



## *Webex Agenda, 9 January 2014*



1. Status and schedule for data from the last two deployments
2. Fall AGU
3. AQAST meeting
4. Upcoming science team meeting
5. Colorado site survey results
6. Science presentation – EPA small sensor preliminary results – Russell Long



## *Data Status and Schedule*



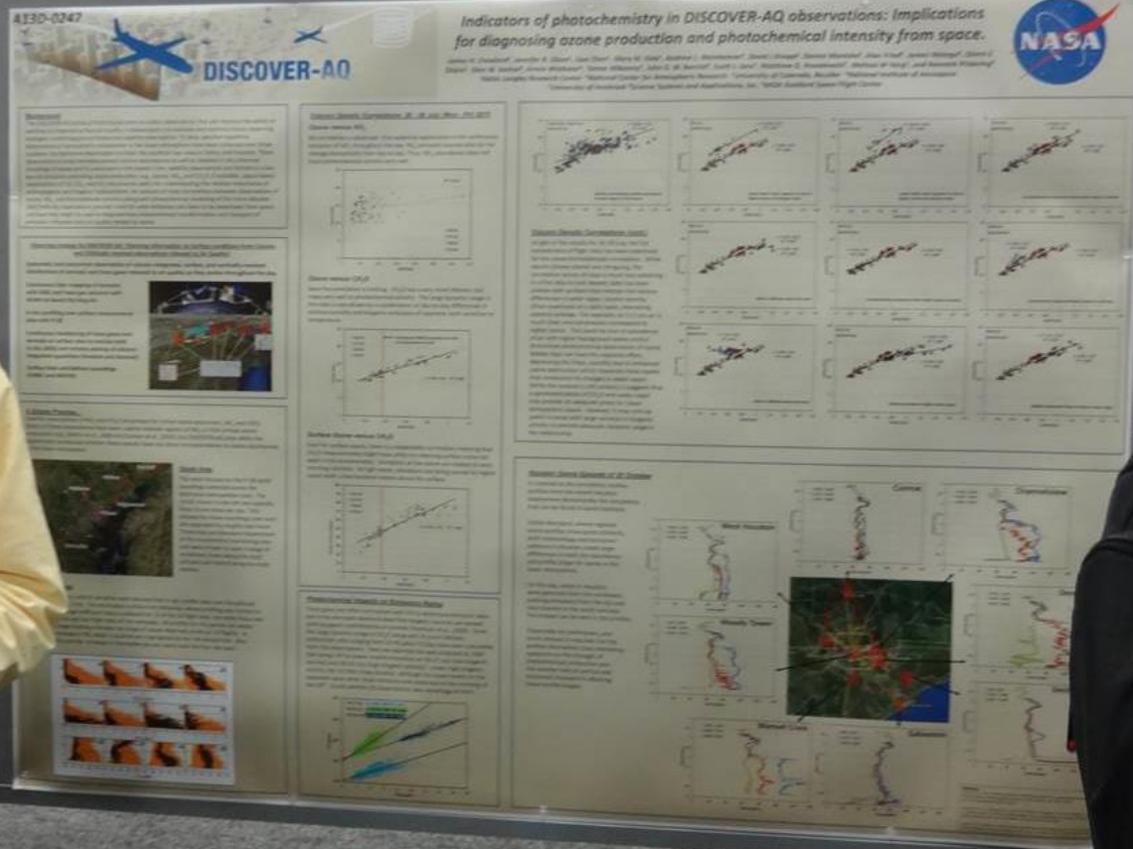
### California

- Still waiting for a few data sets
- P-3B is complete except for a few flights of DLH data
- P-3B merges are current

### Houston

- Merges are now available for all P-3B flights
- This represents the data available for use in presentations at the AQAST meeting in January (please contact anyone whose data you are using)
- Final data deadline is 31 January 2014 (will provide 3 weeks of time before the Science Team meeting)
- Please let Gao know if your circumstances will require an extension beyond the deadline

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**NASA Air Quality Applied  
Sciences Team (AQAST)  
6th Biannual Meeting  
Rice University  
January 15-17, 2014**

The full program and instructions for remote access are available at the URL at the bottom of the page for those who are interested

[Home](#) [Program](#) [Registration](#) [Venue and Accommodations](#)

## *DISCOVER-AQ Houston Experiment*

*Chair: Jim Crawford (NASA/LaRC)*

- 3:00-3:15 Houston air quality during the Sept. 2013 experiment and preliminary evaluation of NOAA CMAQ air quality forecasts (Ken Pickering, NASA/GSFC)
- 3:15-3:30 Measurements of trace gases at two ground sites during DISCOVER-AQ (Xinrong Ren, U. Maryland/NOAA-ARL)
- 3:30-3:45 Late summer ozonesonde observations in Houston: SEAC4RS and DISCOVER-AQ soundings (August - September 2013) in the context of ozonesonde observations from 2004 – 2012 (Gary Morris, U. Valparaiso)
- 3:45-4:00 Characterization of primary and secondary particulate matter during DISCOVER-AQ (Rob Griffin, Rice)
- 4:00-4:15 Overview of NATIVE measurements during DISCOVER-AQ: ozone, nitrogen oxides, VOCs (Anne Thompson, NASA/GSFC)



## Science Team Meeting



**When:** 24-28 February

**Where:** NASA Langley Research Center (Hampton, VA)

**Venue:** Reid Conference Center (and remote access as usual for plenary portions)

### **Travel Support:**

The project has budgeted for the typical travel support for each PI plus one group member to attend.

Mary is starting to contact others who have requested support. If you don't hear from her by Monday, assume we have forgotten you and bug her.

Instructions for travel support will go out by email early next week.

**Badges:** Badges will be necessary since the meeting is on NASA grounds, so Mary Kleb needs to hear from you even if you do not need travel support.

**RSVP:** Please contact Mary even if you do not need badging/travel assistance so that we can properly gauge space requirements

There are still quite a few groups that Mary has not heard from yet, so please take the time to let her know your intentions.



## Science Team Meeting (Agenda)



### Preliminary Agenda:

Monday, 24 February (Maryland)

AM - Presentations

PM - Posters and Breakout

Sessions

Tuesday, 25 February (California)

AM - Presentations

PM - Posters

Wednesday 26 February (California)

AM - Presentations

PM - Breakout Sessions

Thursday 27 February (Houston)

AM - Presentations

PM - Posters

Friday 28 February (Houston)

AM - Presentations

PM - Breakout Sessions

This will be a long meeting, so this rough agenda has been fashioned to provide some periods of high and low intensity.

We need to start collecting titles for talks and posters, so that we can flesh out the details. **Please forward those to both me and Ken Pickering.**

There is a small bar (Afterburner's) in the Reid Center. If we can convince them to be open during the afternoon poster and breakout sessions, it may help keep the atmosphere positive 😊 (but there will be no "open bar" 😞)

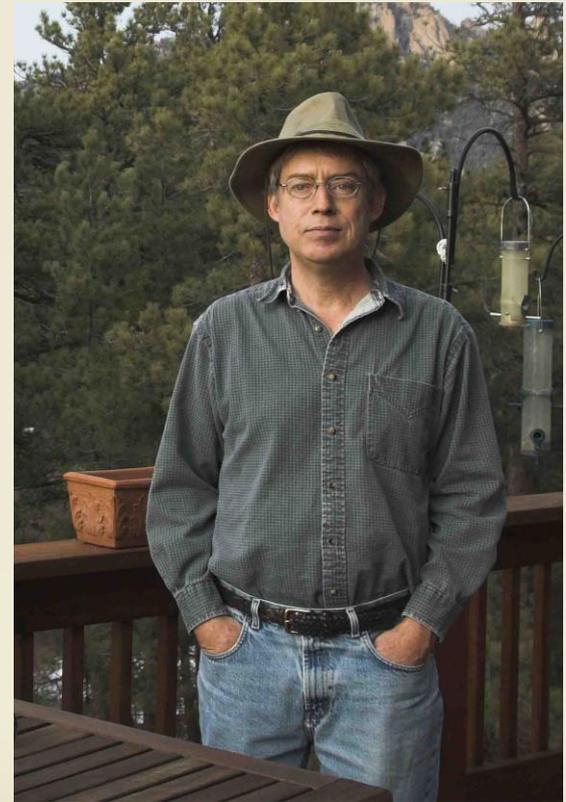


Frank Flocke and Gabi Pfister are the leads for FRAPPÉ (Front Range Air Pollution and Photochemistry Experiment)

Due to their efforts, the last DISCOVER-AQ deployment will include the largest contingent of collaborators yet.

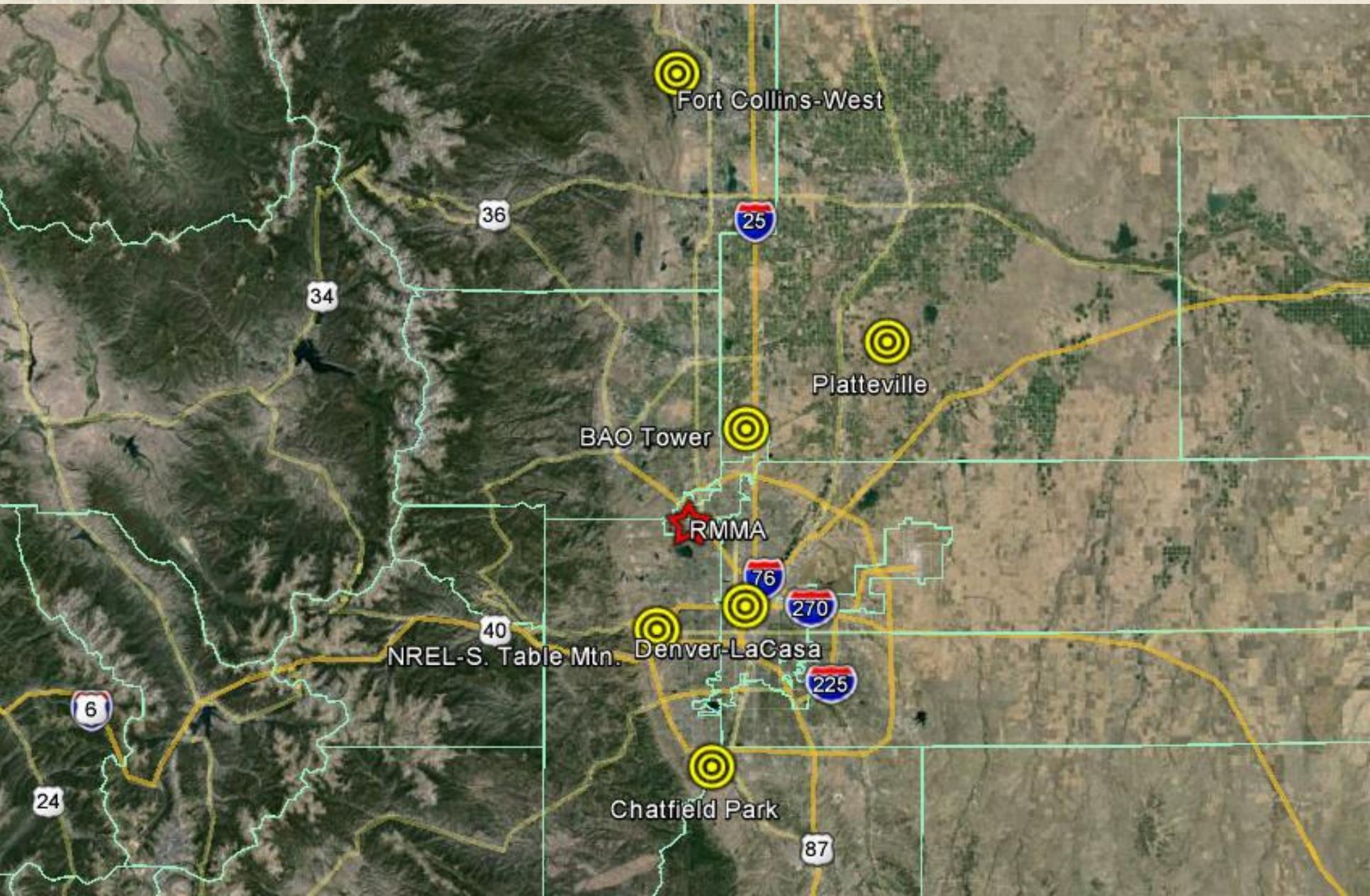
It didn't happen without a huge effort on their part...see the story at:

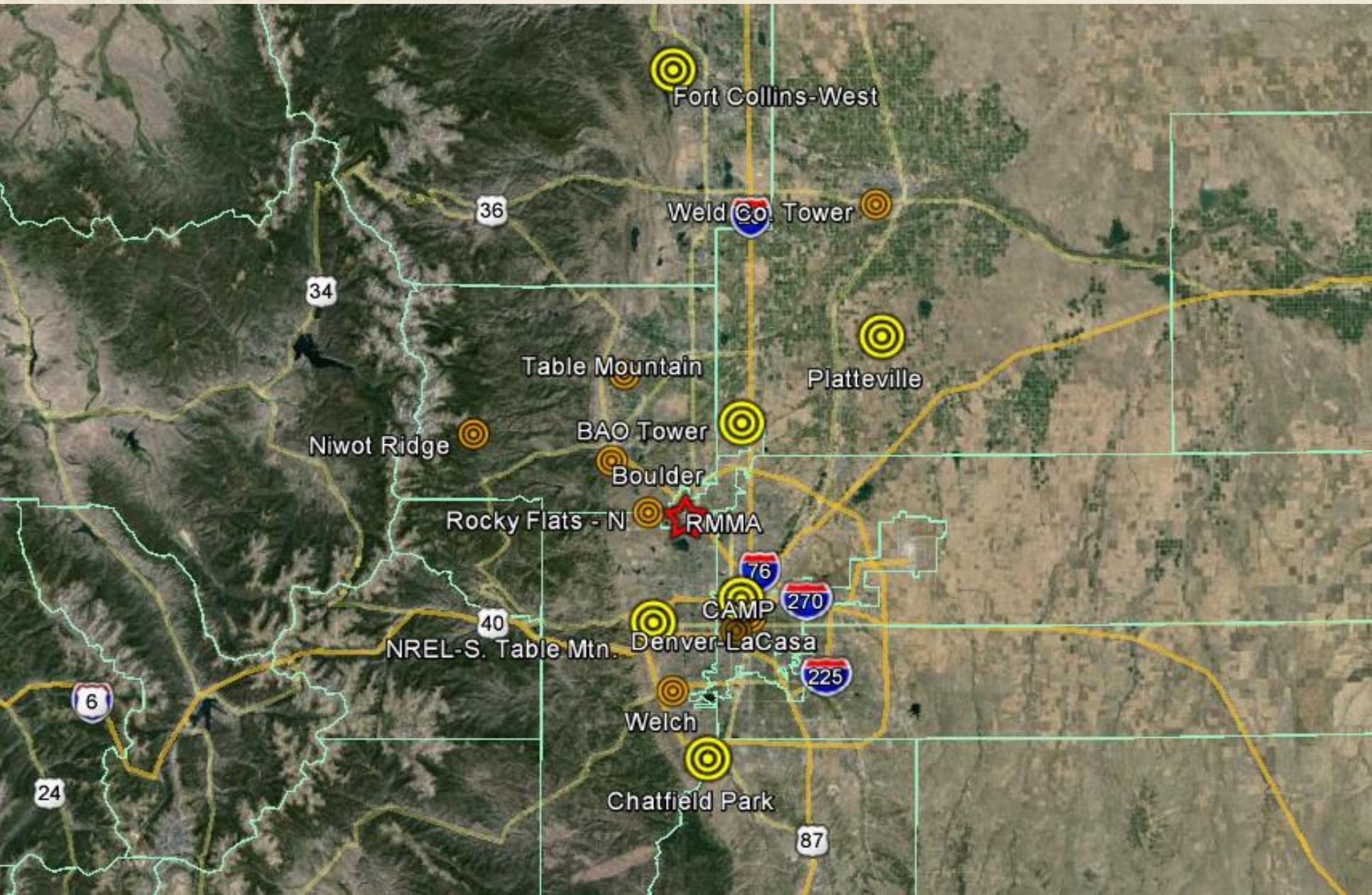
<https://www2.ucar.edu/for-staff/update/finding-funds-field-experiment>

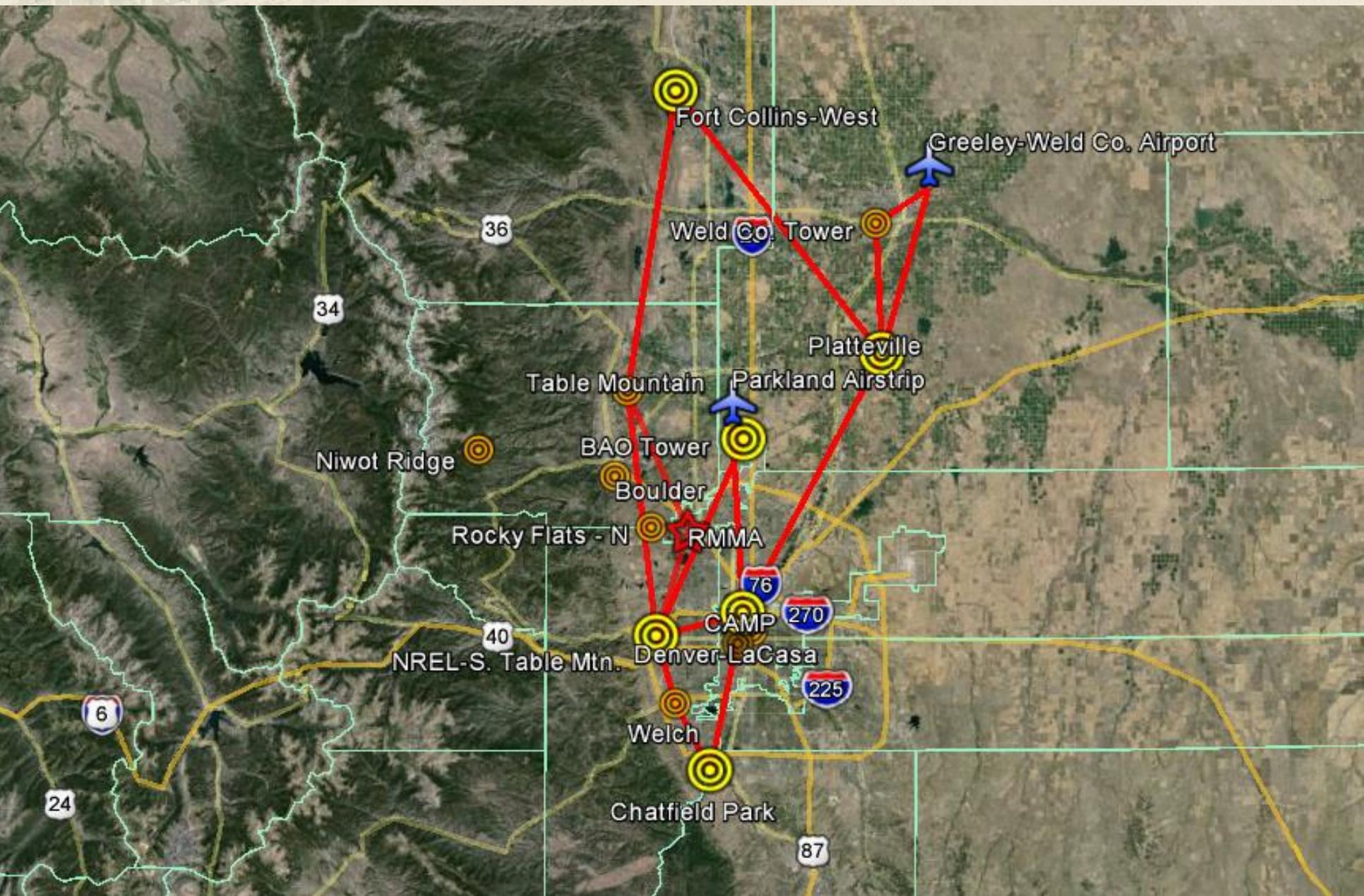


Gordon Pierce and Patrick Reddy (Colorado Department of Public Health and Environment) along with others from CDPHE bring a wealth of experience and historical knowledge to our effort. This was evident during the site visit and other interactions that I have had with them.

They played a big part in helping Frank and Gabi to make FRAPPÉ possible.



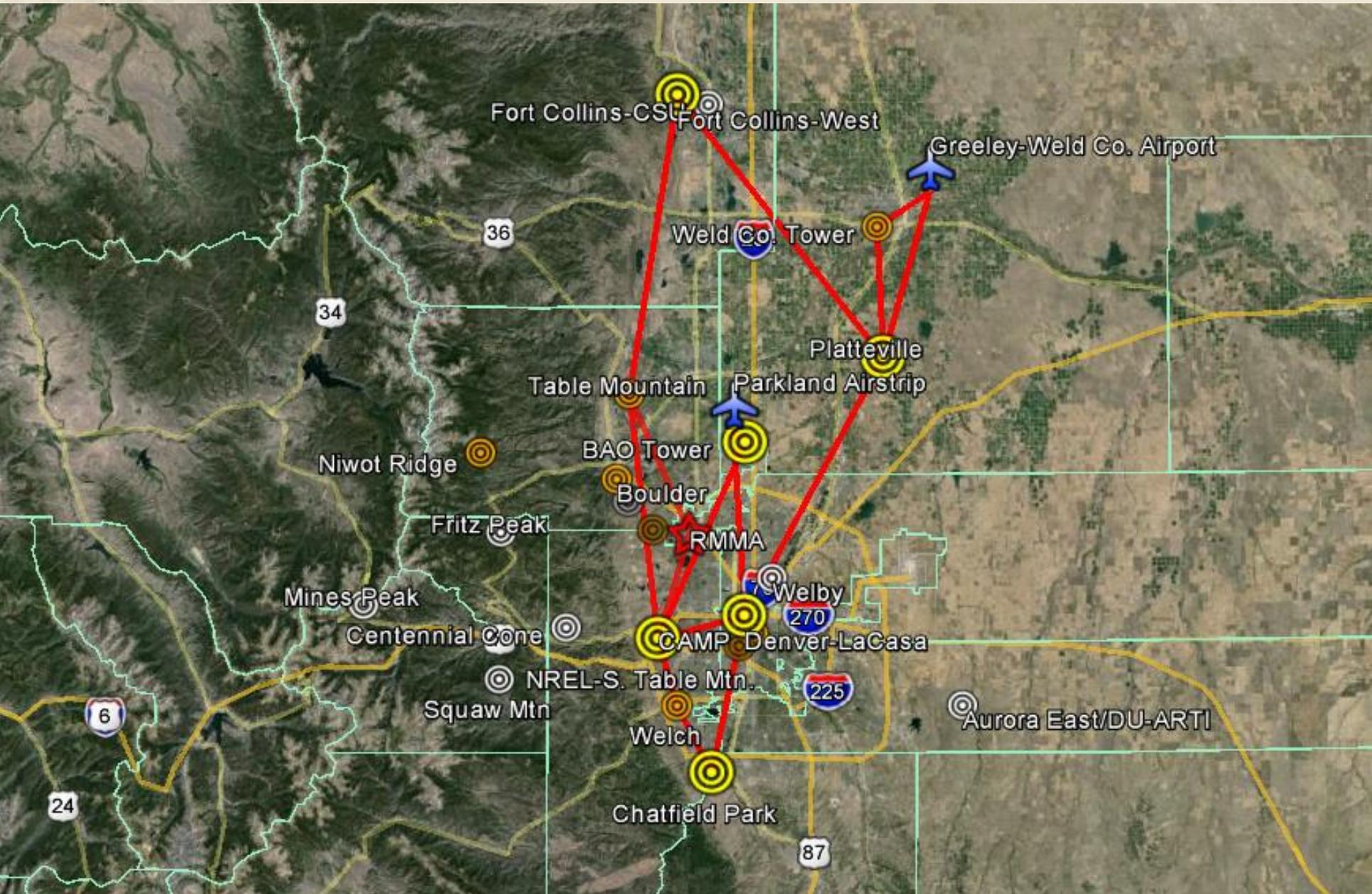




## Comments from P-3B Chief Pilot, Mike Singer:

I'm not sure how far into the mission it will be before we can spiral up to 17,500. It may be the 4th or 5th spiral. The following is a list of other potential small issues.

1. The low approach to Ft. Collins West may have to be limited to 500 feet. Since the airfield is closed, I really can't (legally) justify going down to 200 feet over what is not an active runway.
2. BAO tower is a very high tower (985 AGL). This will require good visibility to keep it in site and some lateral off-set.
3. Parkland Airstrip is a private field and a 200 foot low approach will definitely result in complaints from the owner. Any chance that someone out in Denver could make contact with the owner and get prior approval? They might find it cool and interesting just to be a part of the whole mission.
4. The one unknown is the arrival/departure corridors out away from the Denver airport. If a spiral site is in proximity to one of those, it could be problematic from time to time. I won't know that until I send the plan to ATC.



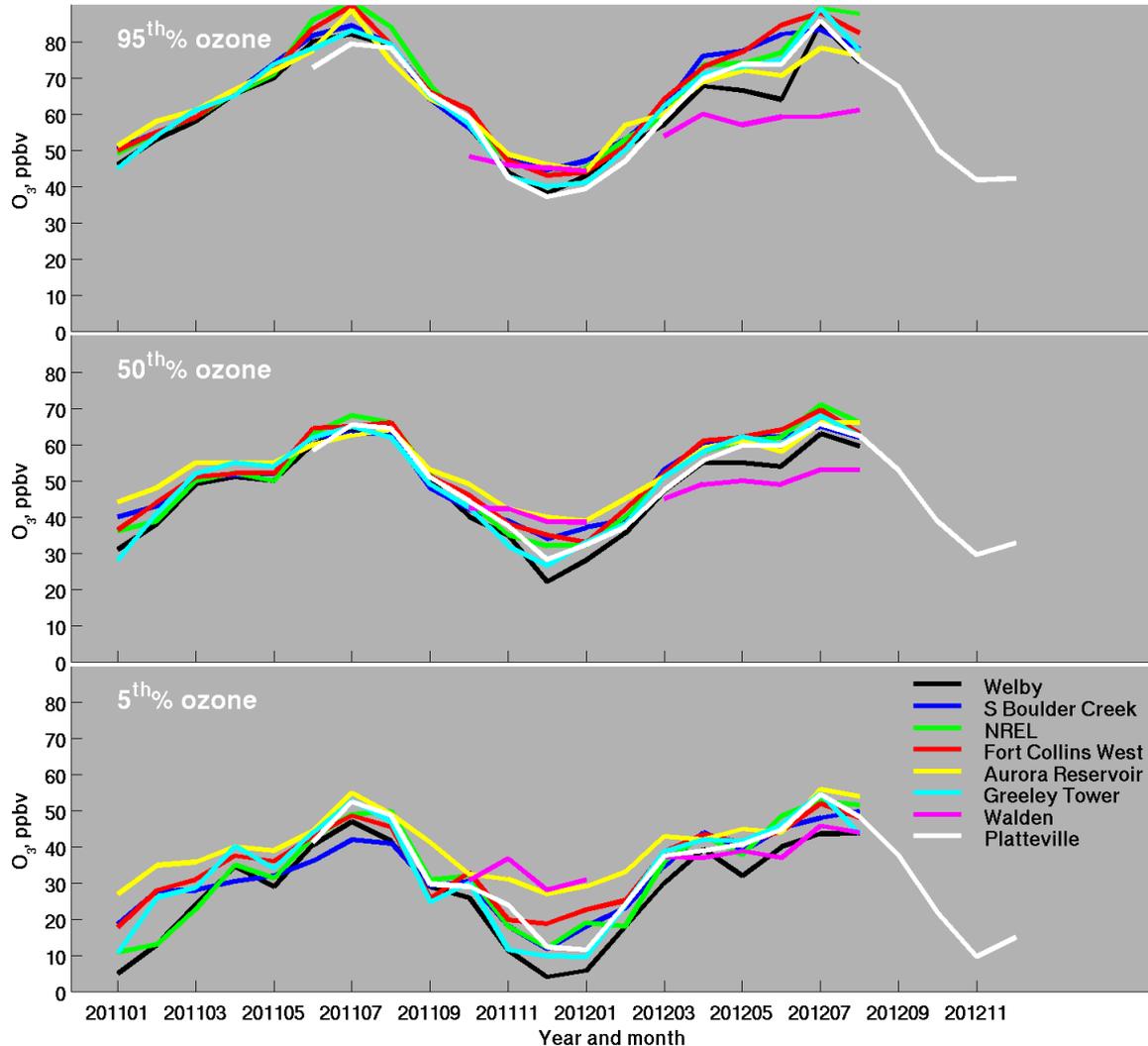
## An Interesting Suggestion from Owen Cooper



I would like to suggest an excellent upwind site that would give very valuable information on what air in the Front Range might be like if there were no humans.

West of Fort Collins is North Park, a large inter-mountain basin (30 km in diameter) with nothing but the very small town of Walden, cattle, moose, a wildlife refuge and beautiful scenery. Its elevation is about 800 m above Denver but much lower than the surrounding mountains (see attached map, with the town of Walden indicated by the red marker). During the day it has deep mixed layers and the middle of the basin is far enough from the mountains that you don't have complicating up-slope flow. I think that the air in North Park is a good indicator of what air would be like in the Front Range if there were no humans.

Monthly ozone (11:00 - 16:59 MST) values at Northern Colorado Front Range monitoring sites



The National Park Service began measuring ozone at the wildlife refuge in 2012 and should continue to measure there through 2014

It's clear at the 95th percentile that the air in the Front Range is more polluted than at Walden during summer, but only by about 20 ppbv. Despite there being nothing in North Park, the daytime 95th ozone percentile for July and August is 60 ppbv.

If you can get 3 or 4 profiles per week above Walden (by either aircraft) you could produce a composite profile of baseline air flowing into the Front Range.



# Preliminary Results from the DISCOVER-AQ Schools Sensors Project

**Russell Long, Jim Szykman, Rachelle Duvall, Melinda Beaver, Eric Hall**  
**U.S. EPA/Office of Research and Development**

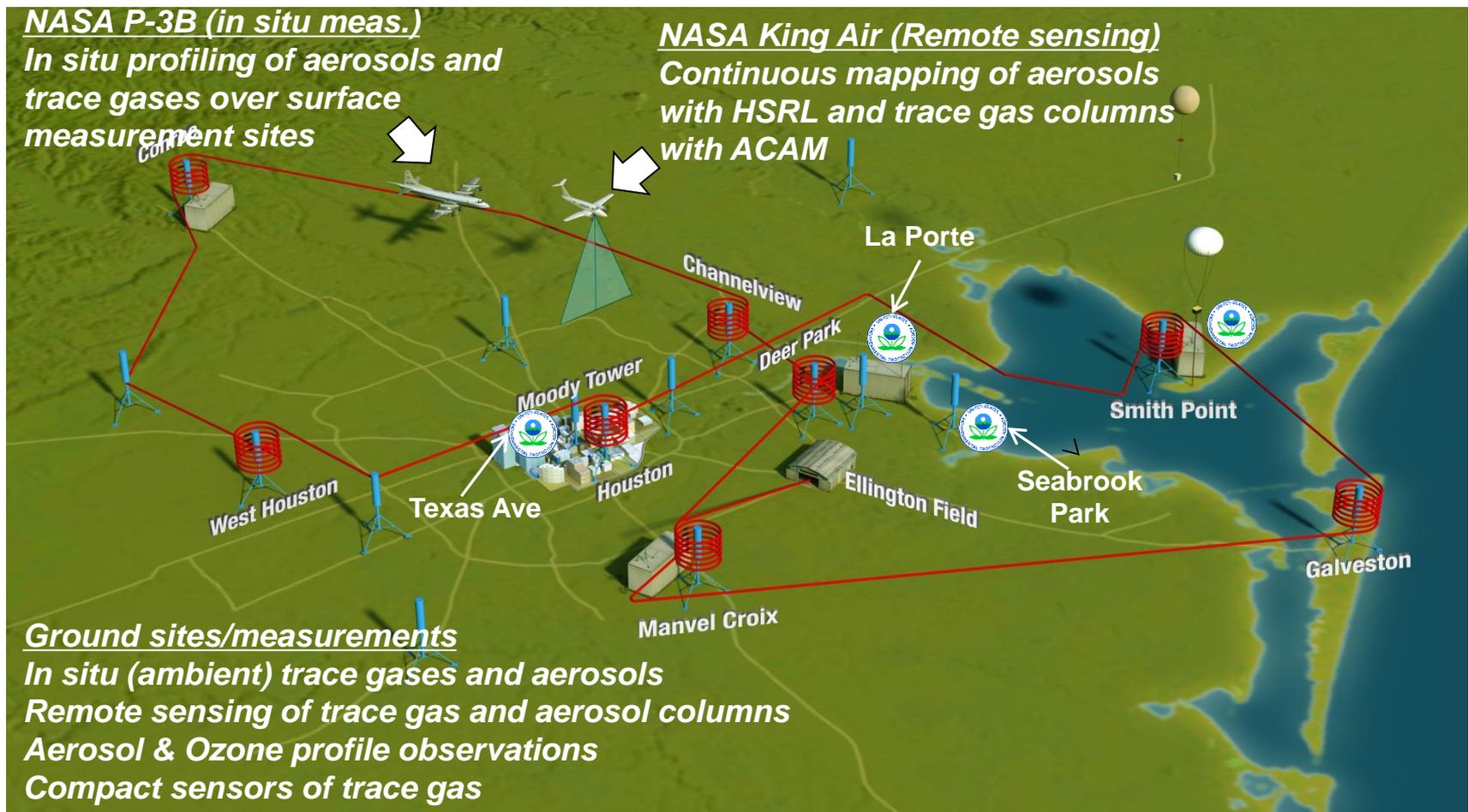
**James Crawford**  
**NASA**

# Overview of Houston Observation Strategy

September 2013



Ground based measurements were located at several sites along the aircrafts flight path. A combined EPA-NASA/Univ. Cambridge small sensor network was deployed at local schools.



# La Porte, TX EPA Ground Site



Rack mounted O<sub>3</sub> and NO<sub>2</sub> Instrumentation



Gas sample inlet, sensor shelter, and met station at La Porte, TX



La Porte TX ground site with EPA trailer, NOAA ozone LIDAR, and NASA mobile lab



United States  
Environmental Protection  
Agency

# Features of EPA Deployed Sensor-Cairclip

- ✓ Sensor evaluated in laboratory prior to ambient deployment in DISCOVER-AQ campaign
- ✓ Detection range for O<sub>3</sub> and NO<sub>2</sub>: 0 to 250 ppb
- ✓ Weight: 55 grams (about 0.12 pounds)
- ✓ Dimensions: 32 mm (1.26 inches) wide, 62 mm (2.44 inches) long
- ✓ Battery life: ≥24 hours
- ✓ Recharging battery: 4-6 hours to completely charge
- ✓ Battery charged with either a USB cable or AC adapter
- ✓ Can store 28,800 data points
  - 20 days of 1 minute average data
- ✓ Cairsoft user software to retrieve measurement data

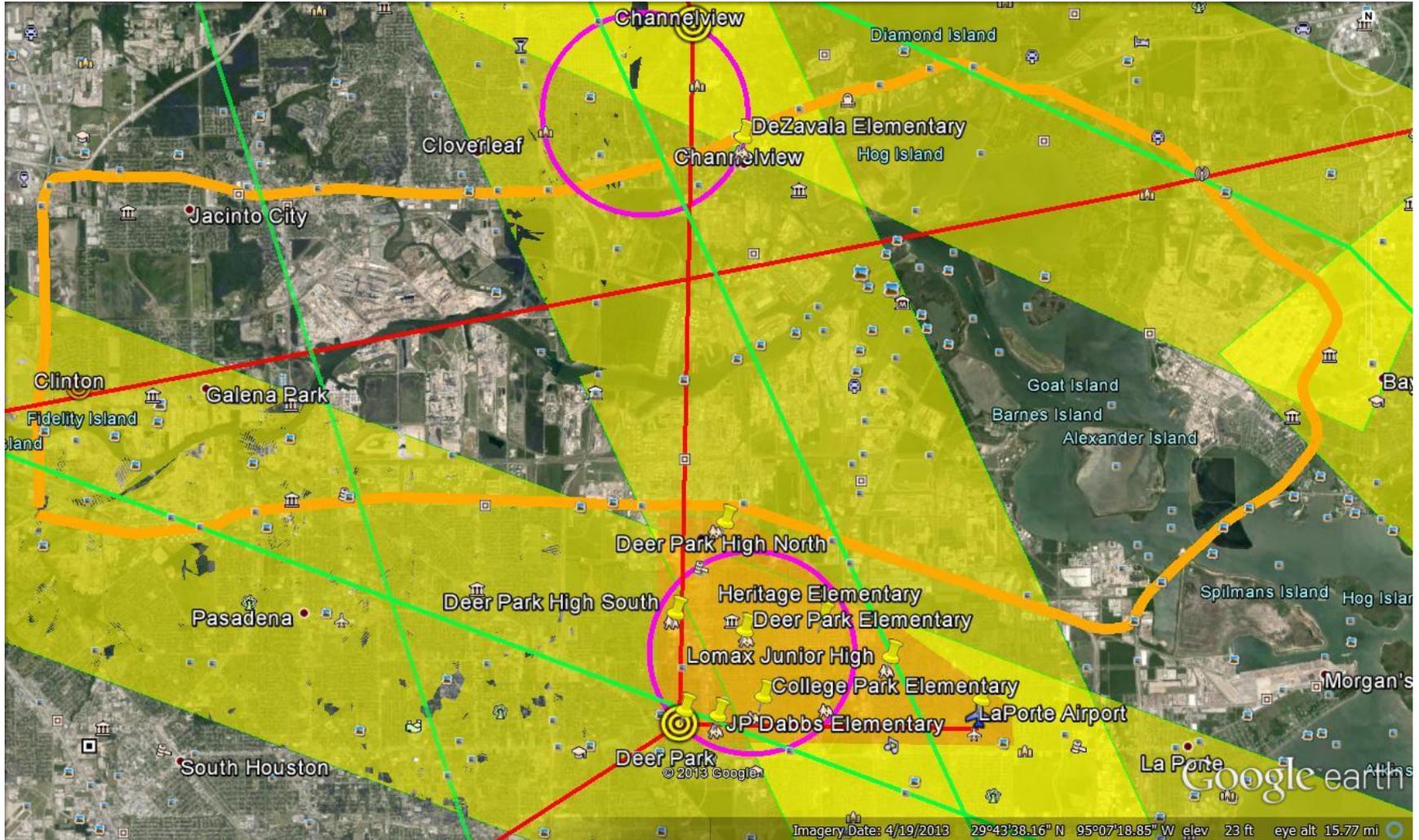




United States  
Environmental Protection  
Agency

# EPA-NASA Sensor Network

Schools and ground sites located within flight path of aircraft





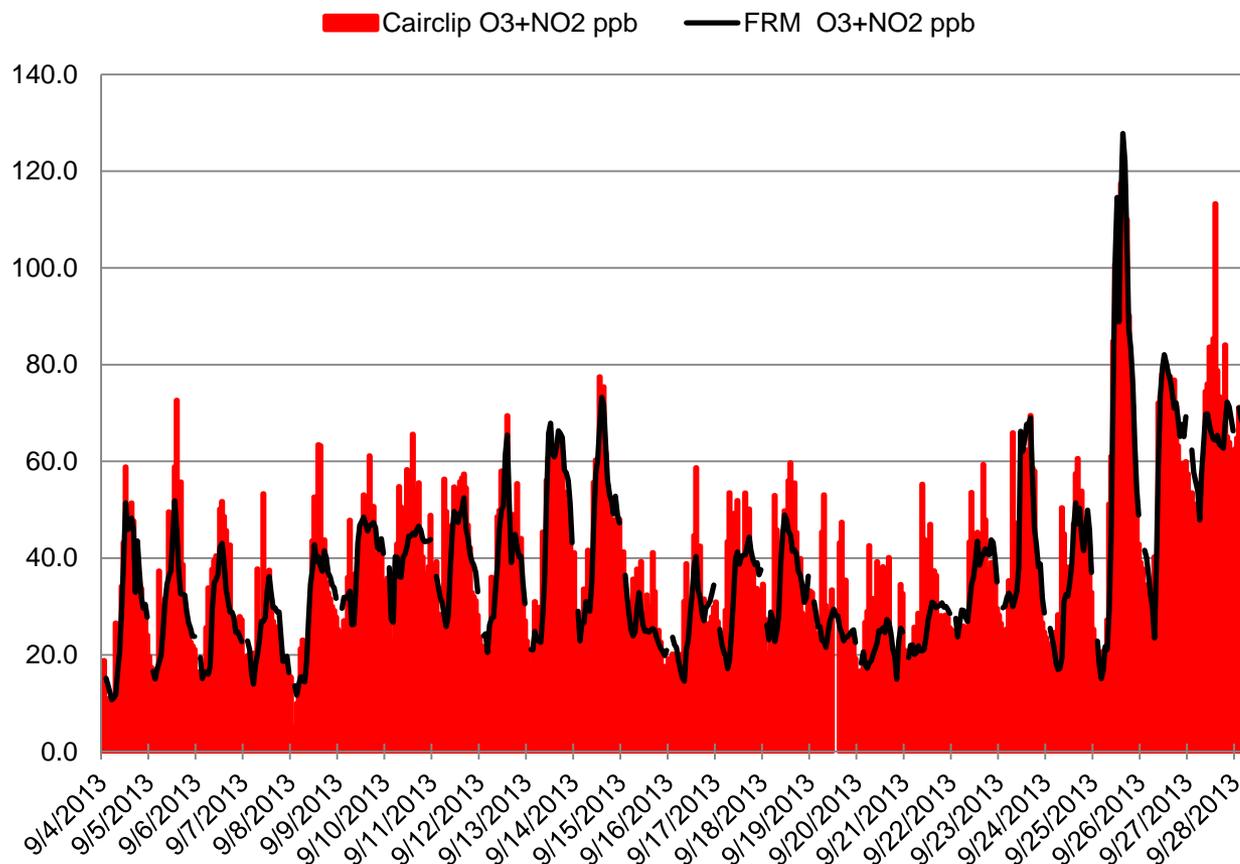
- Sensor network installed on August 19-20, 2013 at 8 schools
- Elementary, junior high, and high school science teachers trained on operation of sensors
- Scientist visits conducted at many of the participating schools
- Teachers and Students collected data with their sensor devices and incorporated sensor measurements into their lesson plans

School	Sensor type	Status of Data Analysis
Lomax Junior High	AQMesh, O <sub>3</sub> +NO <sub>2</sub> Cairclip, NO <sub>2</sub> Cairclip	Preliminary analysis complete
College Park Elementary	AQMesh, O <sub>3</sub> +NO <sub>2</sub> Cairclip	Preliminary analysis complete
Heritage Elementary	AQMesh, O <sub>3</sub> +NO <sub>2</sub> Cairclip, NO <sub>2</sub> Cairclip	Preliminary analysis complete
Deer Park High South	AQMesh, O <sub>3</sub> +NO <sub>2</sub> Cairclip, NO <sub>2</sub> Cairclip	Preliminary analysis complete
Deer Park High North	AQMesh, O <sub>3</sub> +NO <sub>2</sub> Cairclip, NO <sub>2</sub> Cairclip	Data under preliminary analysis
Deer Park Elementary	AQMesh	Data under preliminary analysis
JP Dabbs Elementary	AQMesh, NO <sub>2</sub> Cairclip	Data under preliminary analysis
DeZavela Elementary	AQMesh, O <sub>3</sub> +NO <sub>2</sub> Cairclip	Data under preliminary analysis

# La Porte Airport-La Porte, TX

## September 4-28

### 1 Hr Average

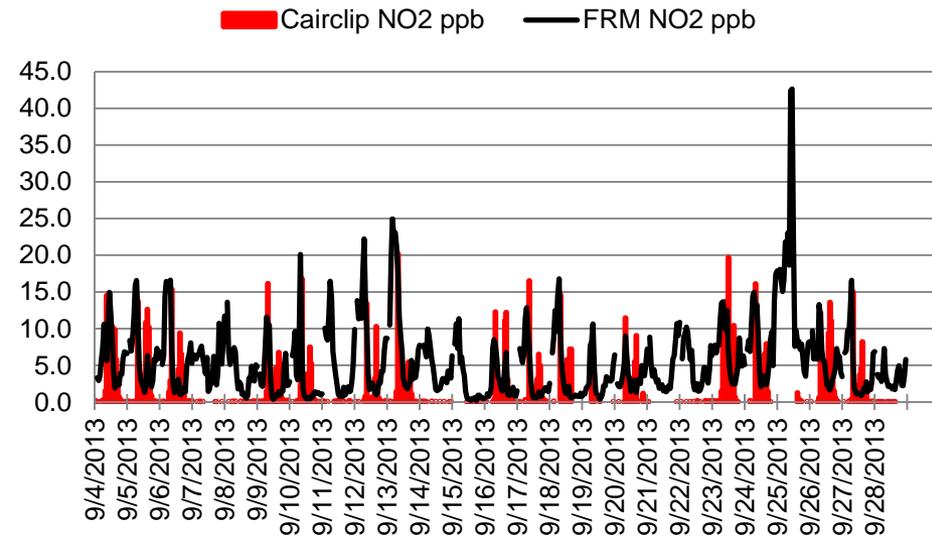
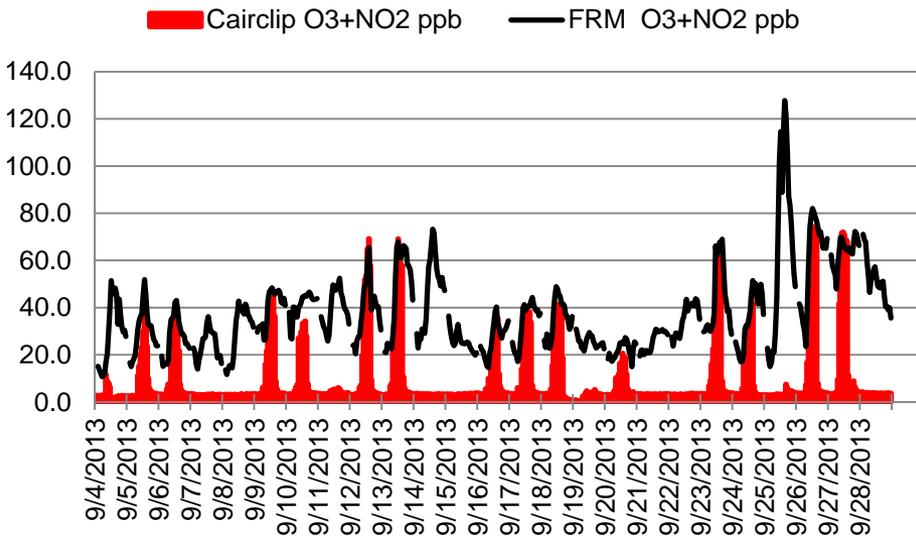


7 Low cost sensors performed extremely well as compared to reference instrumentation during Houston DISCOVER-AQ field campaign

# Lomax Junior High-La Porte, TX

## September 4-28

### 1 Hr Average

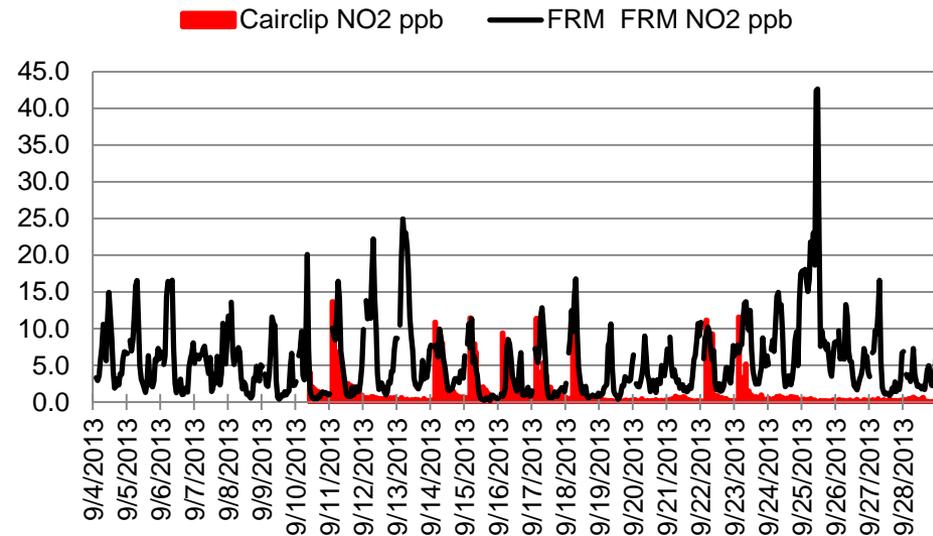
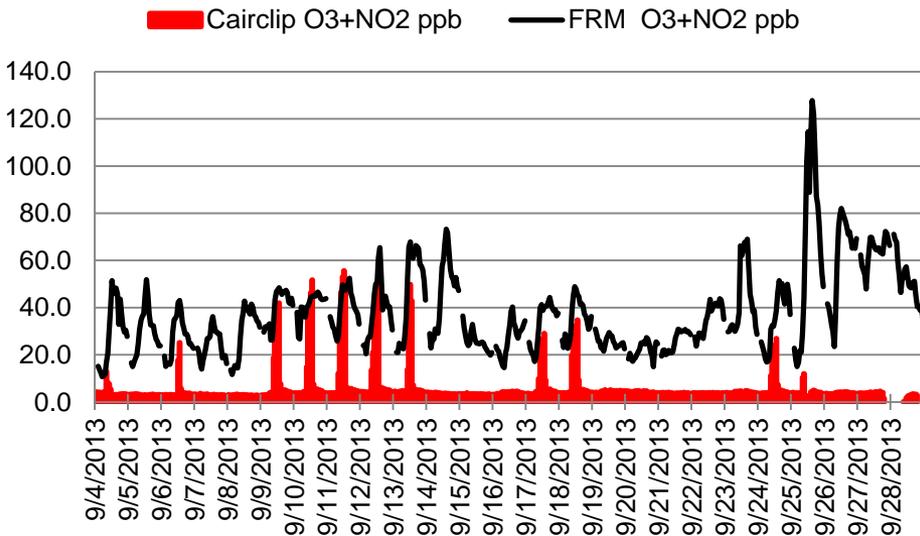


Low cost sensors performed extremely well at Lomax Junior High School. FRM O<sub>3</sub>+NO<sub>2</sub> and NO<sub>2</sub> data collected at the La Porte Airport (~1 mile away from LJH).

# Heritage Elementary-La Porte, TX

## September 4-28

### 1 Hr Average

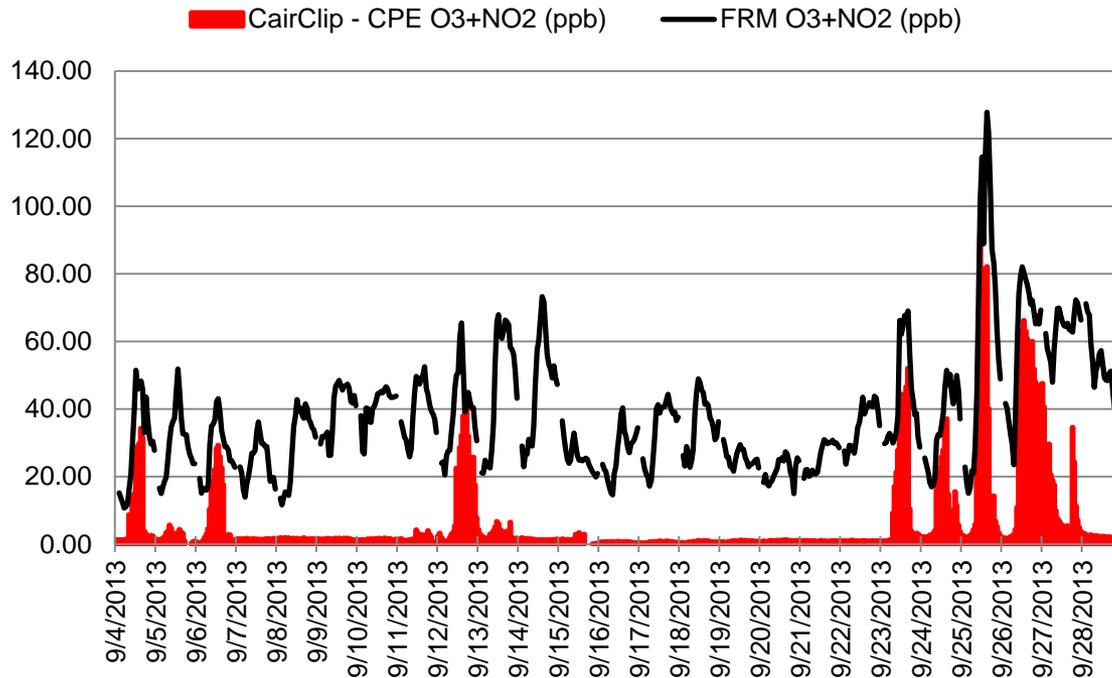


Low cost sensors performed extremely well at Heritage Elementary School. FRM O<sub>3</sub>+NO<sub>2</sub> and NO<sub>2</sub> data collected at the La Porte Airport (~2 mile away from HES).

# College Park Elementary-La Porte, TX

## September 4-28

### 1 Hr Average

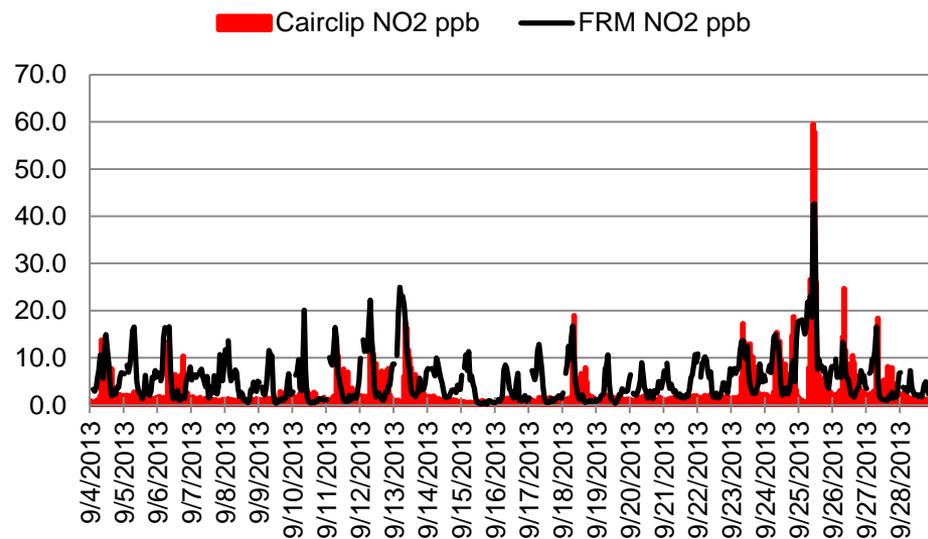
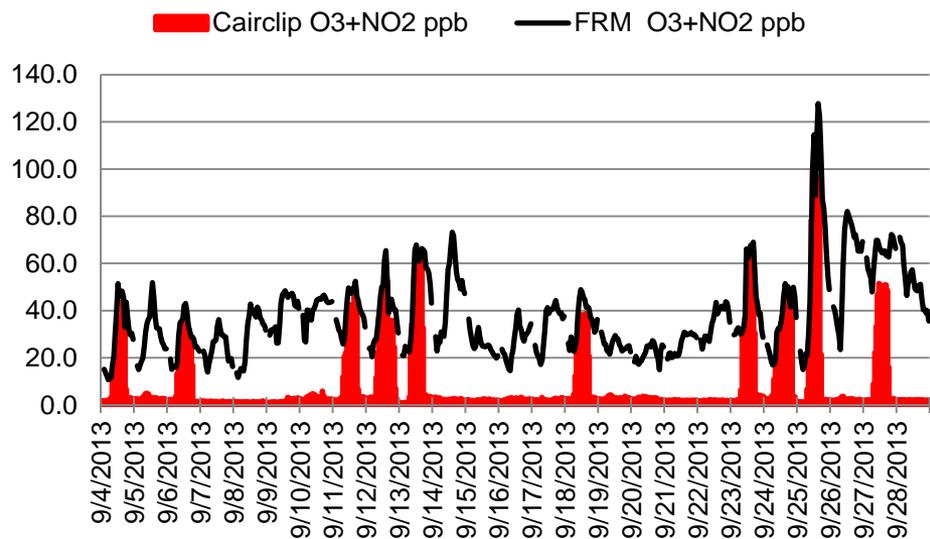


Low cost sensors performed extremely well at College Park Elementary School. FRM O<sub>3</sub>+NO<sub>2</sub> data collected at the La Porte Airport (~3 mile away from CPE).

# Deer Park High South- Deer Park, TX

## September 4-28

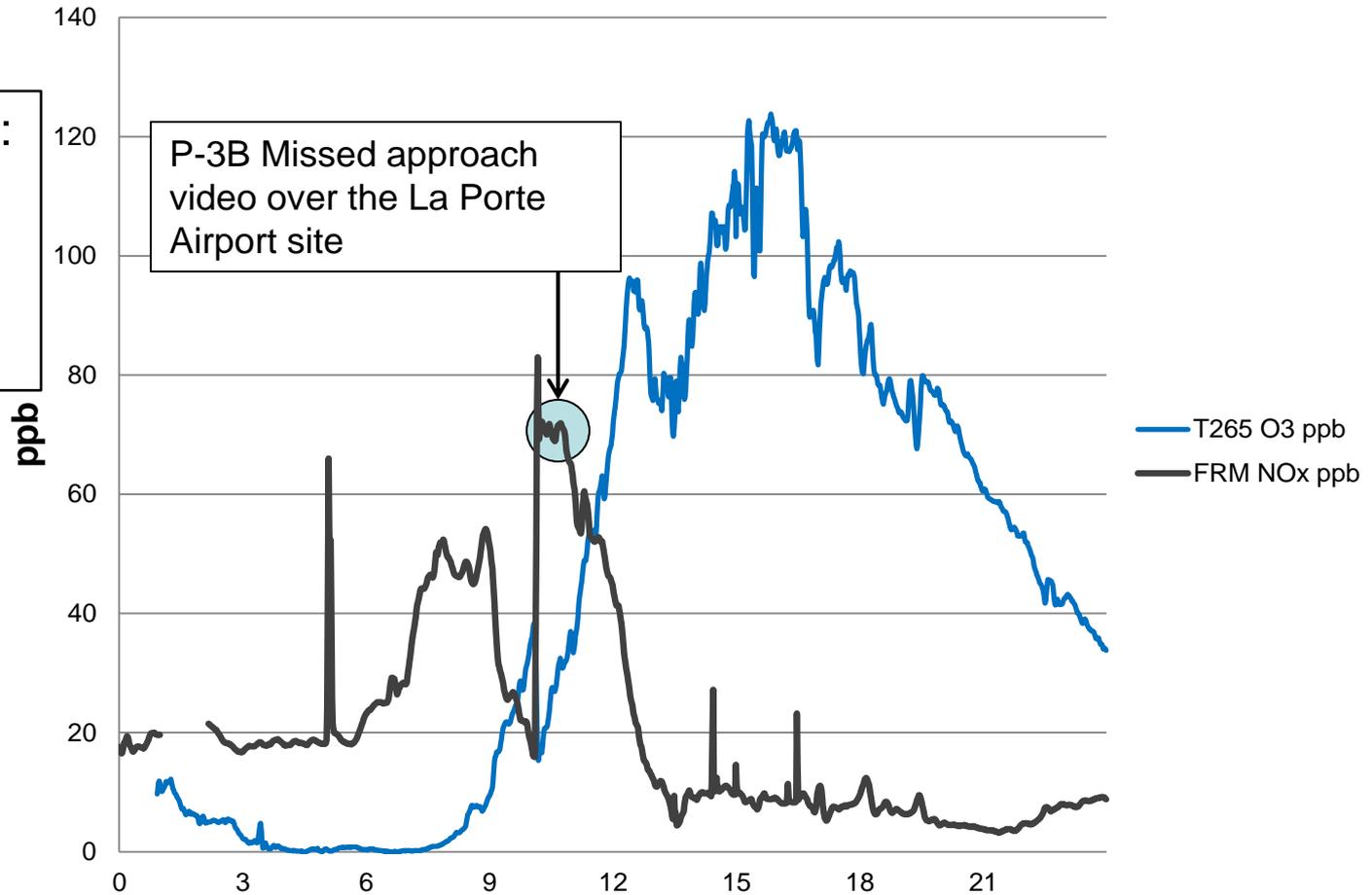
### 1 Hr Average



Low cost sensors performed extremely well at Deer Park High School South. FRM O<sub>3</sub>+NO<sub>2</sub> and NO<sub>2</sub> data collected at the La Porte Airport (~4.5 mile away from DPS).

## La Porte, TX September 25, 2013 1 min Average

September 25, 2013:  
A perfect pollution  
day from an  
NO<sub>x</sub>/ozone  
perspective



- Measurements made at the La Porte Airport site provides valuable state of the science tools to help EPA and partners understand the dynamic relationship/chemistry between ozone and oxides of nitrogen (NO<sub>x</sub>)
- This research also provides tools for evaluation and assessment of new technologies (such as sensors) for the determination of gas phase pollutants like ozone and NO<sub>2</sub>



- **Results from the DISCOVER-AQ Schools Sensor project are very promising**
- **This unique and rewarding research opportunity has allowed EPA and NASA to integrate on-going efforts with new research areas (including working with citizen scientists and sensor based measurements of air pollution)**
- **As a result of the success of the Houston project, sensors are expected to play a large role during the upcoming Denver DISCOVER-AQ deployment in the summer of 2014**