



***DISCOVER-AQ Colorado Measurements
FRAPPÉ Science Team Meeting
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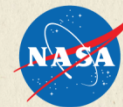
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Webpage: <http://discover-aq.larc.nasa.gov/>



Ground Measurements Monitoring Sites

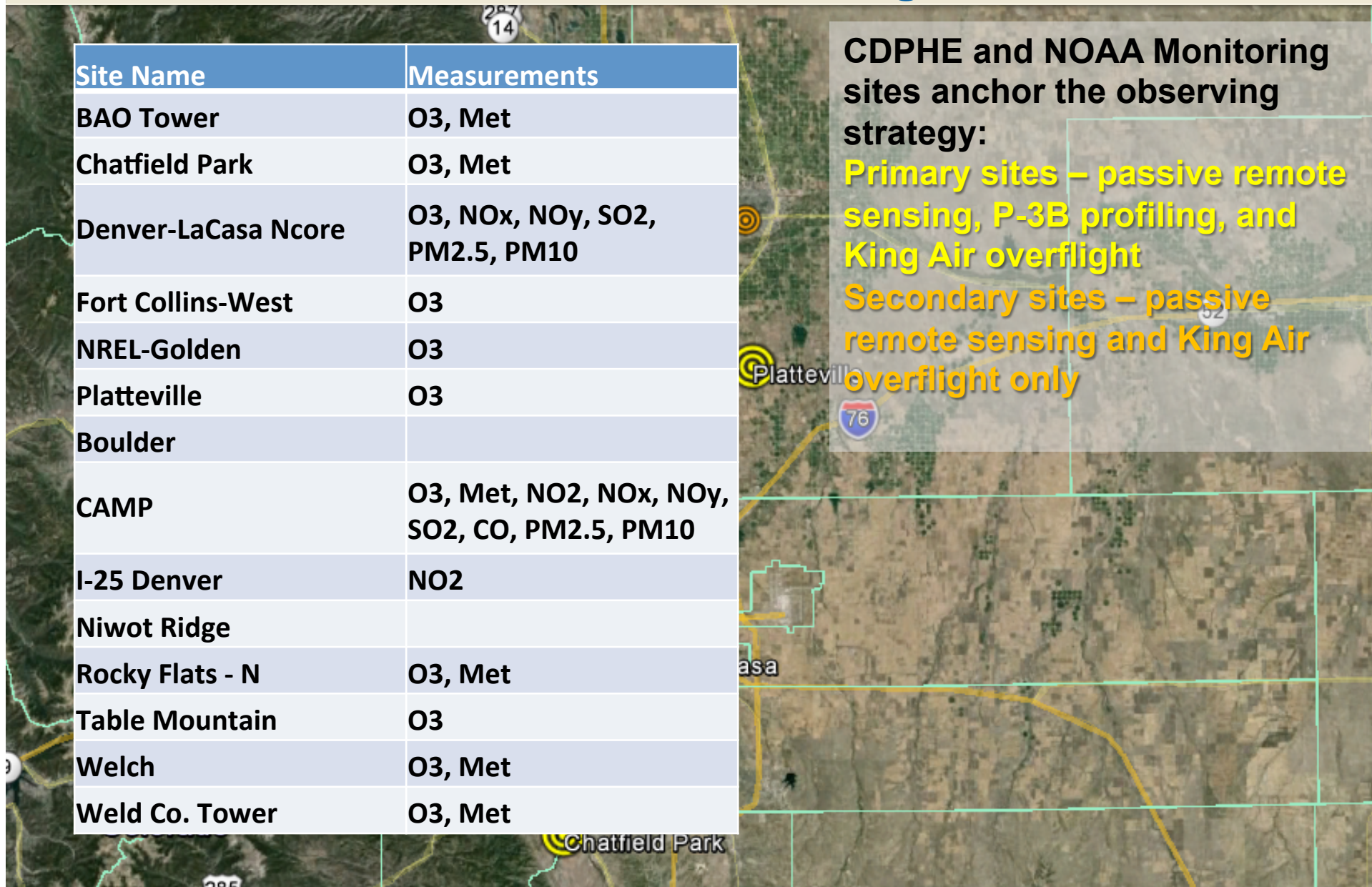


Site Name	Measurements
BAO Tower	O3, Met
Chatfield Park	O3, Met
Denver-LaCasa Ncore	O3, NOx, NOy, SO2, PM2.5, PM10
Fort Collins-West	O3
NREL-Golden	O3
Platteville	O3
Boulder	
CAMP	O3, Met, NO2, NOx, NOy, SO2, CO, PM2.5, PM10
I-25 Denver	NO2
Niwot Ridge	
Rocky Flats - N	O3, Met
Table Mountain	O3
Welch	O3, Met
Weld Co. Tower	O3, Met

CDPHE and NOAA Monitoring sites anchor the observing strategy:

Primary sites – passive remote sensing, P-3B profiling, and King Air overflight

Secondary sites – passive remote sensing and King Air overflight only





Ground Measurements Passive Remote Sensors

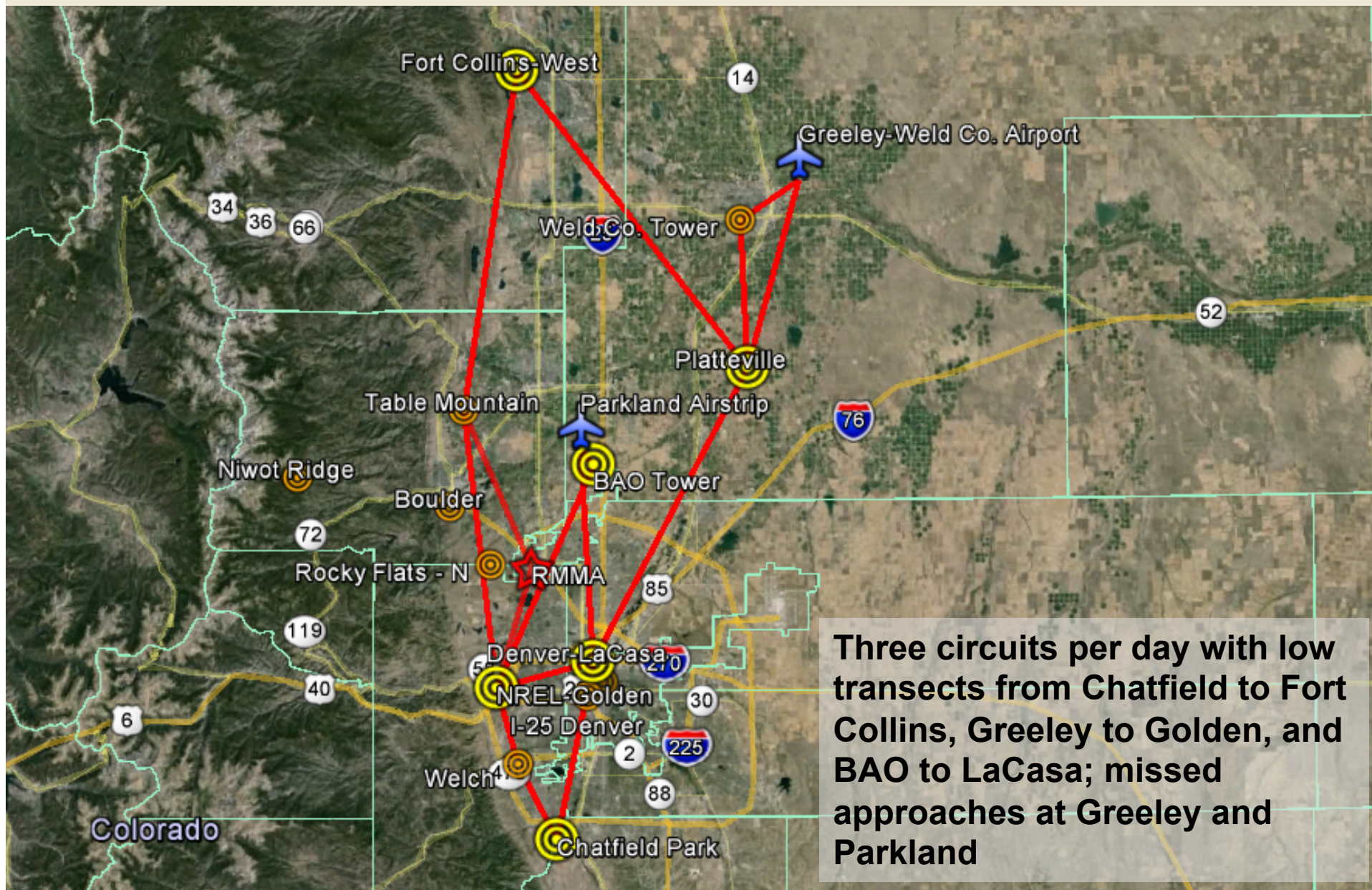


Investigator	Instrument	Parameter/Species
Brent Holben, NASA GSFC	Aeronet	Aerosol Optical Depth and retrieved properties
Jay Herman, NASA GSFC	Pandora	Trace gas columns of O ₃ , NO ₂ , and CH ₂ O





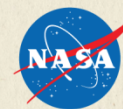
P-3B In Situ Measurements



Three circuits per day with low transects from Chatfield to Fort Collins, Greeley to Golden, and BAO to LaCasa; missed approaches at Greeley and Parkland



P-3B In Situ Measurements



Investigator	Instrument/Technique	Parameter/Species
Bruce Anderson, NASA LaRC LARGE Aerosol Instrument Suite	CNC, APS, SMPS, UHSAS, and CAS	Number, size, volatility
	Nephelometers (dry and humidified) and PSAP	Scattering, absorption, extinction, $f(RH)$
	PILS and SP2	Soluble ions, WSOC, BC
Andrew Weinheimer, NCAR	Chemiluminescence	O_3 , NO_2 , NO , NO_y
Ronald Cohen, UC Berkeley	TD-LIF	NO_2 , ANs, PNs, HNO_3
Alan Fried, NCAR	DFGAS	CH_2O
Glenn Diskin, NASA LaRC	DACOM	H_2O , CO , CH_4
Melissa Yang, NASA LaRC	AVOCET (Licor) and Picarro	CO_2 and CH_4
Armin Wisthaler, Innsbruck	PTR-ToF-MS	NMHCs
John Barrick, NASA LaRC	Filter radiometer	jNO_2
Tara Yacovitch, Aerodyne	Fast Ethane Spectrometer	C_2H_6
Gatebe, NASA GSFC	CAR	BRDF
Martins, UMBC	OI Neph	Ambient Scattering



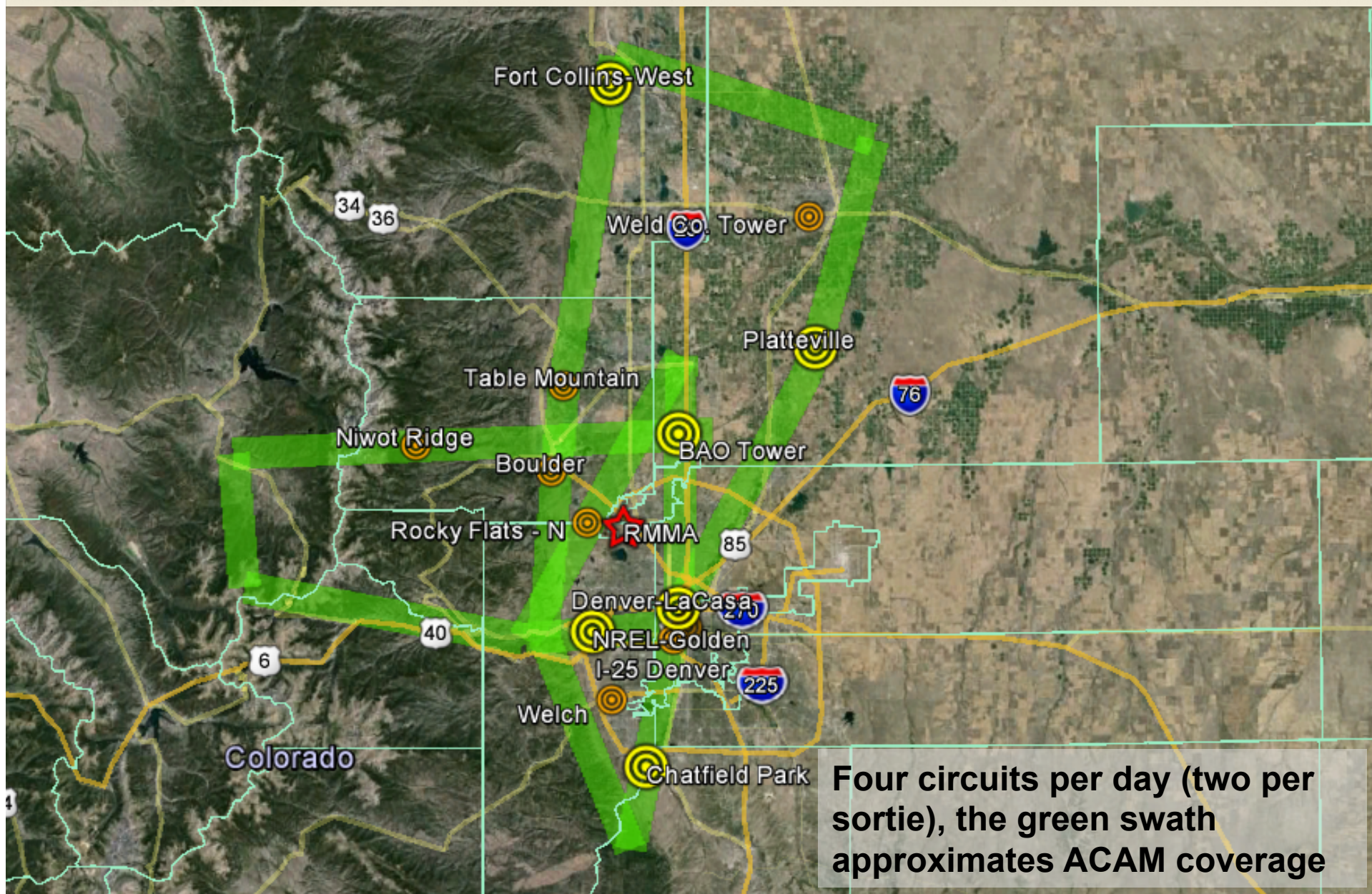
P-3B in action



Michael Charnick 2013



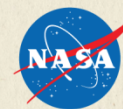
King Air Remote Sensors



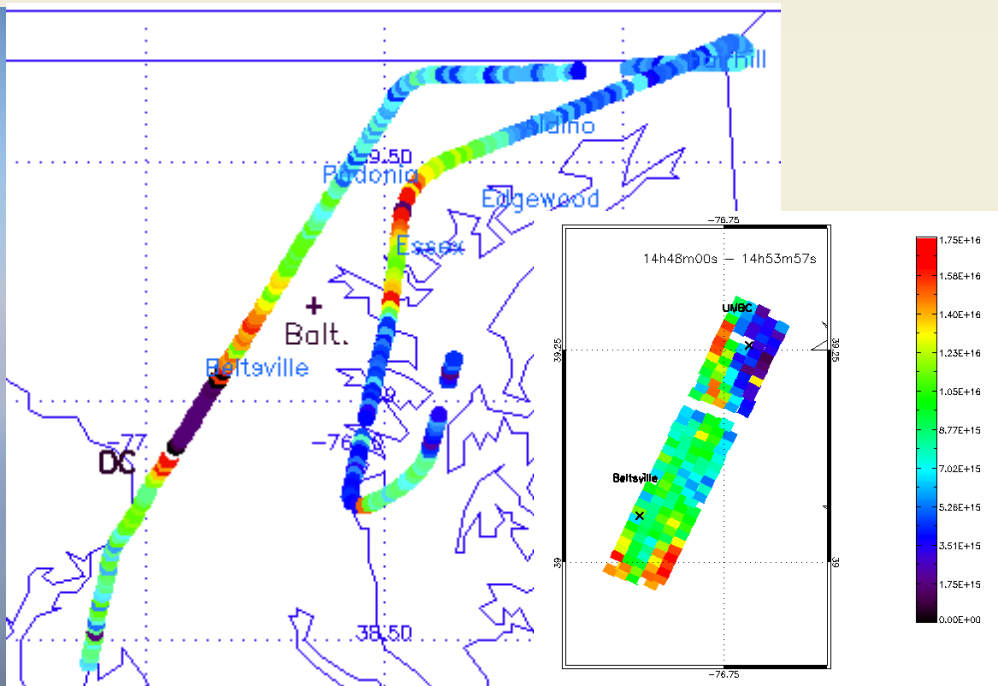
Four circuits per day (two per sortie), the green swath approximates ACAM coverage



King Air Remote Sensors

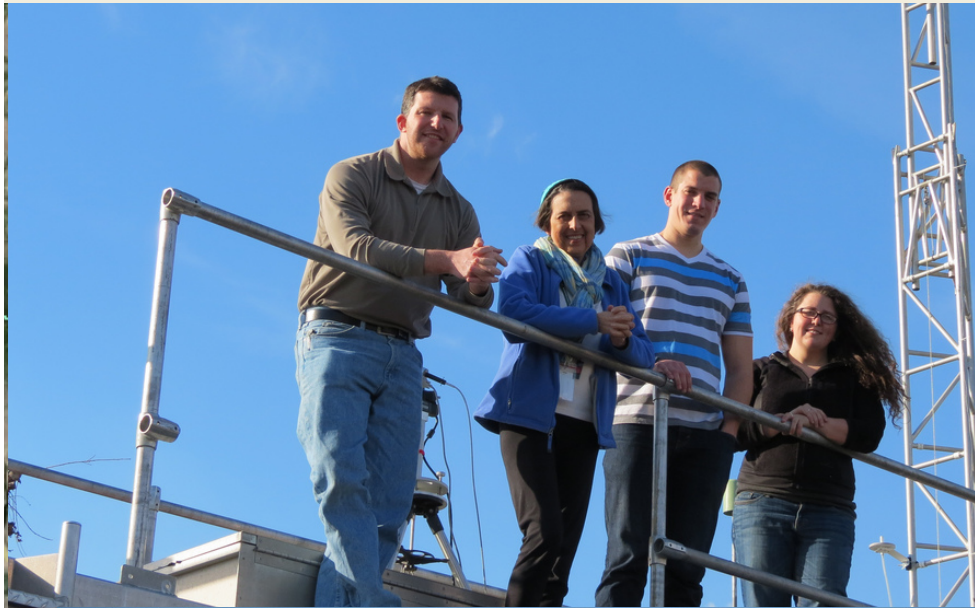
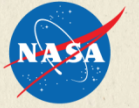


Investigator	Instrument	Parameter/Species
Chris Hostetler and Rich Ferrare, NASA LaRC	HSRL-2	Lidar measurements of aerosol backscatter, extinction, and depolarization as well as retrieved aerosol properties: effective radius, number, and volume; SSA, angstrom exponent
Scott Janz, NASA GSFC	ACAM/GCAS	Trace gas columns of O ₃ , NO ₂ , and CH ₂ O



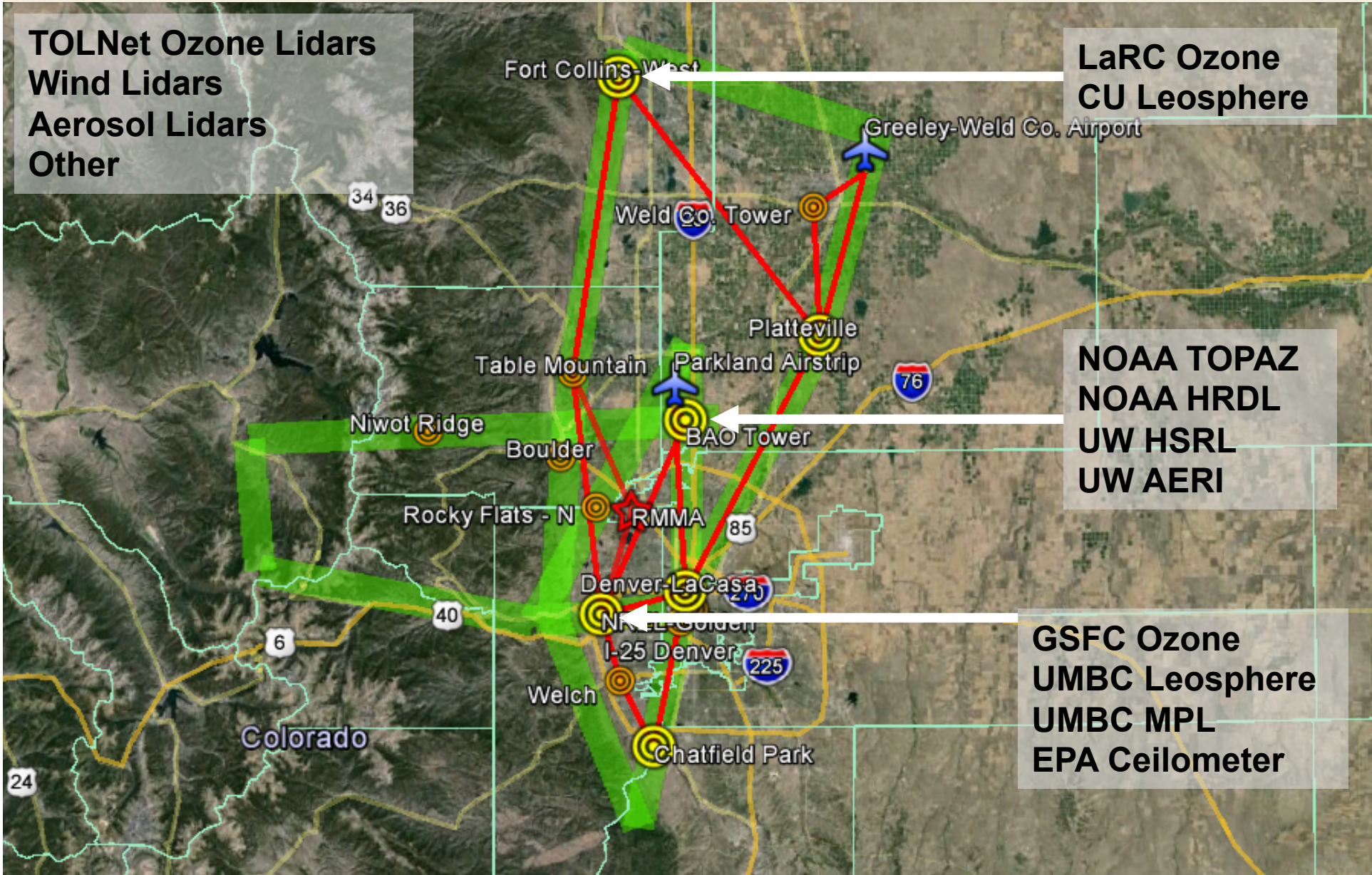


Ground Measurements In Situ and Balloons



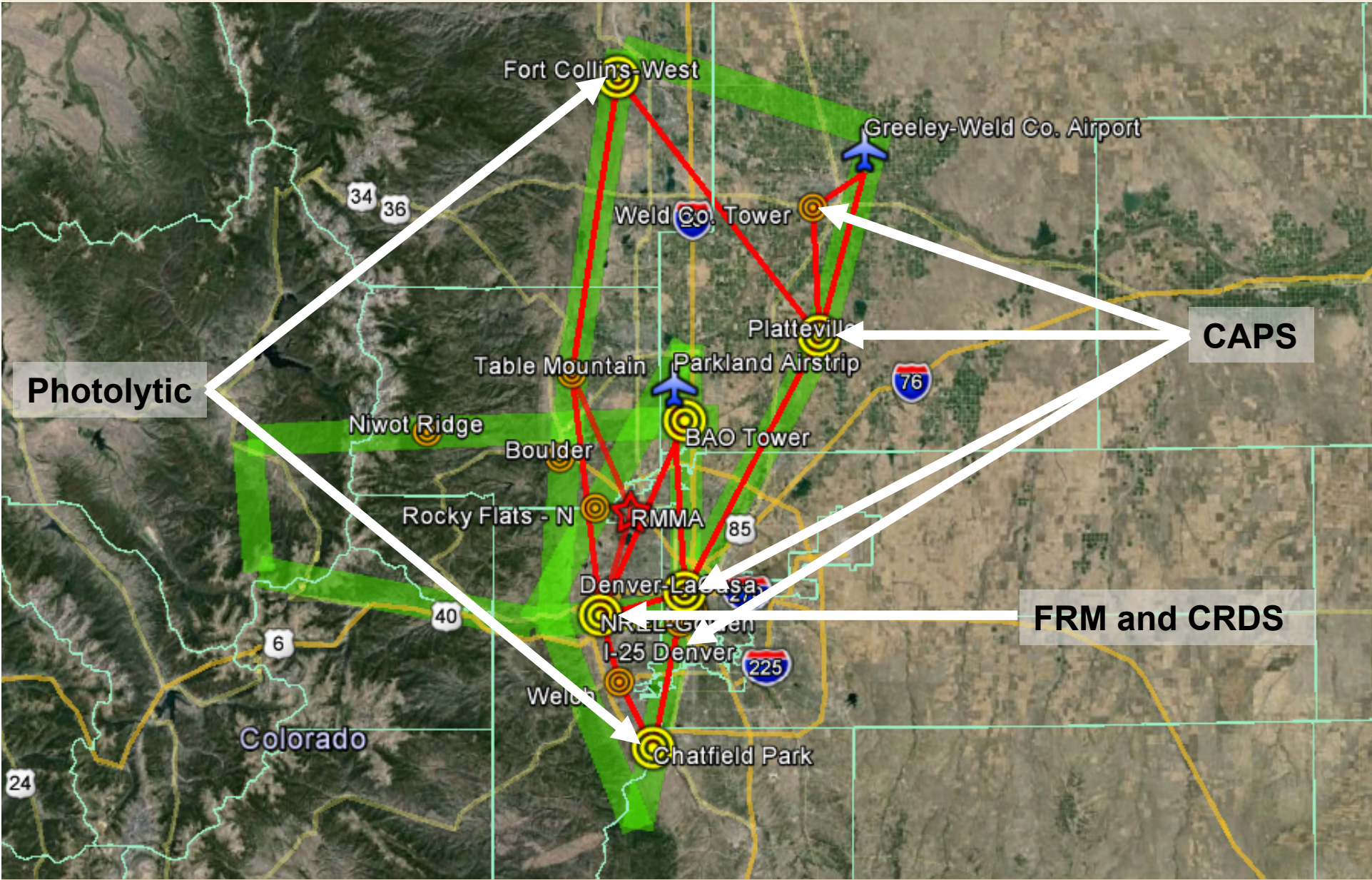


Ground Measurements Active Remote Sensors





Ground Measurements EPA NO2 (7 sites)





Ground Measurements Small Sensors



Instrument	Species/Parameter	Locations
AQMesh	O3, NO2, NO, SO2, CO, T, RH	BAO Tower and Golden Area
Cairclip	O3+NO2 and NO2	Spiral sites and citizen science
Aeroqual	O3 and NO2, T, RH	Spiral sites and citizen science



**Main contacts: Russell Long (EPA)
Iq Mead (Cambridge U.)**



Information and Data Management



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Discover-AQ Mission News

02.06.13: Final Calif. 2013 Flights on Feb. 6
DISCOVER-AQ will fly over the Central Valley of California on Wednesday, Feb. 6. This will be the tenth and final flight for the California 2013 leg of the DISCOVER-AQ mission.

02.05.13: No Flights Scheduled for Feb. 5
The DISCOVER-AQ team will not fly on Tuesday, Feb. 5, 2013.

02.03.13: Flights Set for Feb. 4
The DISCOVER-AQ team will conduct flights over the Central Valley of California on Monday, Feb. 4, 2013.

[Go To Archive](#)

Mission Highlights

1 2 3 4 5 6 7 8

Packing for California 2013 Campaign
The Langley Aerosol Research Group (LARGE) is all packed up and ready to go. Their instruments are being integrated onto the P3-B for flights beginning in January 2013 in Central California's San Joaquin Valley.

Our Mission

Langley Research Center

[Download this video or view other multimedia](#)

DISCOVER-AQ is a four-year campaign to improve the use of satellites to monitor air quality for public health and environmental benefit.

Through targeted airborne and ground-based observations, DISCOVER-AQ will enable more effective use of current and future satellites to diagnose ground level conditions influencing air quality.

<https://discover-aq.larc.nasa.gov/>

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DISCOVER-AQ

Deriving Information on Surface Conditions from CO_lumn and VERTically Resolved Observations Relevant to Air Quality

Baltimore-Washington, D.C. 2011
California 2013
Texas 2013
TBD 2014

[Data Archive: DISCOVER-AQ](#)

[Interactive Flight Tracks & Time / Profile Data Plotter](#) **UPDATED!**

[P3-B Profile Summaries - Percentiles Plots](#) **UPDATED!**

[P3-B Merged Data: Extract / Download one or more variables](#) **UPDATED!**

[P3-B Aircraft Forward / Nadir Videos](#)

[Reports: Outlook / Flight / Status / QuickLook](#)

[Flight Profile Summary](#)

[Flight / Profile Times: P3-B / B200](#)

[Satellite Overpass Tracks](#)

[Data Access & Other Data Sources](#)

[ICARTT Data Format Document](#)

[Data Management Plan](#)

[Related Links & News](#)

Recent Activities

- DISCOVER-AQ Team Meetings / Presentations / Telecons **UPDATED!**
- California Site Survey Report (16-19 July 2012)

Flight Tracks: NASA P3B, B200

P3-B » [Click here to download *.KMZ file \(ALL Flights\)*](#)

B200 » [Click here to download *.KMZ file \(ALL Flights\)*](#)

Click on image to view full scale

* RightClick >> "Save Target As..." to save the *.kmz file, then open with GoogleEarth

Tools

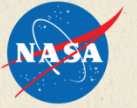
- Data Scanning/Submittal
- Register PI dataIDs

The overarching objective of the DISCOVER-AQ investigation is to improve the interpretation of satellite observations to diagnose near-surface conditions relating to air quality. To diagnose air quality conditions from space, reliable satellite information on aerosols and ozone precursors is needed for specific, highly correlated times and locations to be used in air quality models and compared to surface- and aircraft-based measurements. DISCOVER-AQ will provide an integrated dataset of airborne and surface observations relevant to the diagnosis of surface air quality conditions from space. >> [more](#)

<http://www-air.larc.nasa.gov/missions/discover-aq/discover-aq.html>



Standard Data Products



Data Merges (Chen/Shook): 1 sec, 15 sec, 1 min, PILS, SP-2

Data Flagging (Chen): Spirals, proximity to key ground sites, and highway transects

Forward and Nadir Videos (Barrick): Split into easily downloadable increments viewable on Quicktime and other media viewers

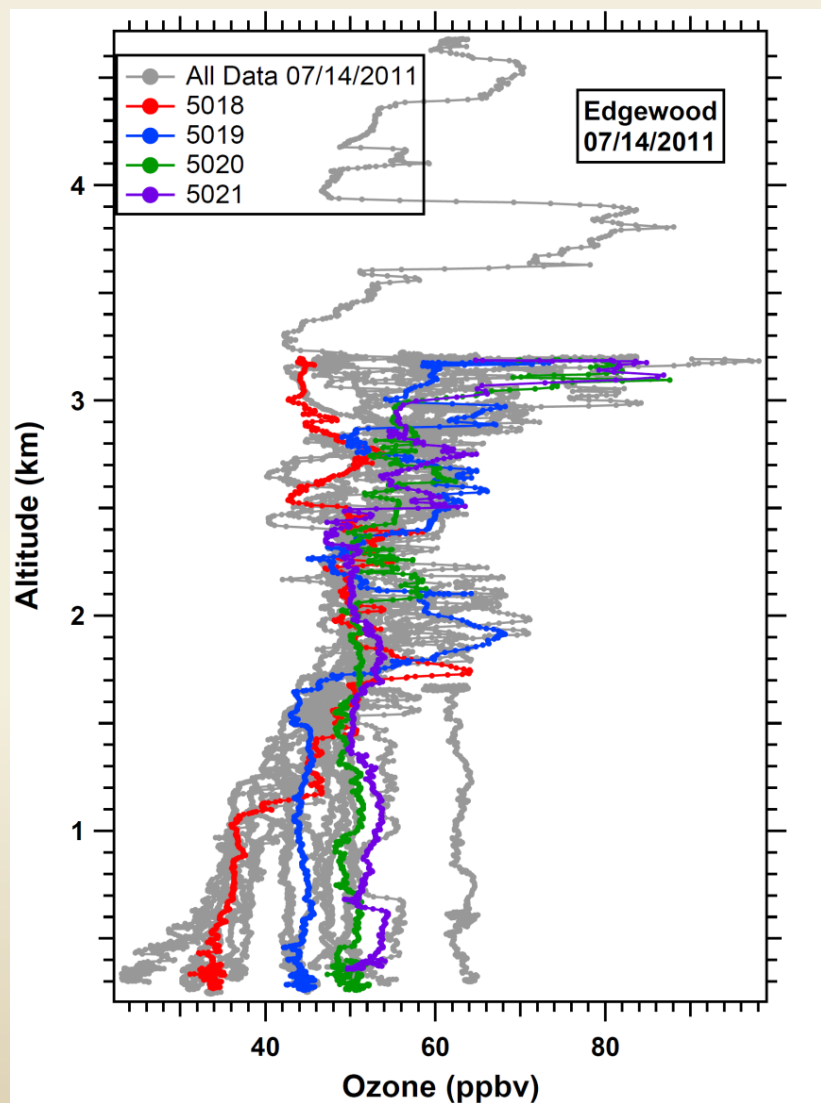
Column Density and Gridded Profile Data Products (Chen)

In situ data binned at 100 m resolution allows direct comparison of profiles.

Column densities are calculated over a standard altitude range.

There are enough caveats in calculating column densities to warrant a standard data product for use by the team.

Investigators not using this resource should be prepared to describe how their assumptions depart from the standard product to avoid confusion.



Profile Data Plots (Chen/Shook)

Produced for easy browsing of the profile data.

Each plot highlights a particular variable for a specific site and day.

Background data in gray provides context relative to other sites and times.

Two versions of each plot:

- 1) Gray data for all sites on that day
- 2) Gray data for all days at that site

Surface data to also be included when available.



Data Products (cont.)

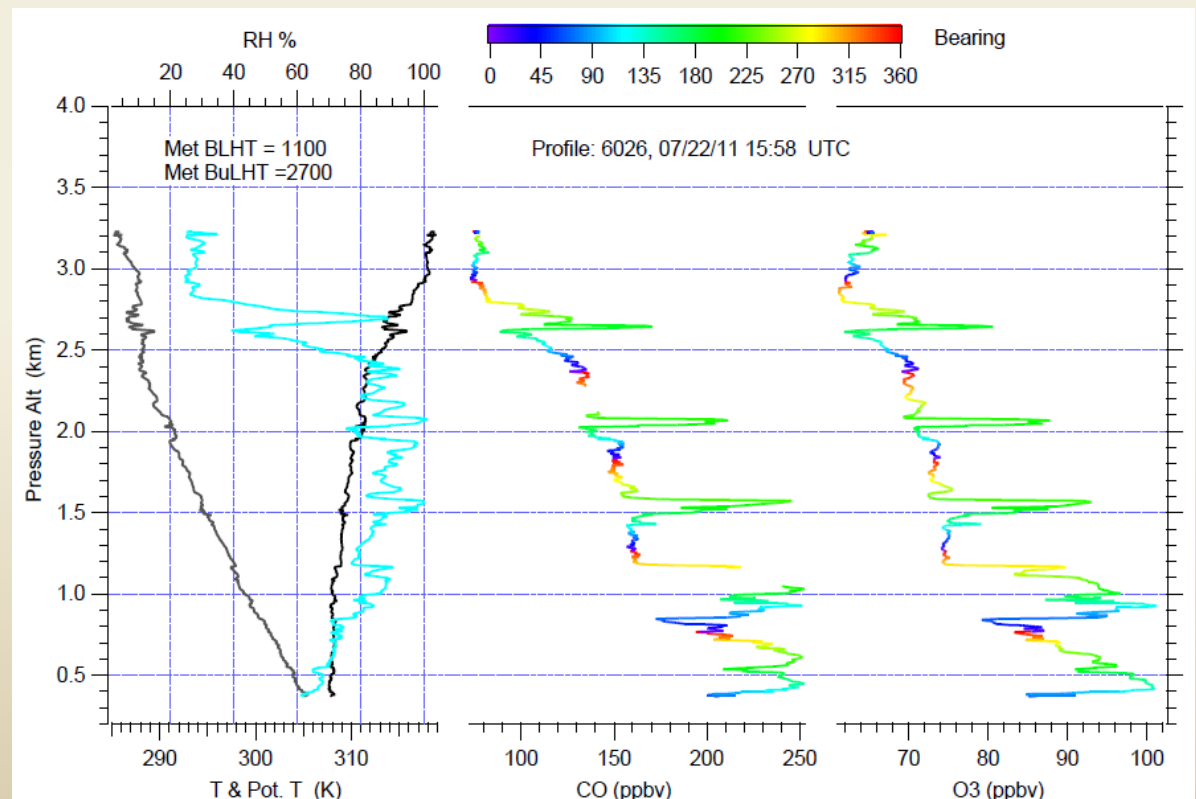
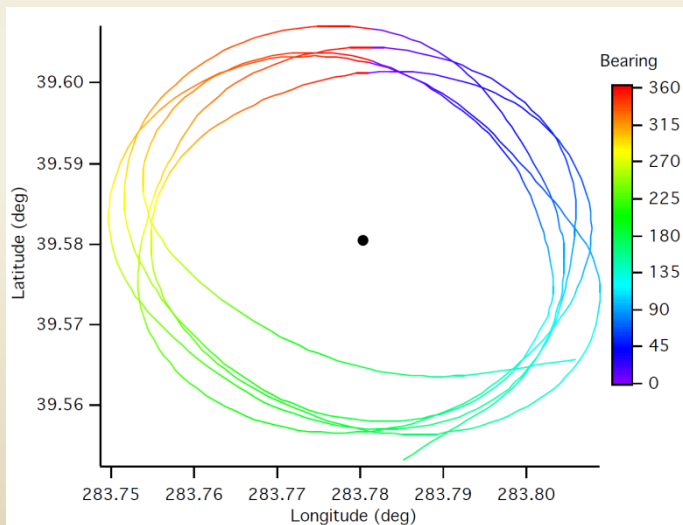


Profile Analysis Plots (Chen/Shook)

Produced for each profile and each in situ variable.

Color scale indicates the location (bearing) of the P-3B relative to the center of the spiral.

Used to assess horizontal gradients affecting vertical structure.



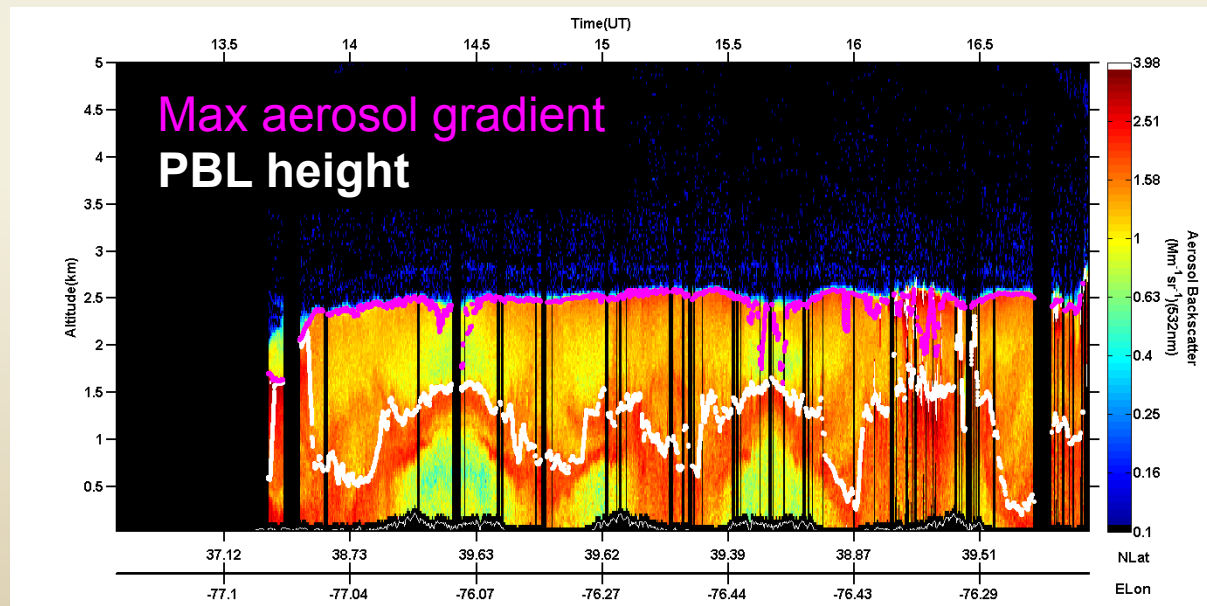
Boundary Layer and Mixed Layer Depth determinations available from several sources:

P-3B Profiles and Ozonesondes (Chen/Shook)

HSRL (Rich Ferrare)

Ground-Based Lidars (Tim Berkoff)

Ceilometers (EPA, Szykman)



Terra/Aqua Daily Images and Google Earth overlays

