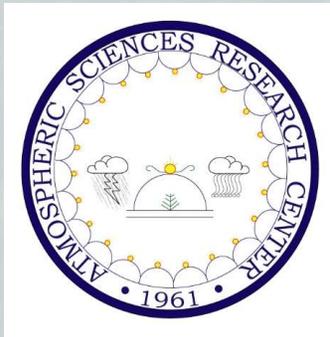


Mobile Laboratory Measurements of O₃ and NO₂ During LISTOS 2018: Observations of Dramatic Ozone Spatial Gradients

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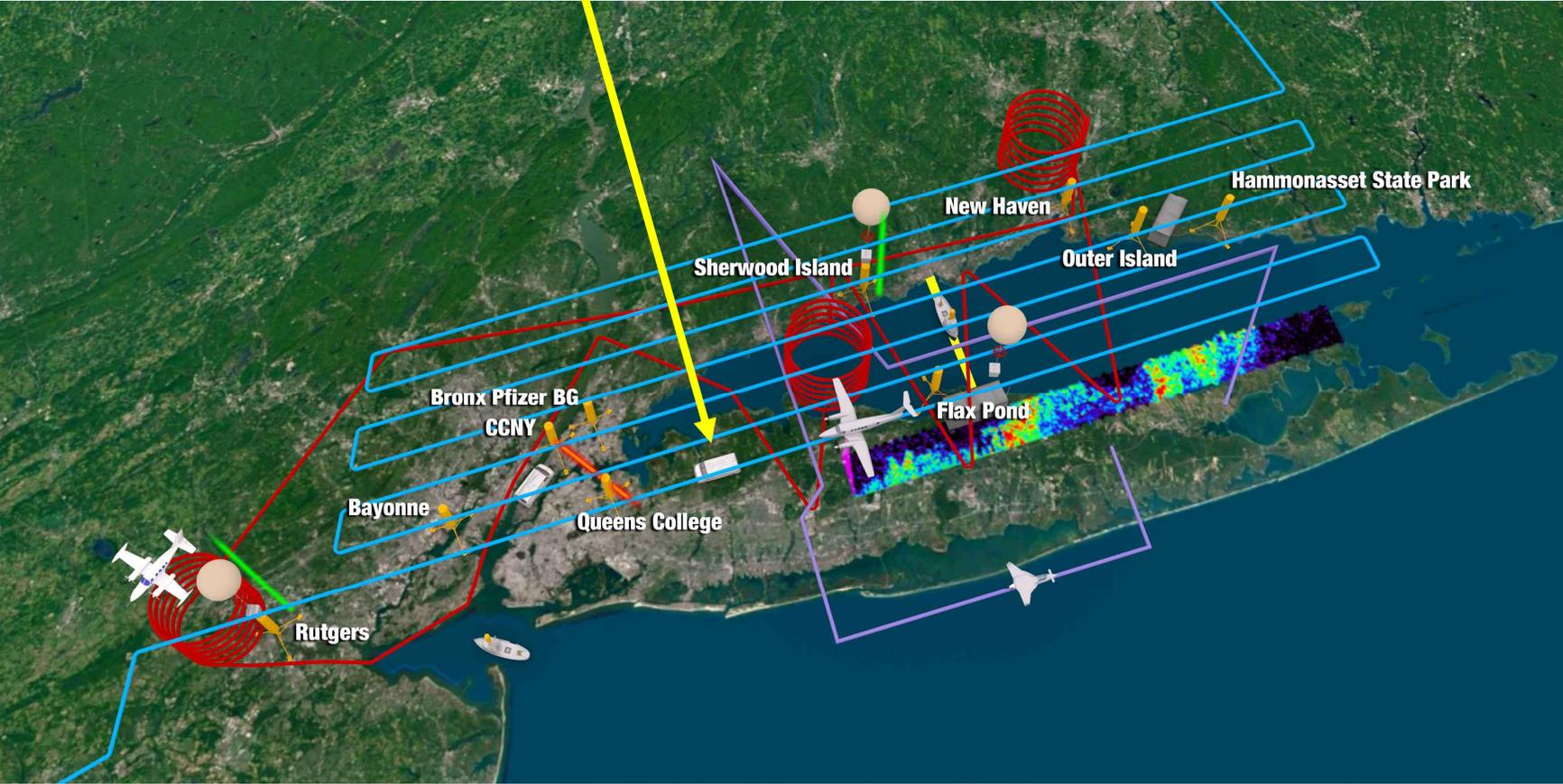
LISTOS Meeting 4/11/19



Acknowledgements

- NESCAUM agreement 2411 and NYSERDA contract number 48971
- Special thanks go to NYS Mesonet group for providing the LiDAR data, and to Stony Brook University and Stephen Abrams for support at the Flax Pond Marine Laboratory.

Here we are!



Mobile Lab

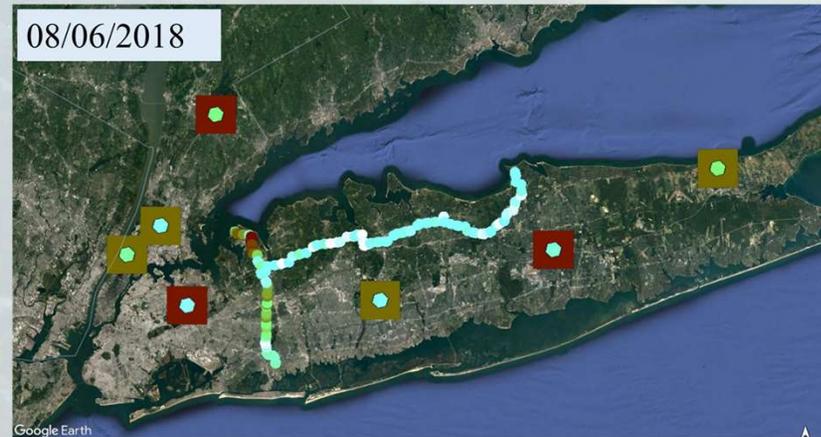
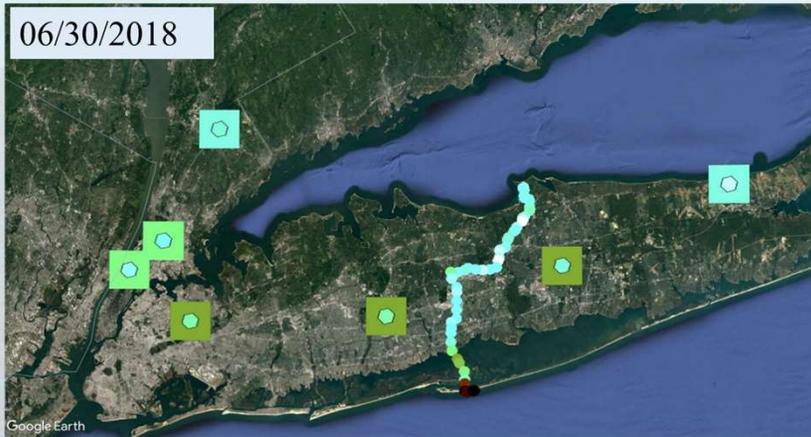
- 2007 Dodge Sprinter Van
- Battery life: 7+ hours of operation
- O₃: API model 430 and 2B model 200
- NO₂: API model 500U
- PM₁: Aerodyne HR-ToF- AMS
- Particle number: TSI 3785 WCPC
- PM_{2.5} (opt.): Thermo pDR 1500
- GPS
- Whole air samples: Entech CS1200E



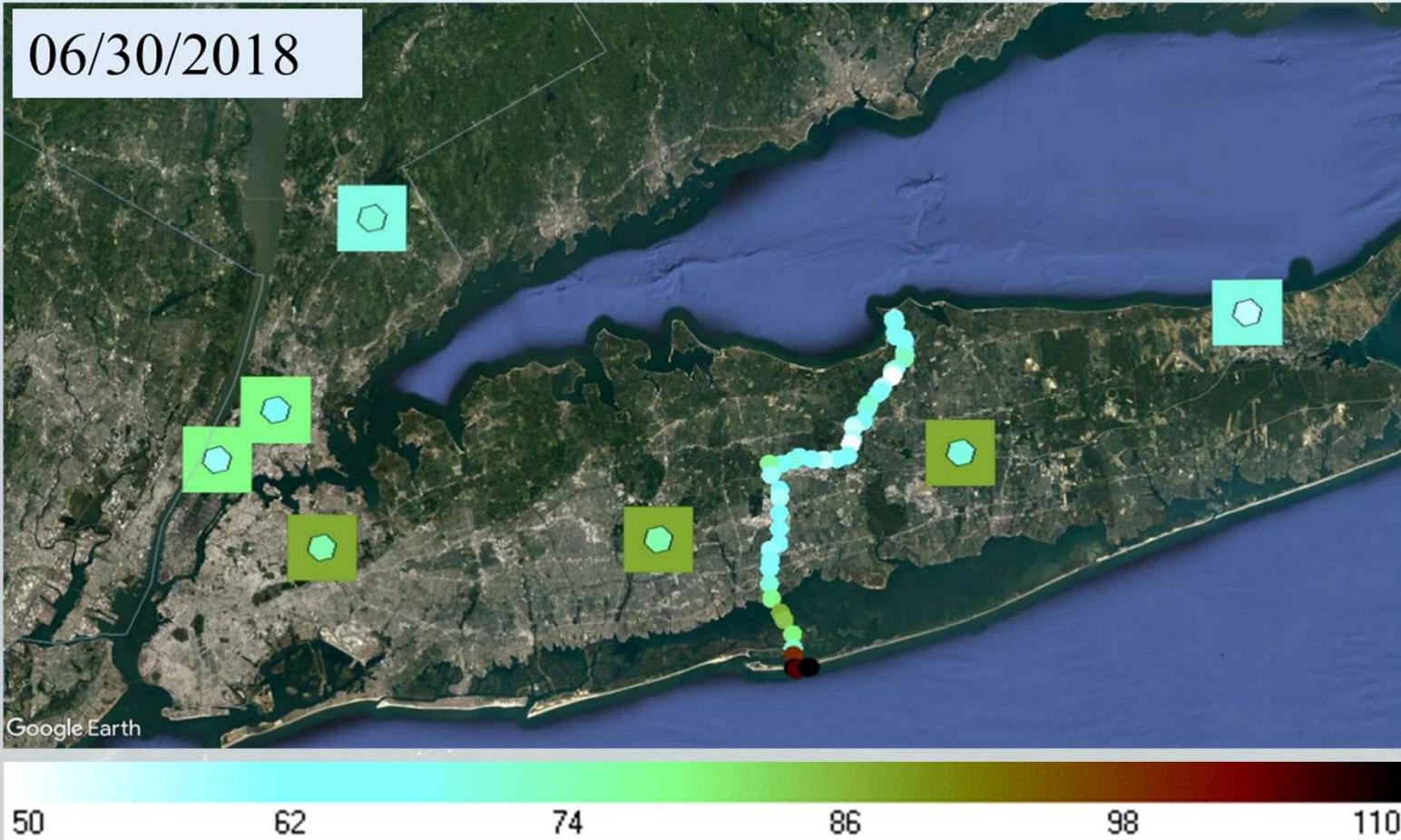
Deployments

- Eleven deployments: mainly on days with high forecast ozone concentrations
- All of Long Island and northeast to Westchester county and into Connecticut
- East-west and north-south transects
- Major highways (LIE and interstates) and local roads

Days with Dramatic Ozone Spatial Gradients

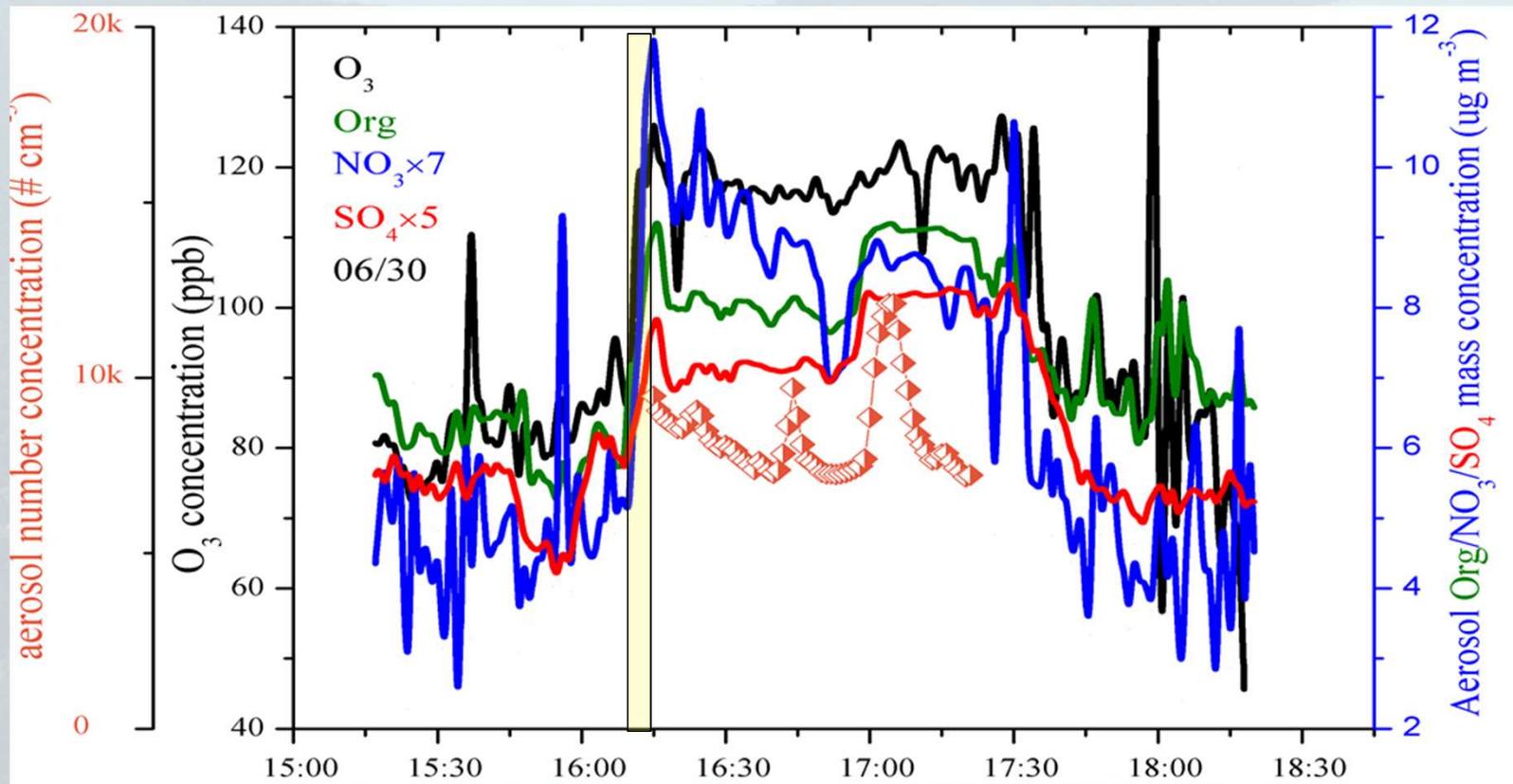


June 30, North-South Transect



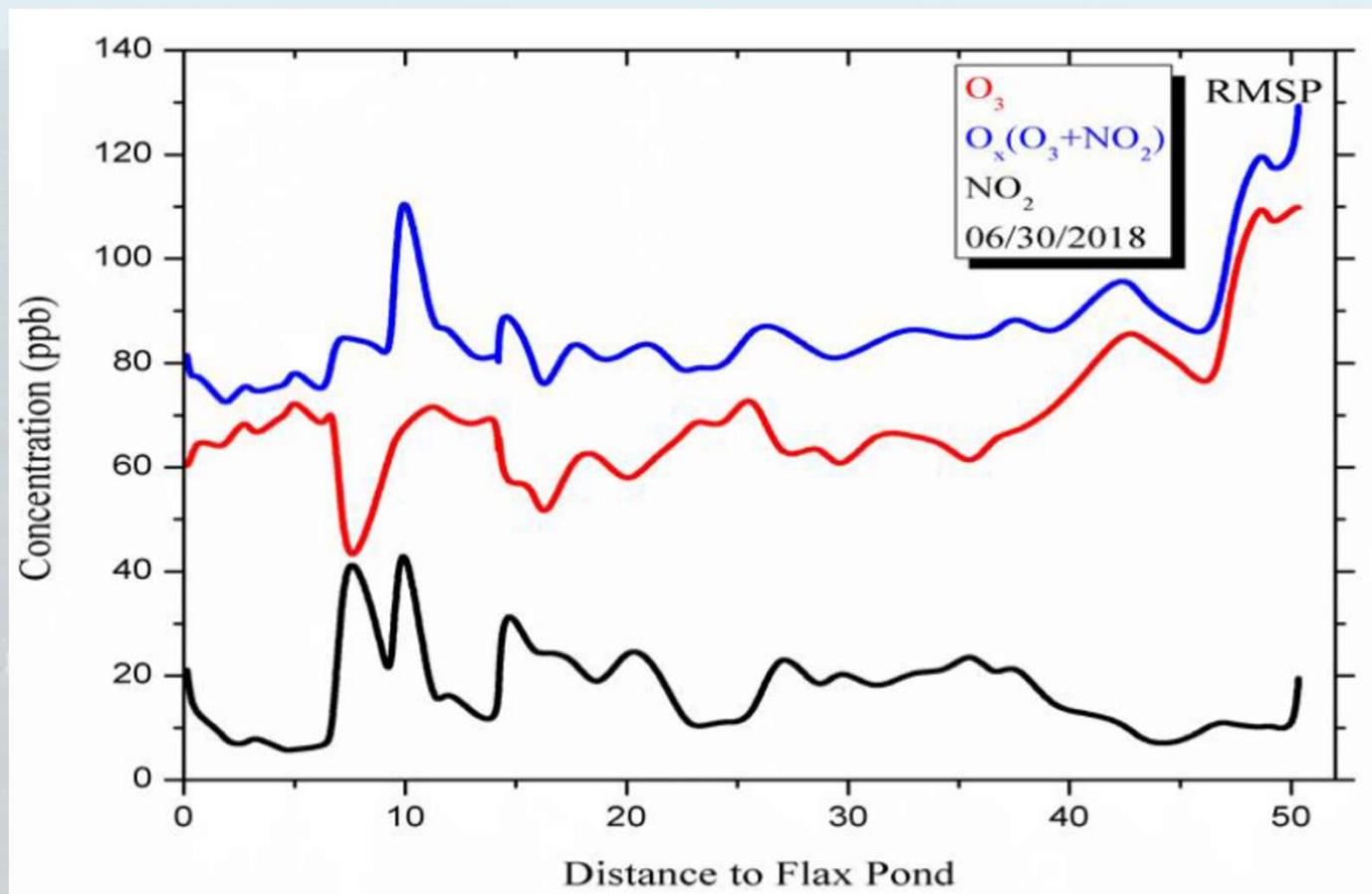
LISTOS Meeting 4/11/19

6/30/19 On Road – O₃ and AMS Components

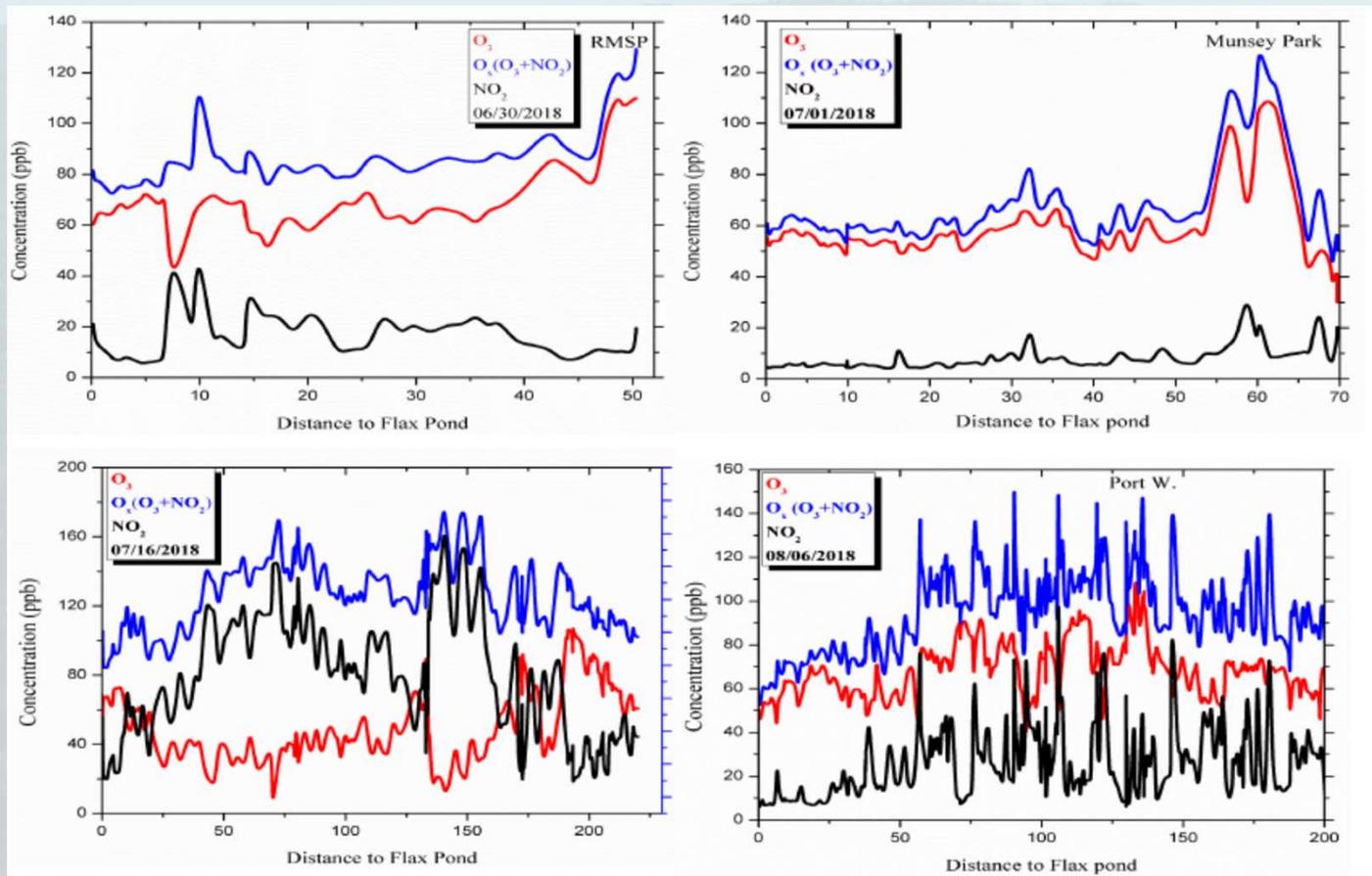


Note O₃ jump from ~80 to ~120 ppb in roughly 5 min.

Gases Only – Plotted vs. Distance



Four “Sharp Gradient” Deployments



Observed Ozone Gradients

Location	RMSP	Munsey Park	White Plains	Port Washington
Date	06/30/2018	07/01/2018	7/16/2018	08/06/2018
$\Delta O_3/\Delta y$ (ppb/km)	18	12	11	19
	Low NO₂ - < 20 ppb	Very Low NO₂ - ≤ 10 ppb	High NO₂ - ~ 60-80 ppb	Moderate and Variable NO₂ – 20-60 ppb

Current and Future Work

- Consider first cases where NO_2 levels are low or very low to eliminate NO titration as the driving force for sharp ozone gradients.
- Sea-breeze circulation transported ozone seems the most likely cause of the gradients on these days.
- Use theory and available observational tools to confirm the influence of sea-breeze for these cases.
- Determine whether current high resolution models can reproduce the observations.

Visible satellite image for 8/6/2018

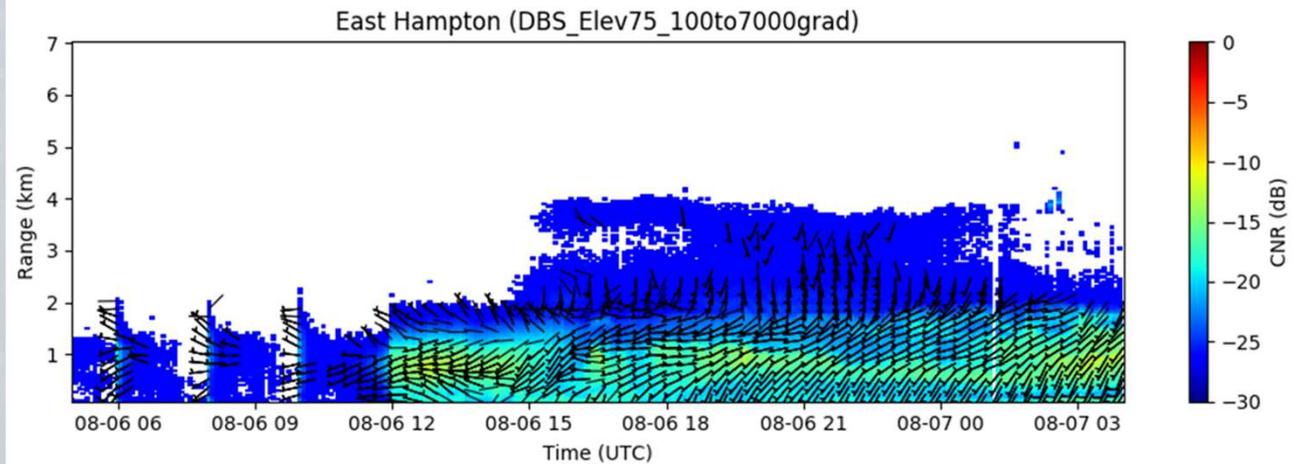
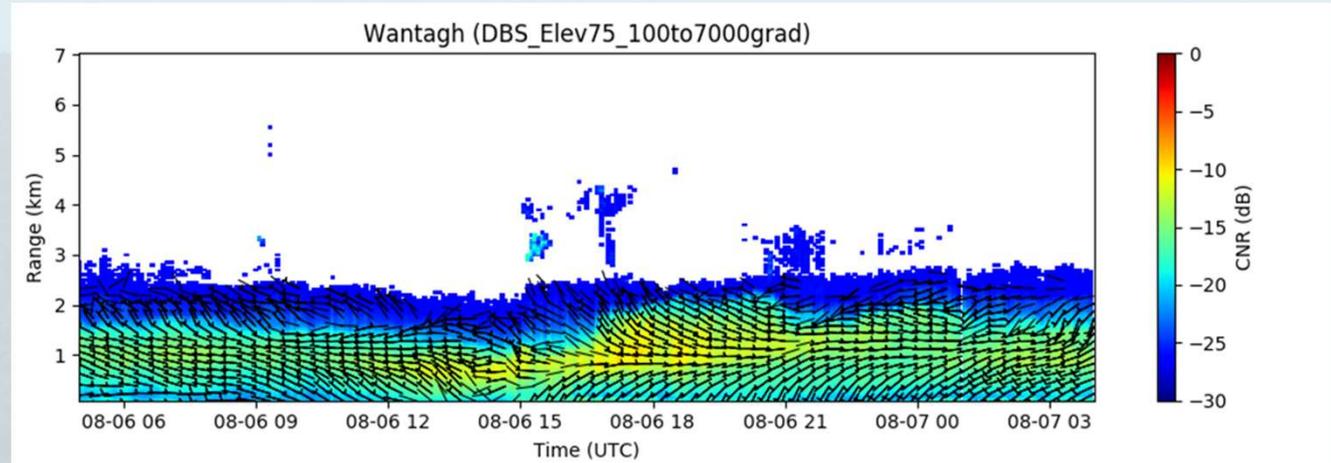


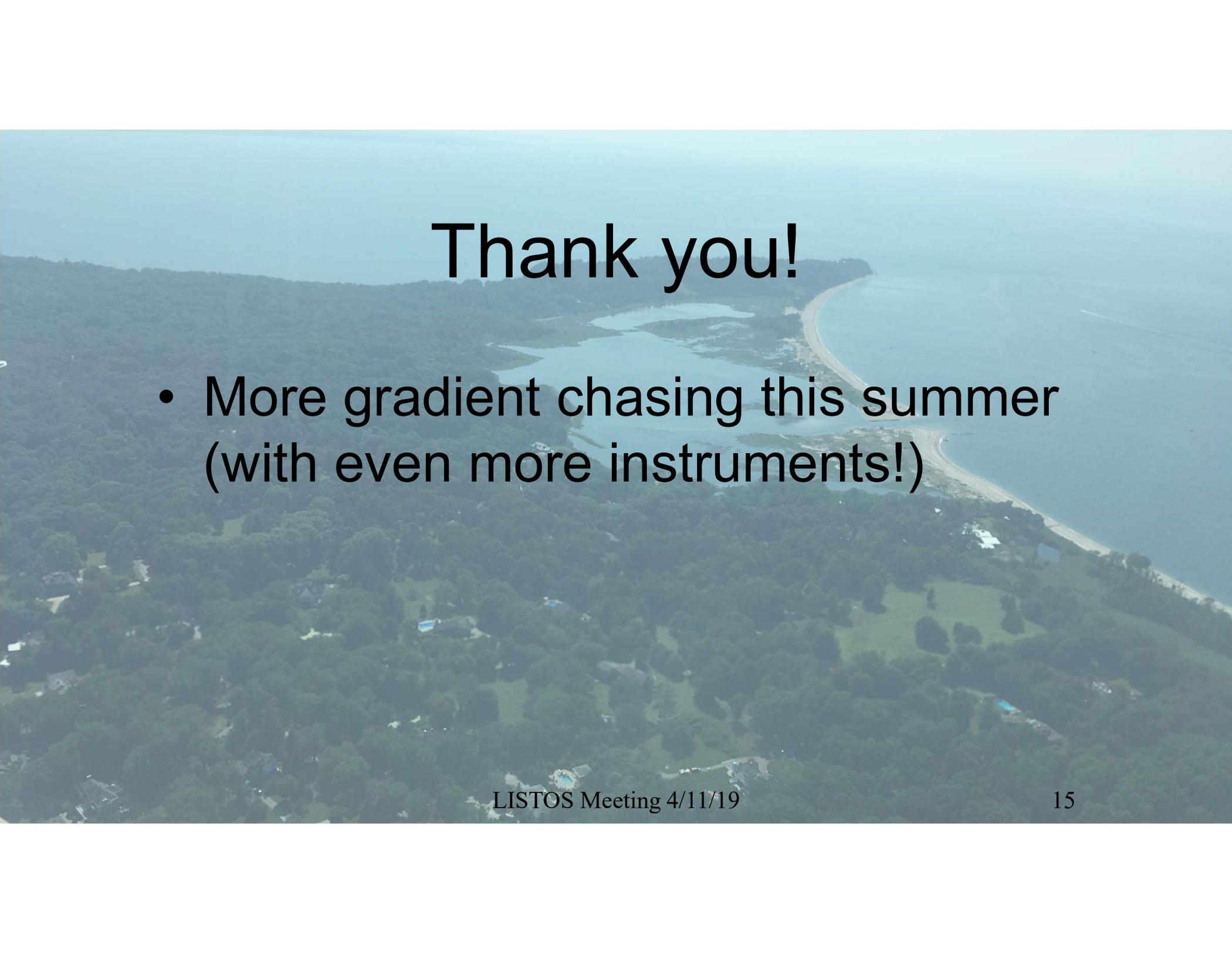
South Shore Wind LiDAR Plots From NY Mesonet Profilers

8/6/2018

Wantagh:

**East
Hampton:**



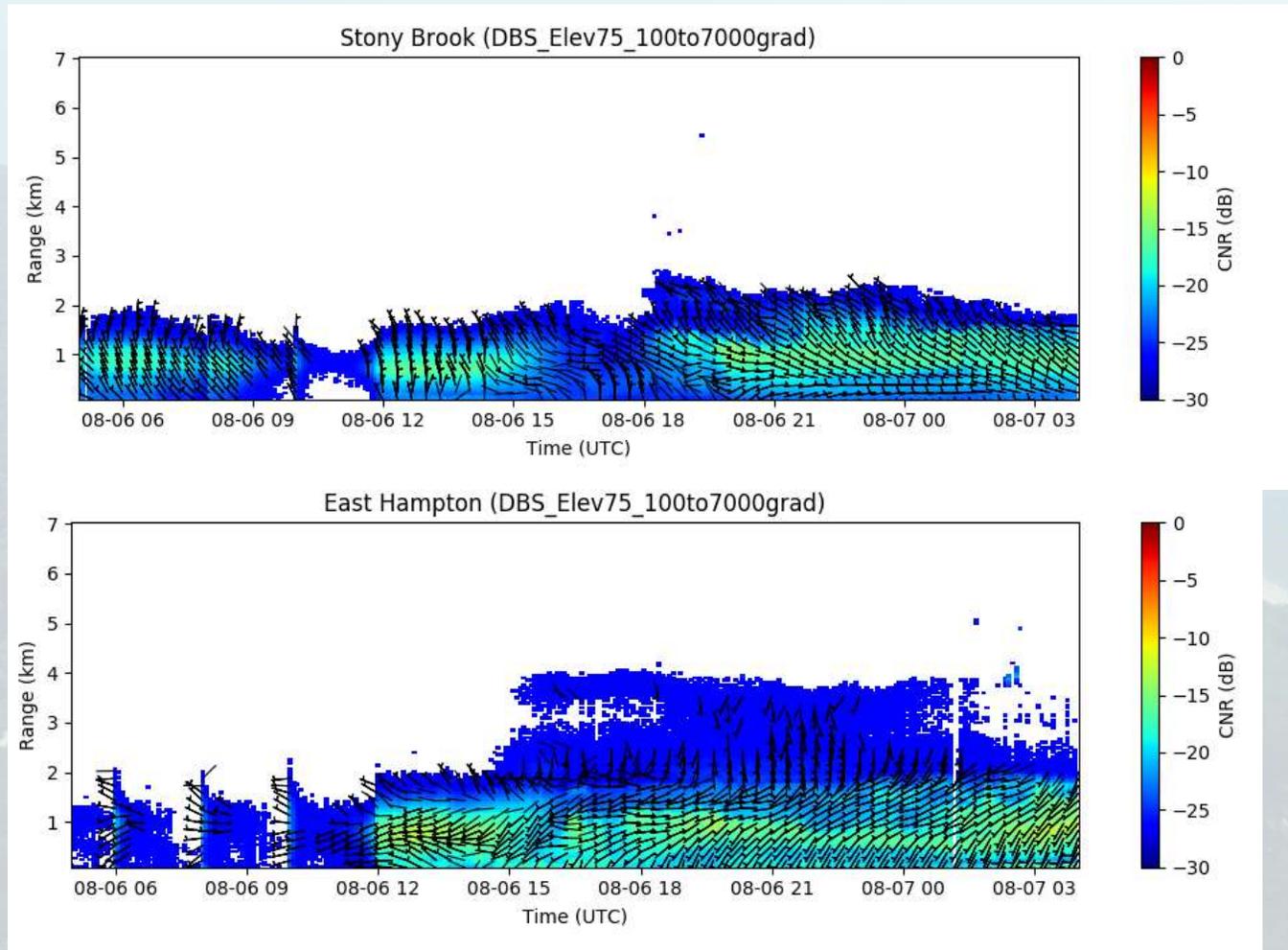


Thank you!

- More gradient chasing this summer (with even more instruments!)

08/06: Lidar Data – Stony Brook and East Hampton

Stony Brook:



East Hampton:

Summary

On-Road Measurement Day	Strong evidence of sea and/or shore breeze?	Supporting evidence (if applicable)
06/24/2018	No	N/A
06/30/2018	Yes – sea and shore breeze	Method #1; Method #2 surface obs., back trajectories, and lidar data
07/01/2018	Yes – sea breeze	
07/02/2018	No	N/A
07/10/2018	Yes – sea breeze	Method #1; Method #2 surface obs. and lidar data
07/15/2018	No	N/A
07/16/2018	Yes – sea and shore breeze	Method #1; Method #2 surface obs., radar reflectivity, vis. satellite imagery, and lidar data
08/05/2018	Yes – sea and shore breeze	Method #1; Method #2 surface obs., vis. satellite imagery, and lidar data
08/06/2018	Yes – sea and shore breeze	Method #1; Method #2 surface obs., radar reflectivity, vis. satellite imagery, and lidar data
08/15/2018	Yes – shore breeze	Method #1; Method #2 surface obs. and vis. satellite imagery
08/16/2018	No	N/A