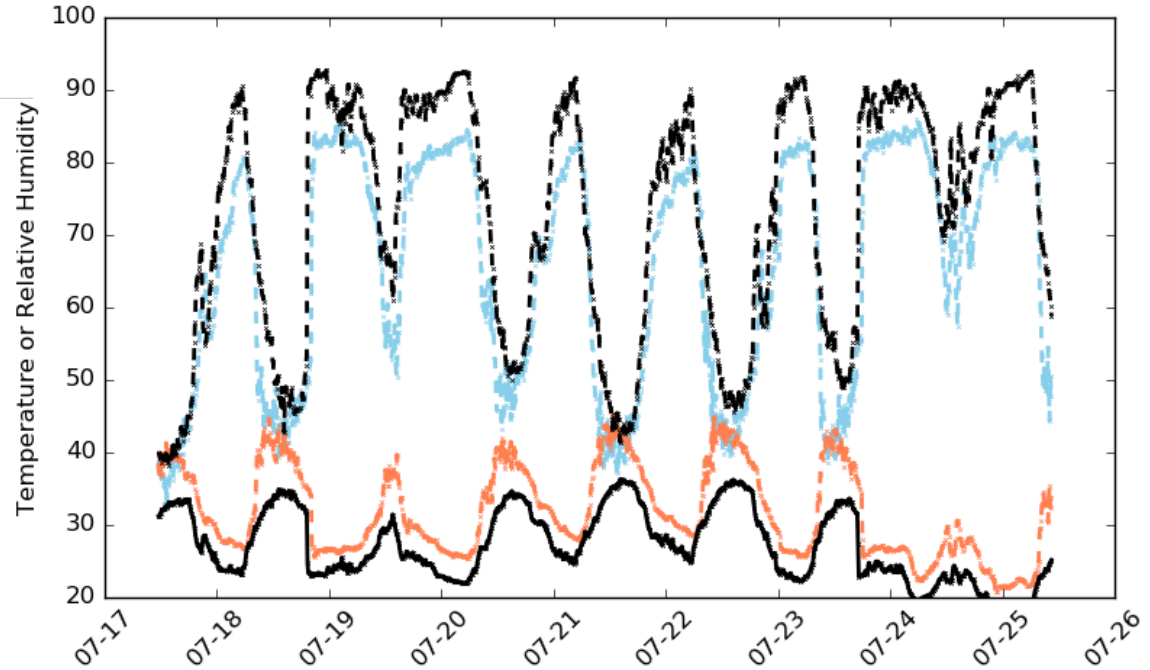

y = (0.801)x + 0.006
R² = 0.777
Avg. Bucket Ozone Conc. (ppmv)
NJDEP Ozone Conc. (ppmv)
0.00
0.02
0.04
0.06
0.08
0.10

July data


Enclosure 1
Enclosure 2
NJDEP
Ozone Conc. (ppmv)
0.10
0.08
0.06
0.04
0.02
0.00

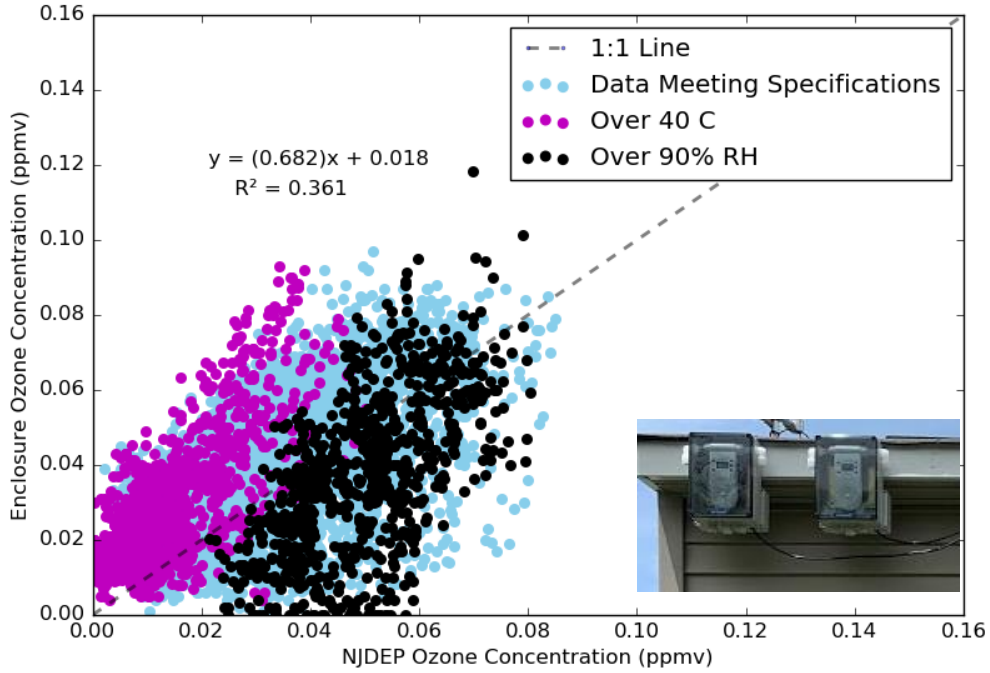

Bucket 1
Bucket 2
NJDEP
Ozone Conc. (ppmv)
0.10
0.08
0.06
0.04
0.02
0.00

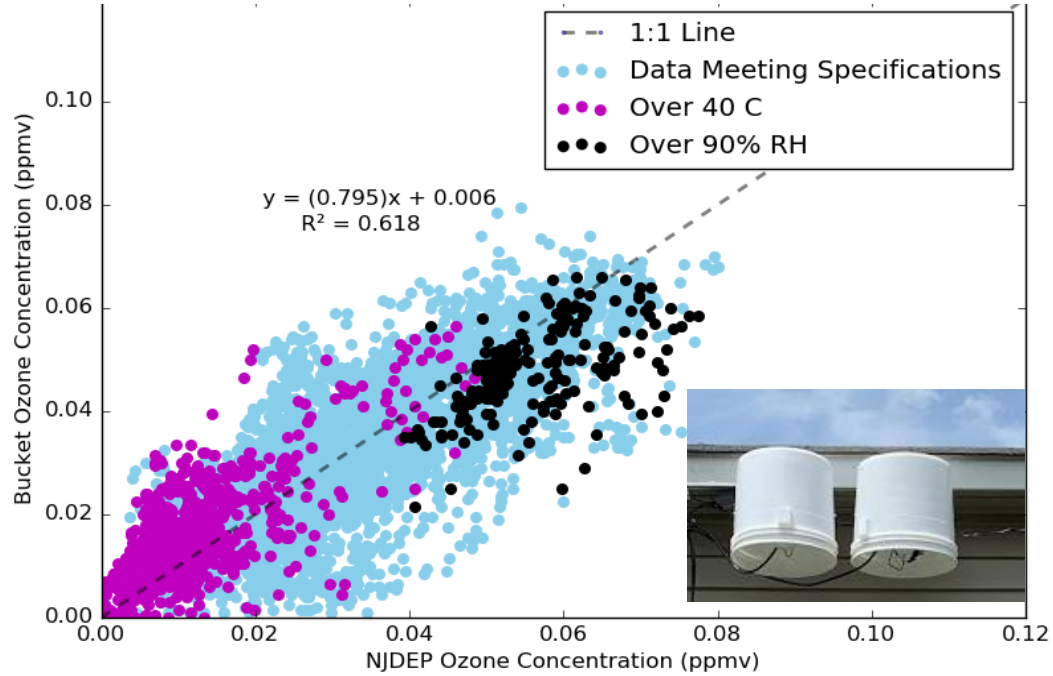

Enclosure RH
Enclosure Temp
Bucket RH
Bucket Temp
NJDEP
Temperature or Relative Humidity
100
90
80
70
60
50
40
30
20
07-17
07-18
07-19
07-20
07-21
07-22
07-23
07-24
07-25
07-26


Temperature or Relative Humidity
100
90
80
70
60
50
40
30
20
07-17
07-18
07-19
07-20
07-21
07-22
07-23
07-24
07-25
07-26

Robustness

Intercomparison of Sensors		
	Enclosure Housing	Inverted Buckets
Slope	0.834	1.192
Correlation	0.765	0.955
Compared to NJDEP		
	Enclosure Housing	Inverted Buckets
Slope	0.682	0.795
Bias (%)	-47.8	-20.5
Correlation	0.361	0.618
Data Reported (%)	58.2	73.7
Data Removed T (%)	26.9	8.5
Data Removed RH (%)	14.9	13.3





Conclusions and future projects

- Impact of housing
  - Enclosure with better air flow and sunlight cover
- New more secure enclosures for long term monitoring

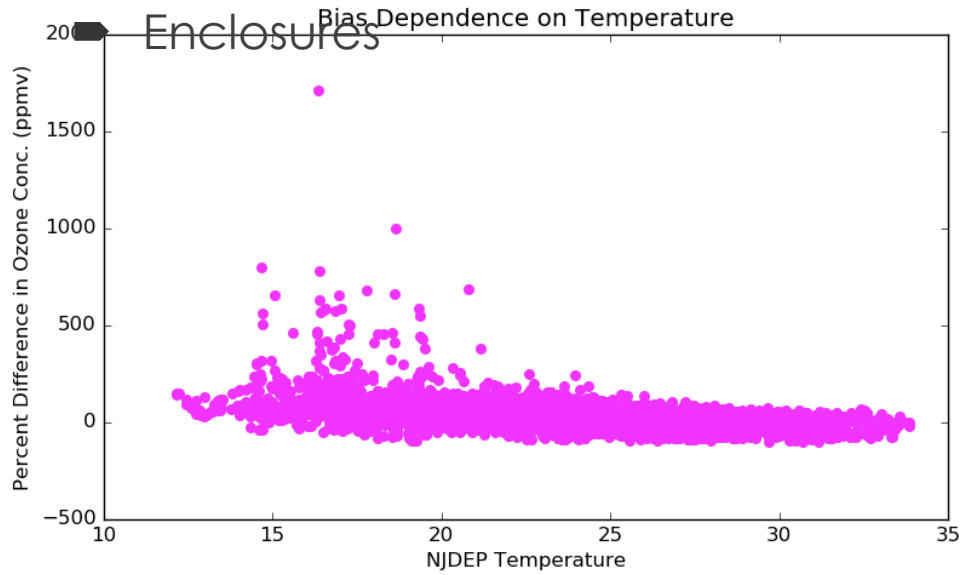
Acknowledgments

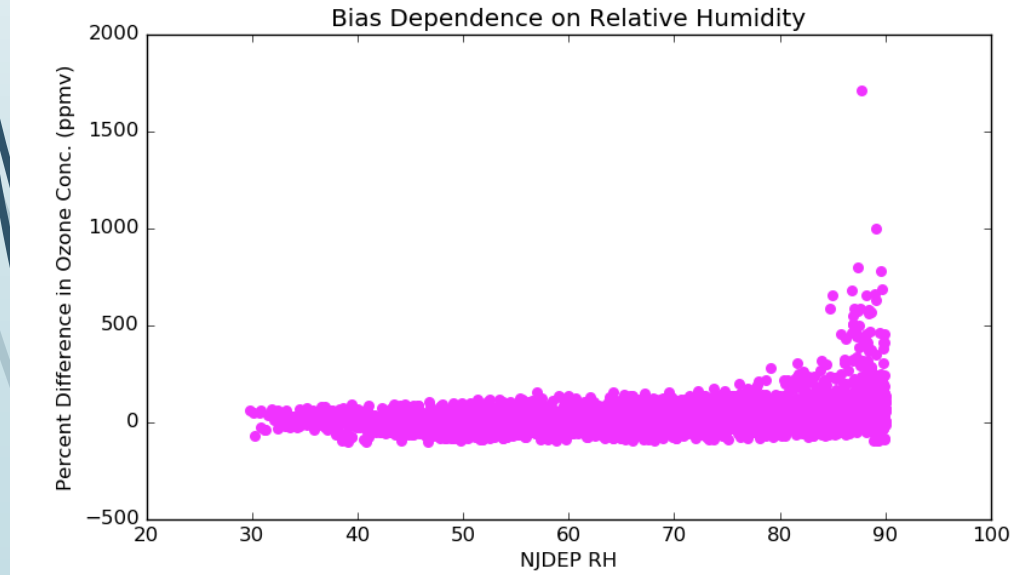
- Ronald E. McNair Scholars Program
- Dr. Druckenbrod and Dr. Stratton
- NJDEP
- Luis Lim – Chief of Bureau of Air Quality Monitoring
- Lab mates – Alina B. and Marco M.
- GEMS Department
- Chemistry and Biochemistry Department
- Rider University

1865 RIDER UNIVERSITY

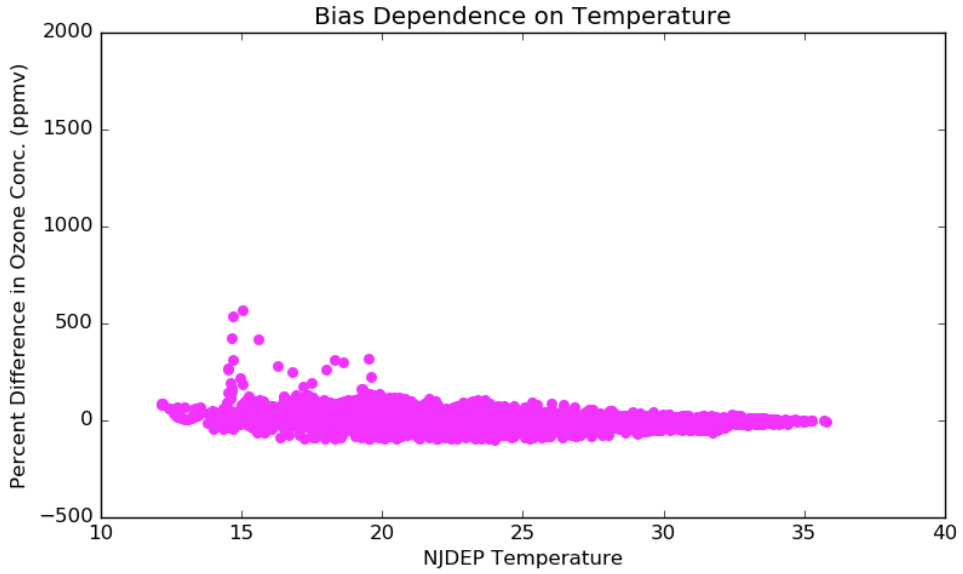
Questions?

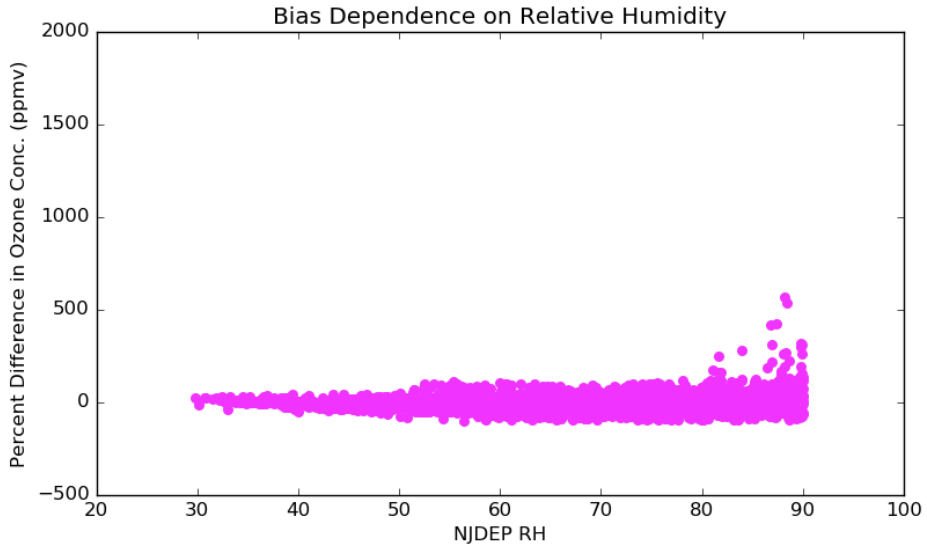
- Enclosures



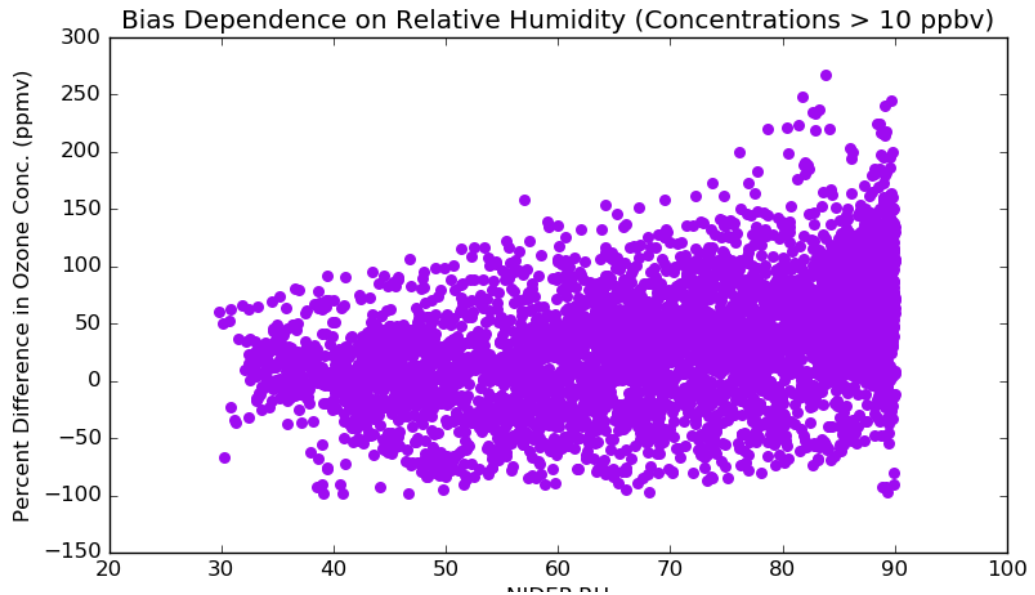


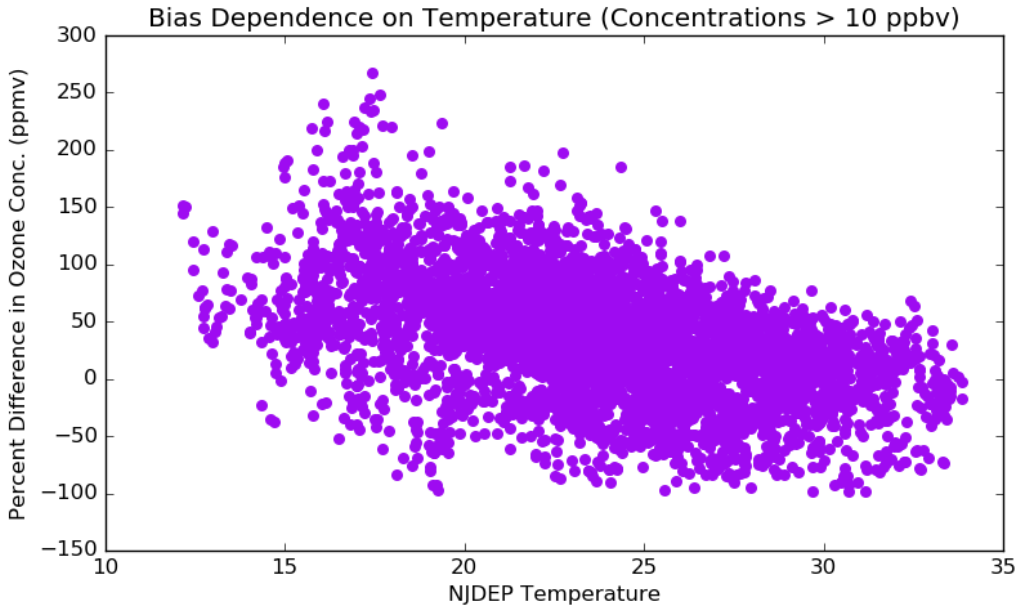
- Buckets



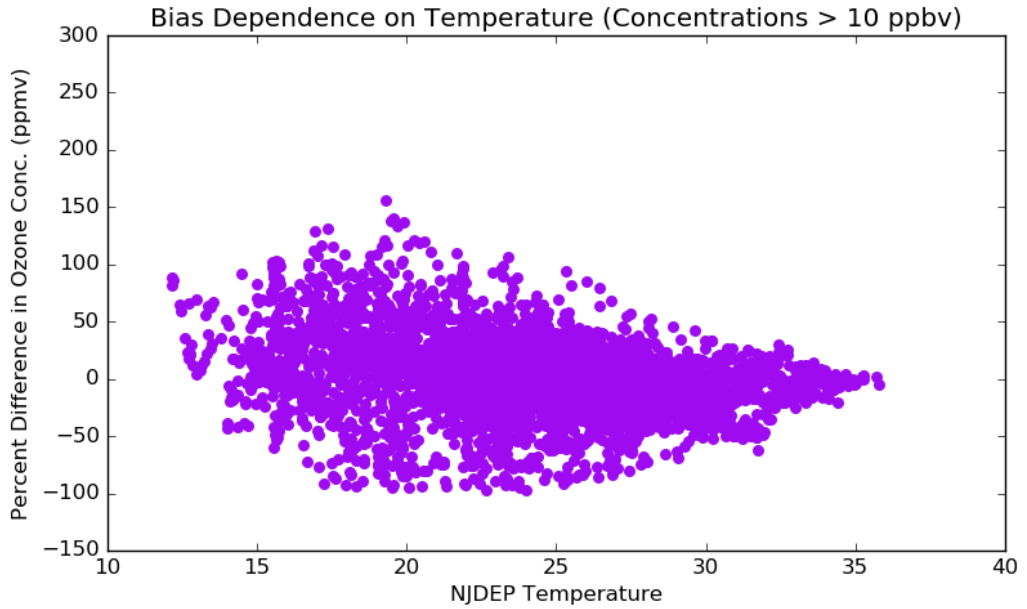


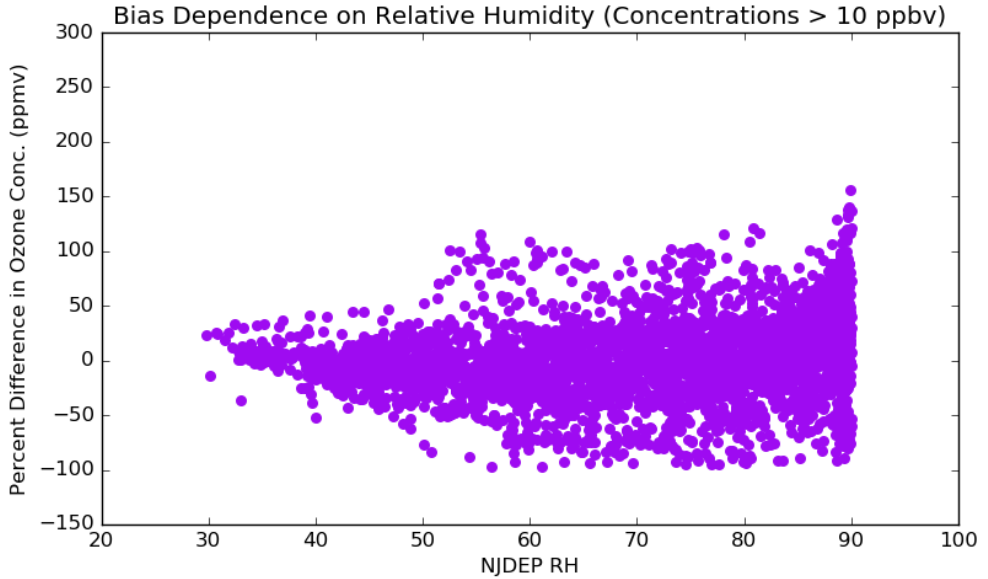
Enclosures



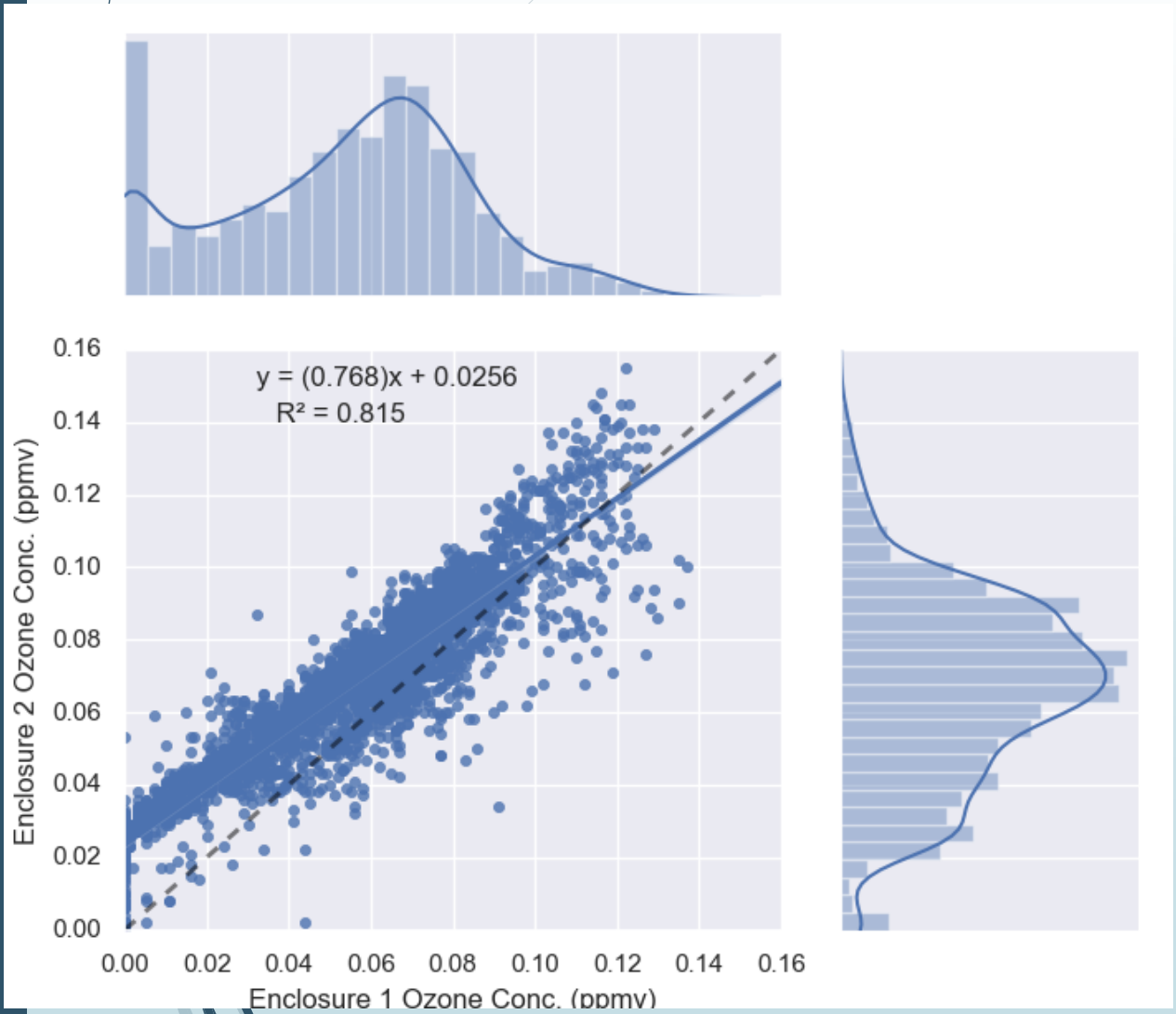


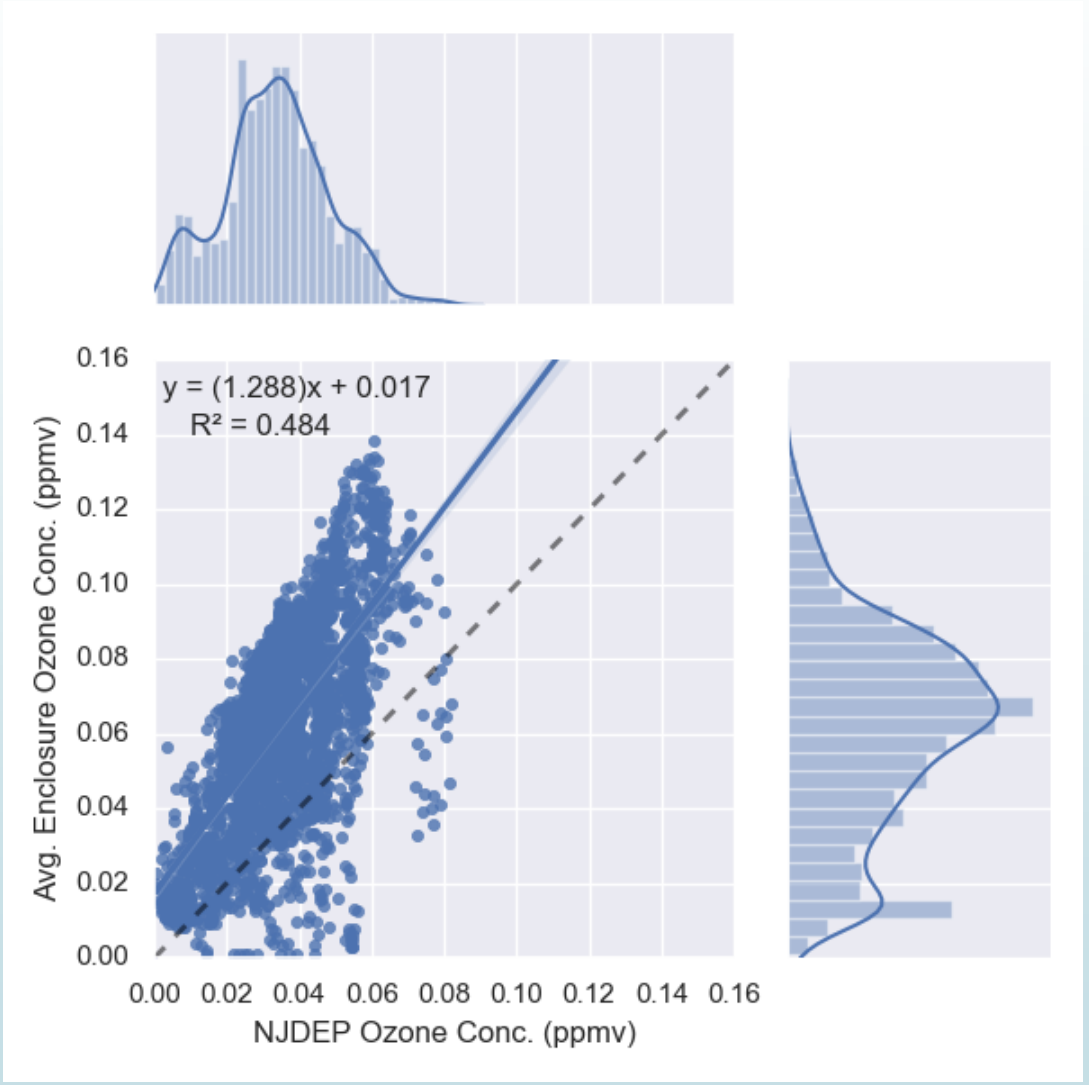
Buckets



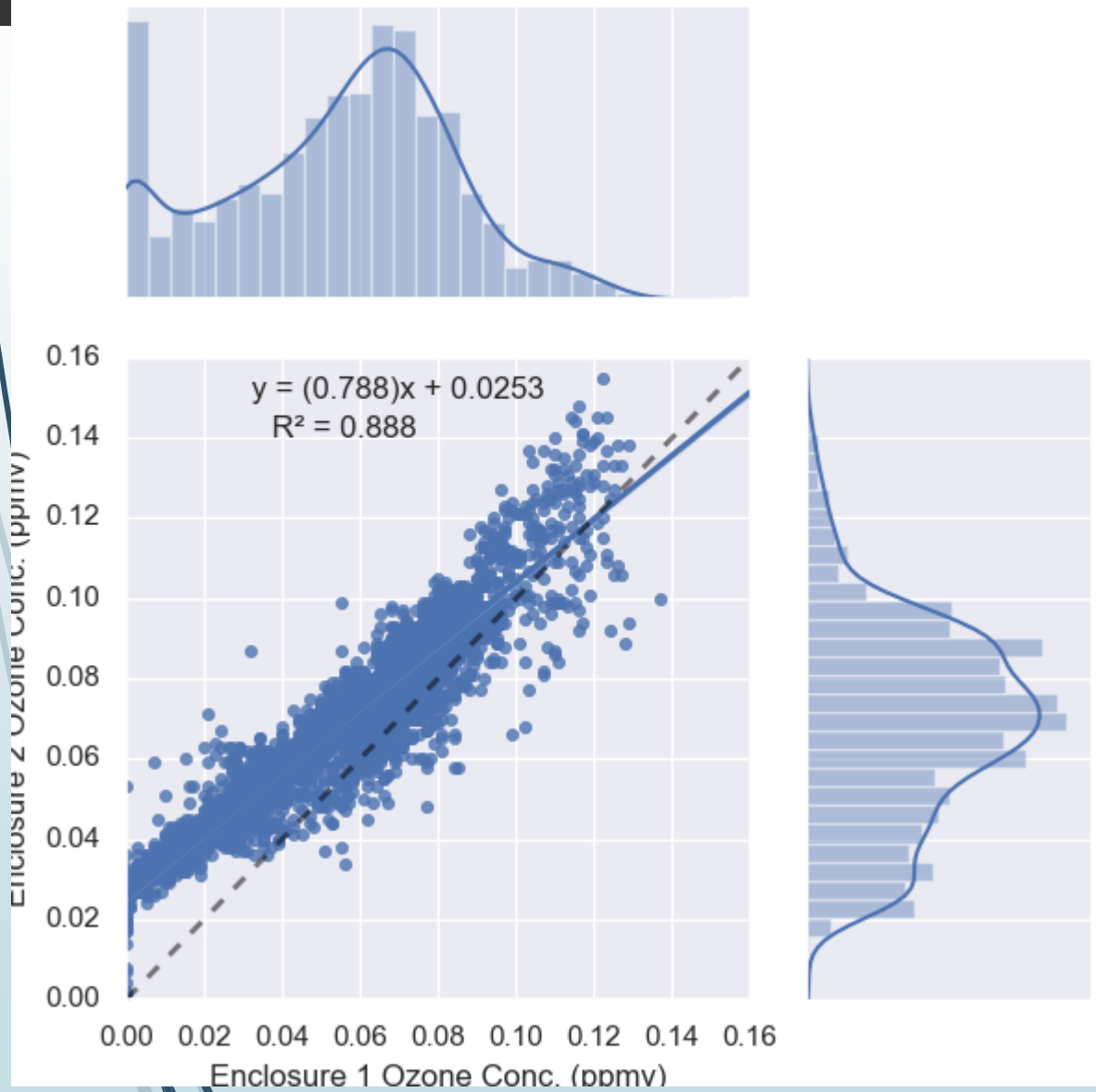


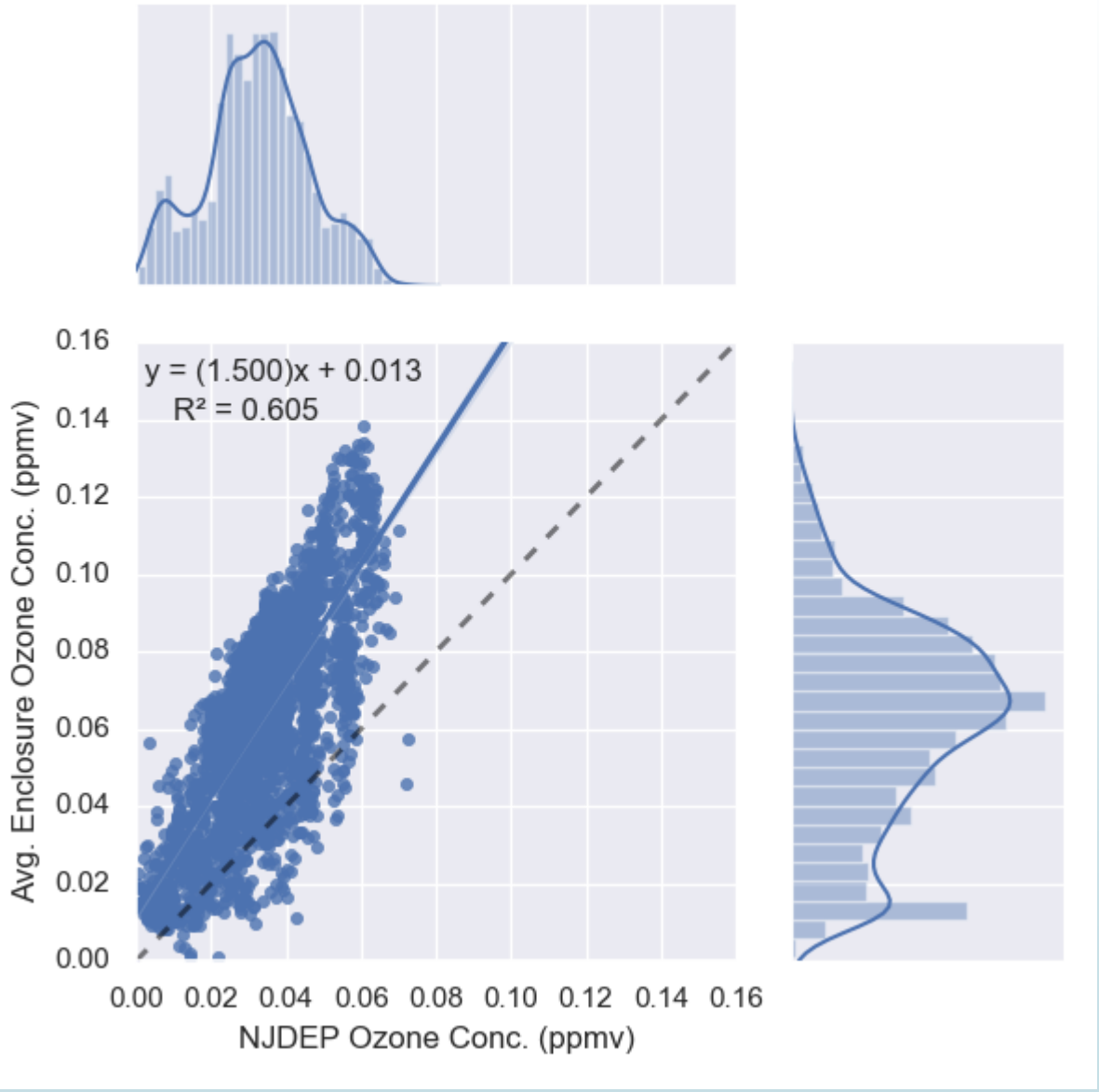
June 5-18 All data



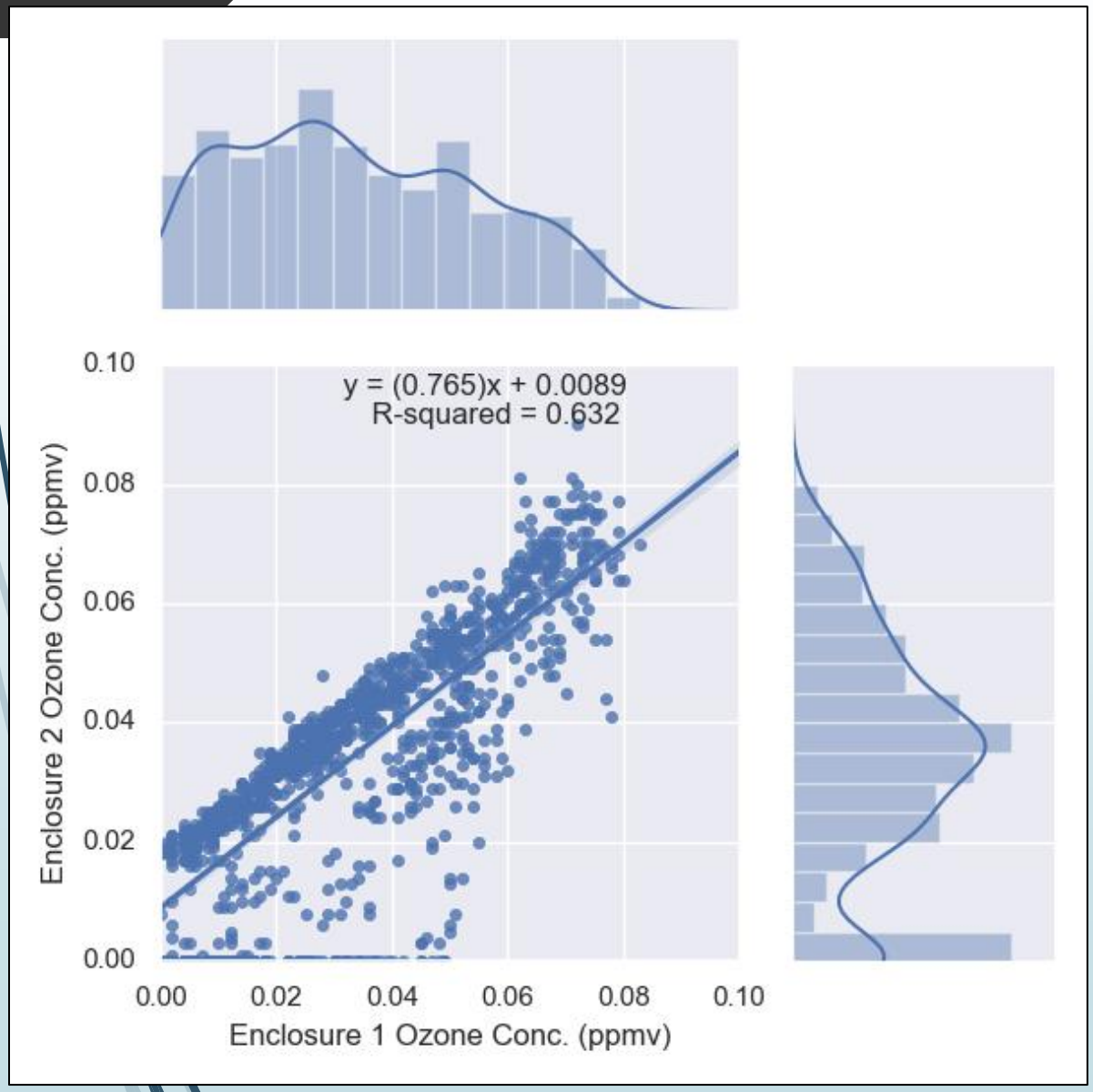


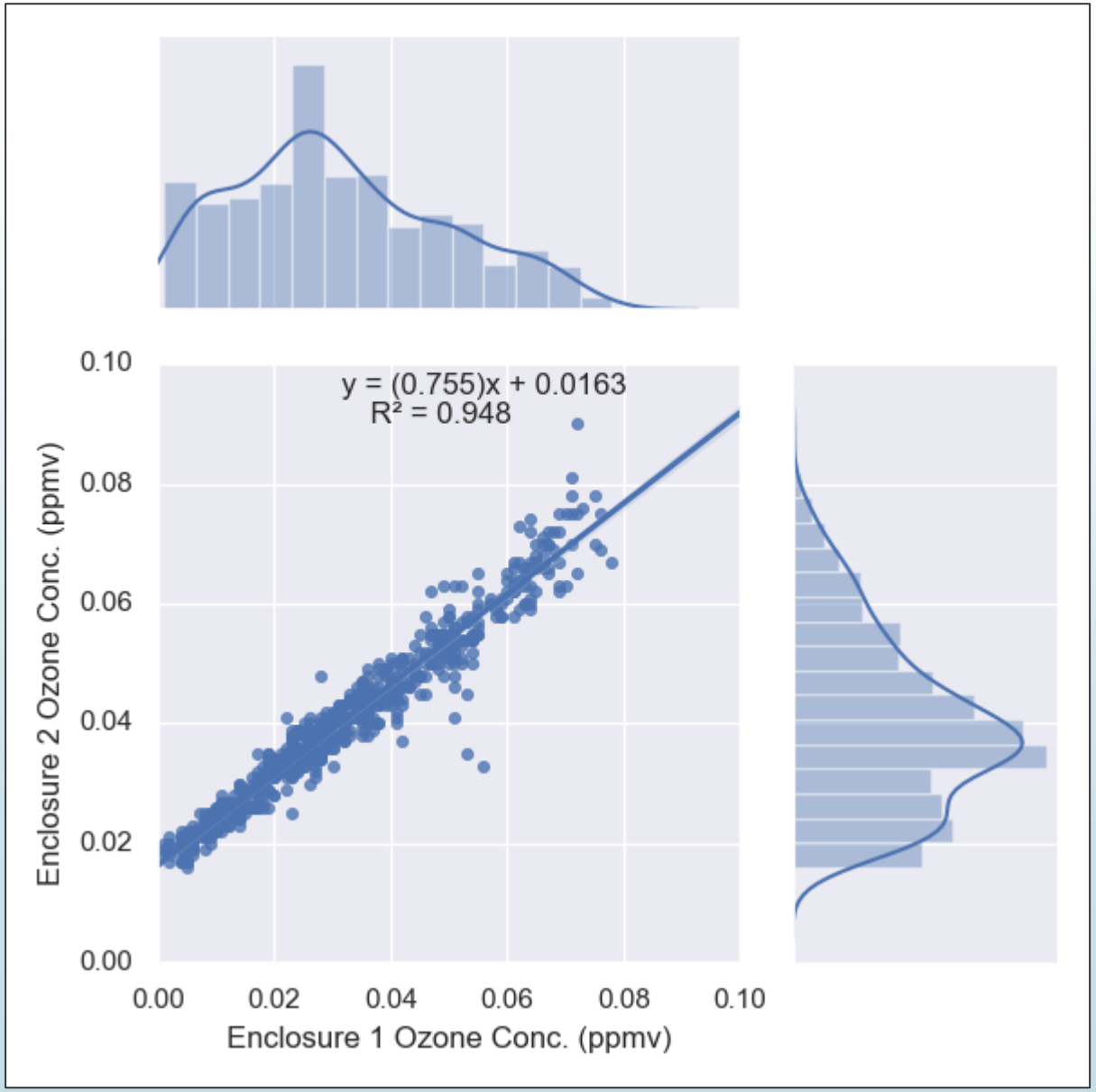
June 5-18 All data no 40 C



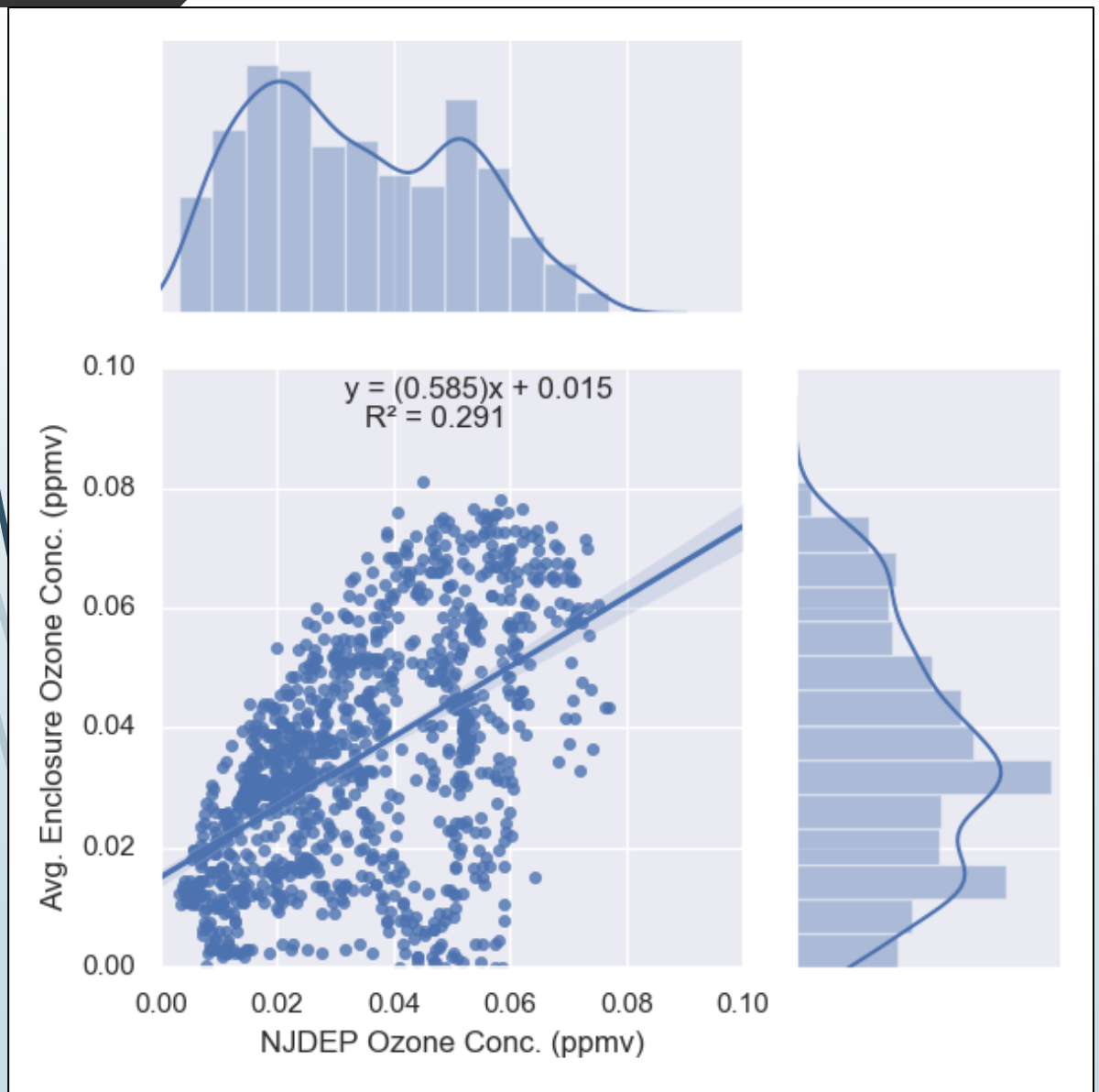


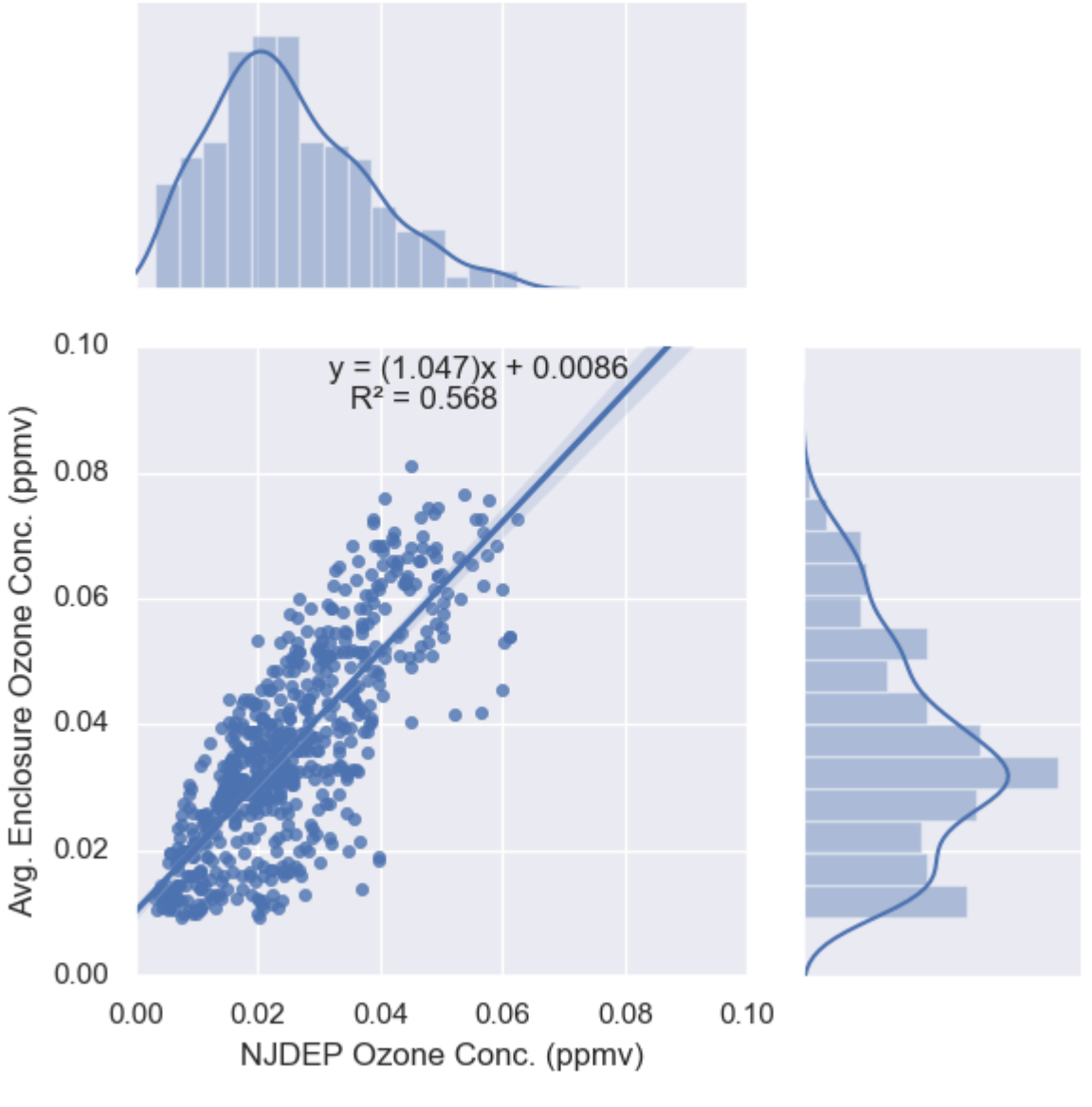
July Enclosure Data under 40 C

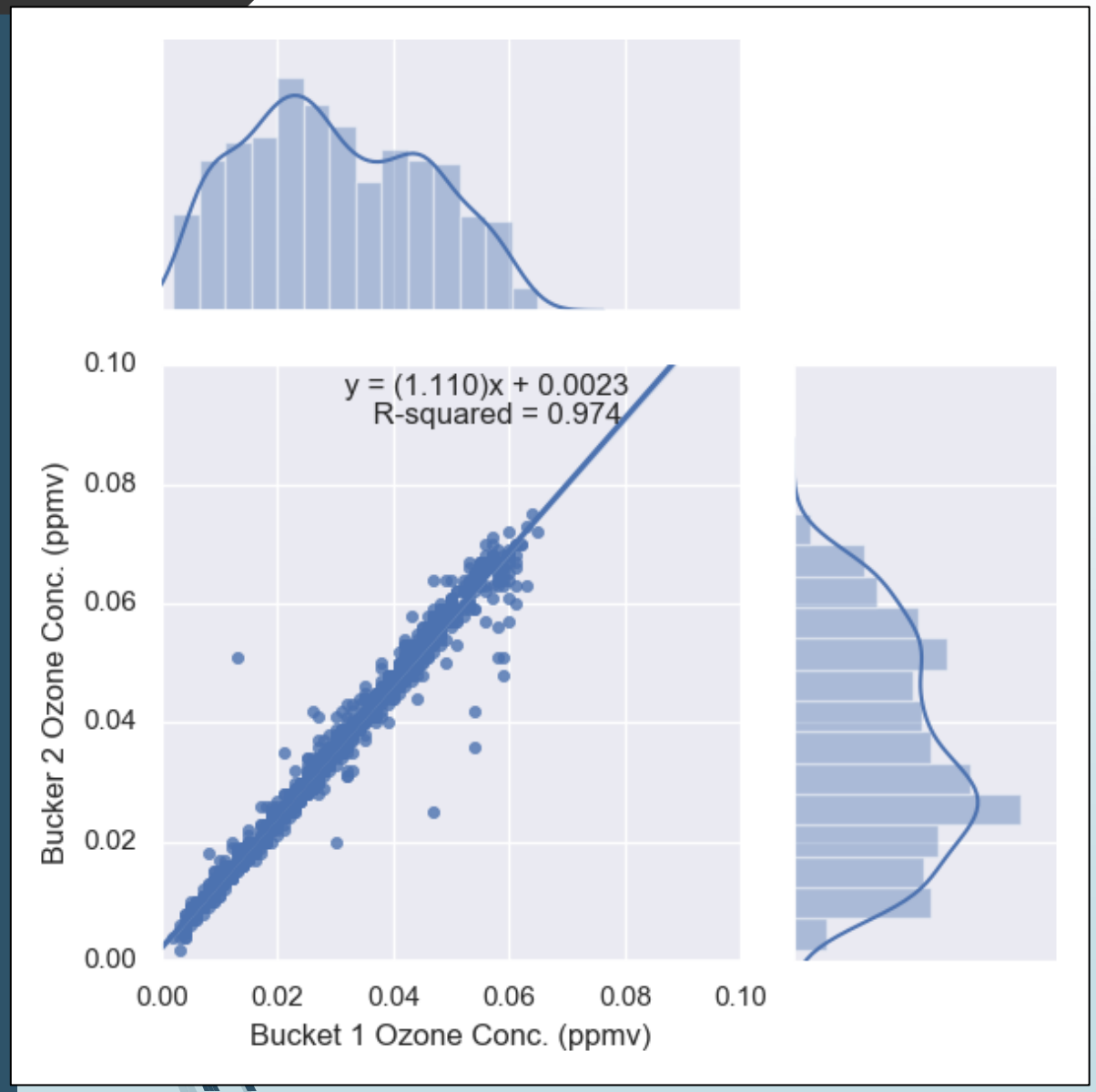


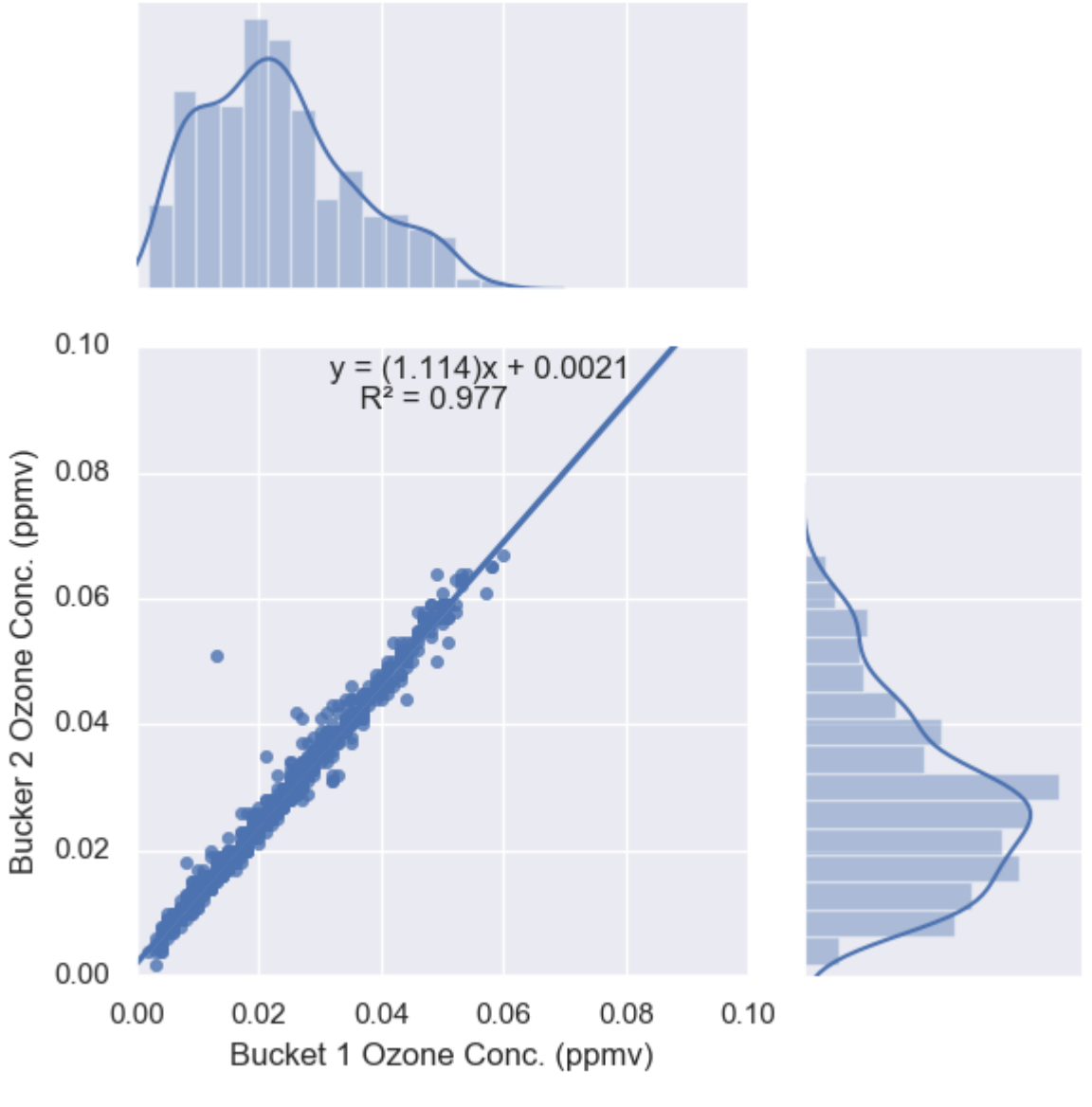
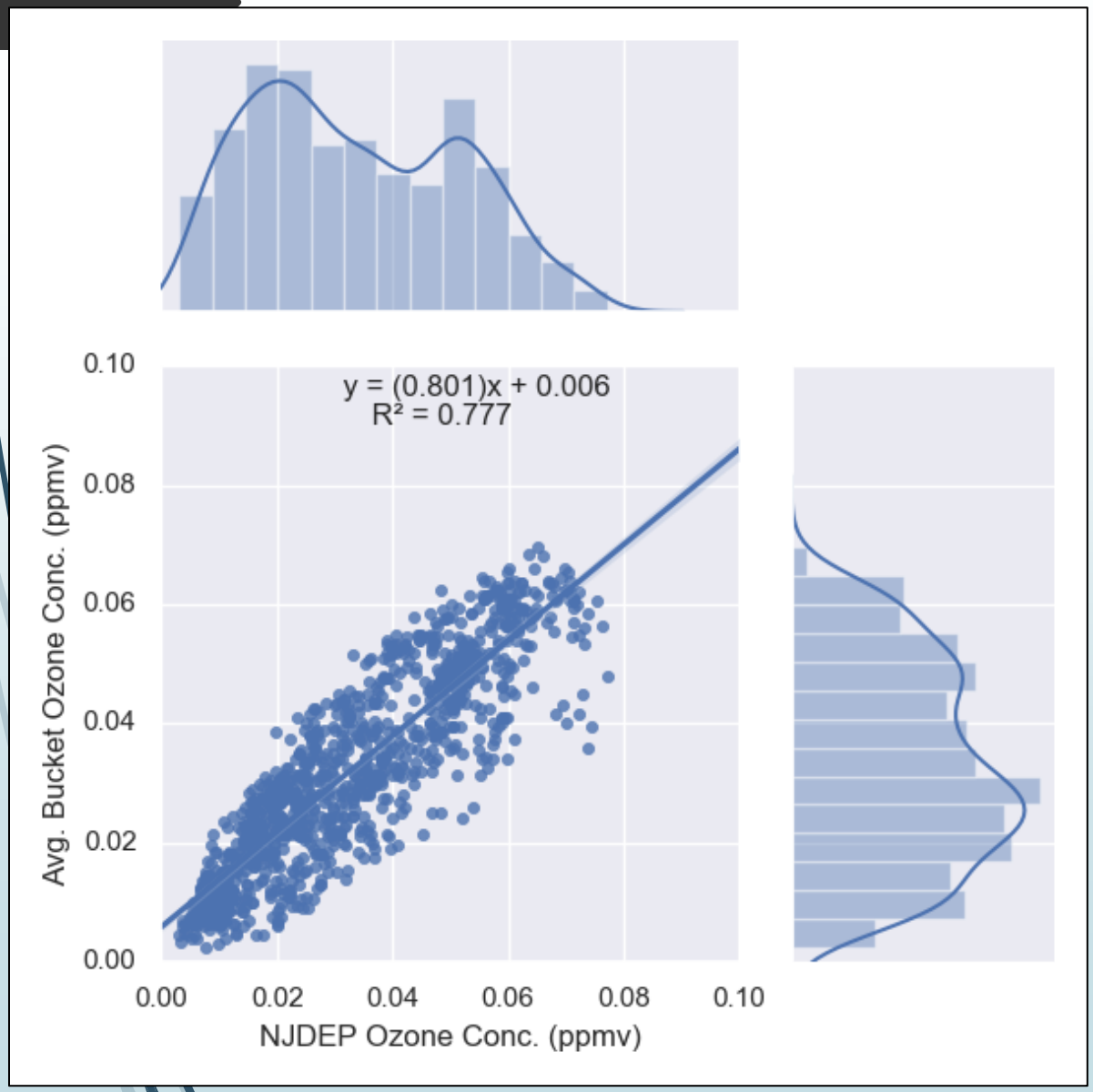
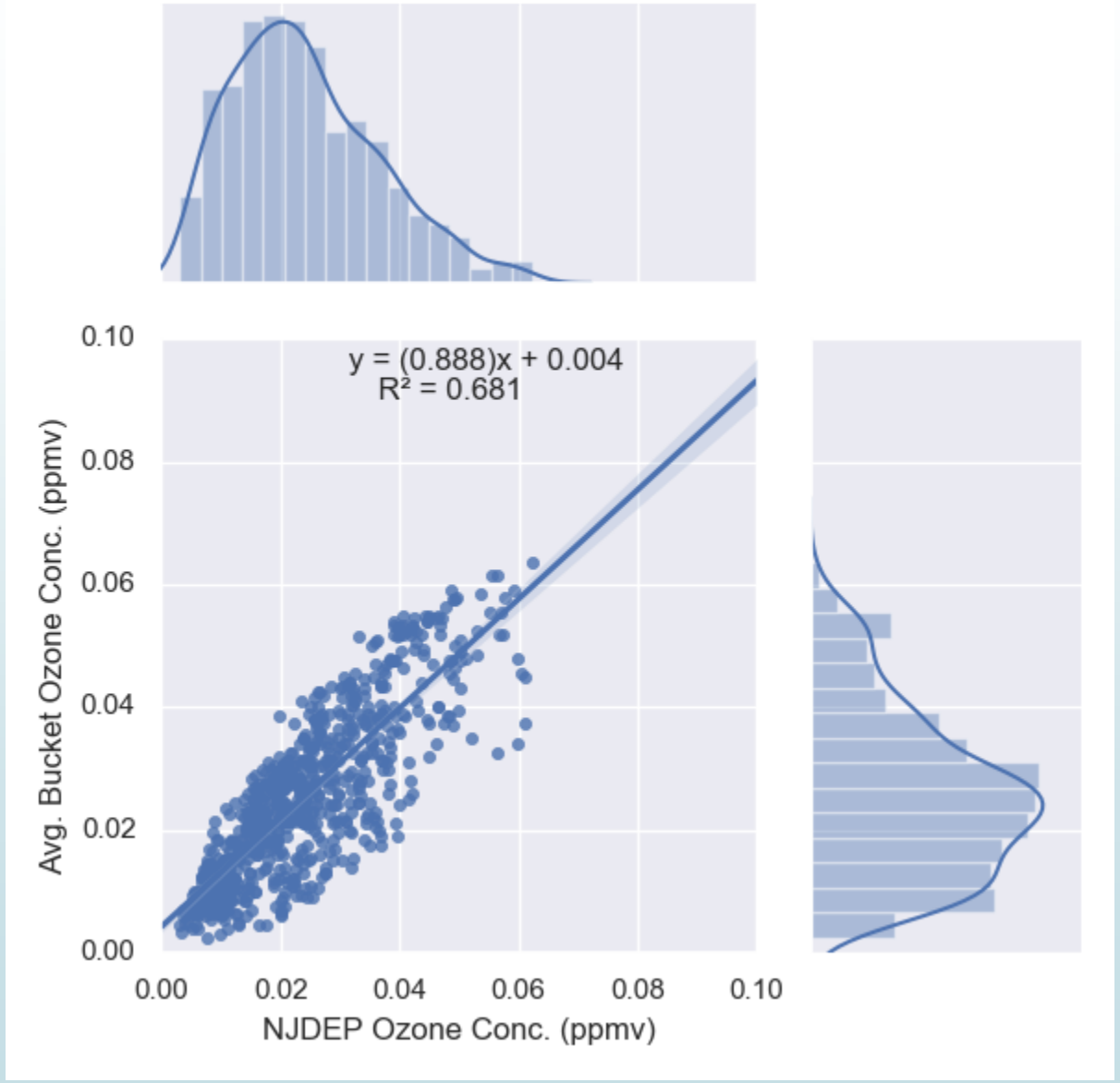


July Enclosure Data under 40 C






y = (1.110)x + 0.0023
R-squared = 0.974
Bucker 2 Ozone Conc. (ppmv)
Bucket 1 Ozone Conc. (ppmv)
0.00
0.02
0.04
0.06
0.08
0.10


y = (1.114)x + 0.0021
R² = 0.977
Bucker 2 Ozone Conc. (ppmv)
Bucket 1 Ozone Conc. (ppmv)
0.00
0.02
0.04
0.06
0.08
0.10

July Bucket Data under 40 C