



Project Overview
FRAPPÉ Science Team Meeting
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Near-surface pollution is one of the most challenging problems for Earth observations from space...

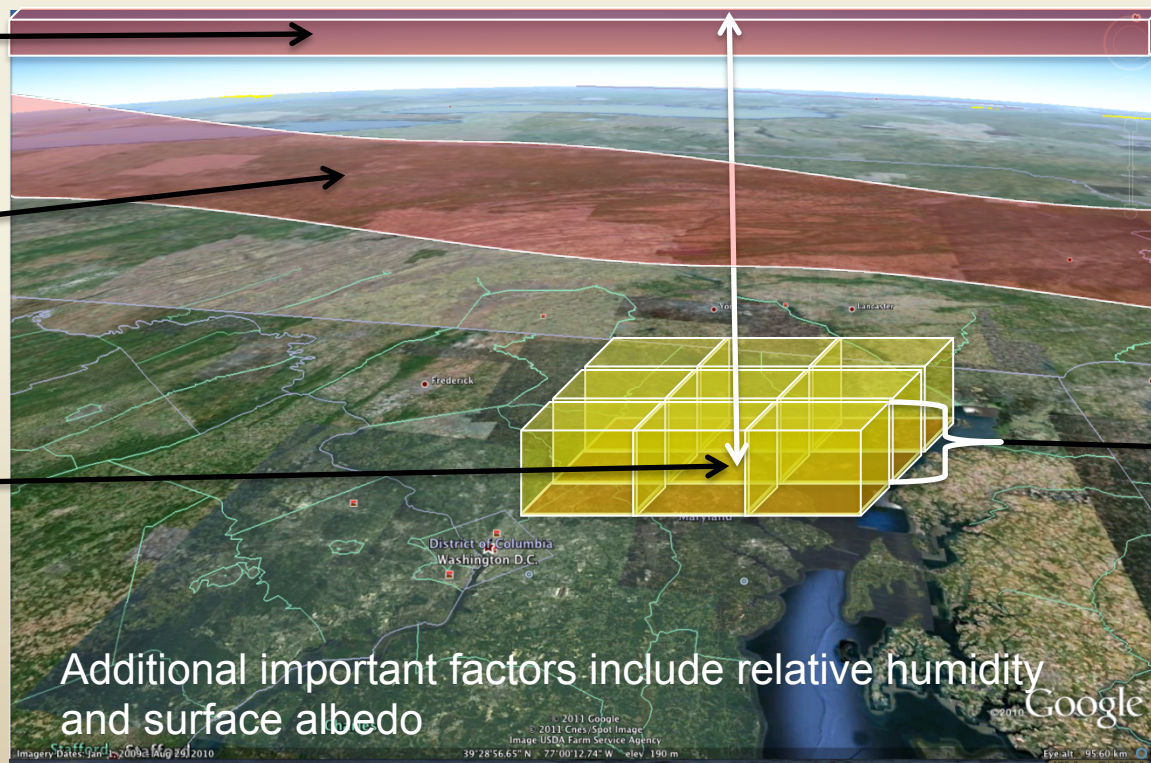
Near-surface information must be inferred from column-integrated quantities obtained by passive remote sensing from downward-looking satellite instruments.

Some constituents have large relative concentrations in the stratosphere and/or free troposphere (e.g., O_3 and NO_2) making it difficult to distinguish the near-surface contribution to the total column.

Stratospheric Burden

Long-range transport of pollution aloft

From space, the size of the measurement pixel matters (as does grid size for models)



Boundary layer depth influences the volume over which surface pollution is mixed

It also matters how well the pollution is mixed



Investigation Overview



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

A NASA Earth Venture campaign intended to improve the interpretation of current and future satellite observations to diagnose near-surface conditions relating to air quality

Objectives:

- 1. Relate column observations to surface conditions for aerosols and key trace gases O_3 , NO_2 , and CH_2O**
- 2. Characterize differences in diurnal variation of surface and column observations for key trace gases and aerosols**
- 3. Examine horizontal scales of variability affecting satellites and model calculations**

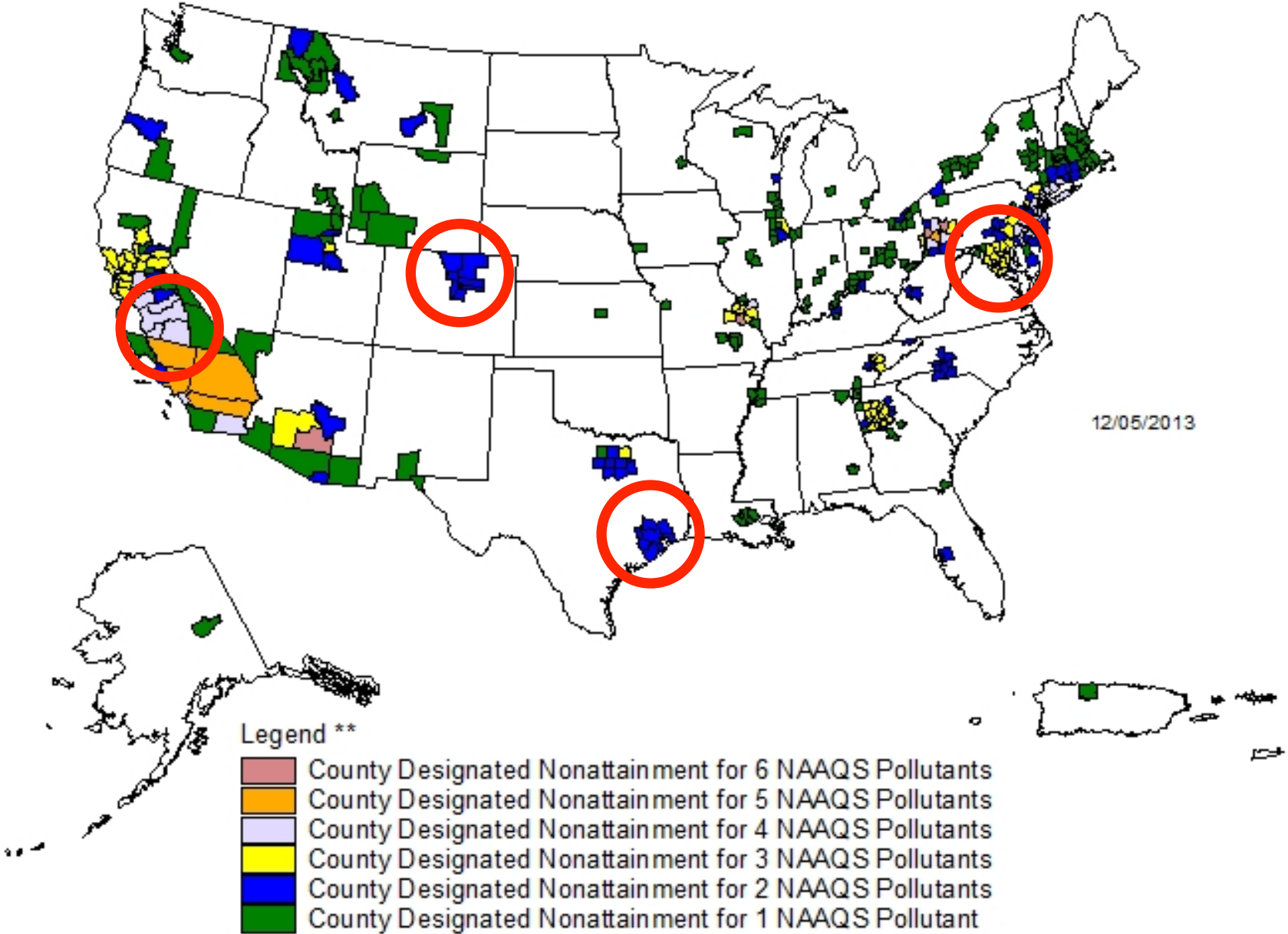
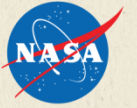
Deployments and key collaborators

Maryland, July 2011 (EPA, MDE, UMd, UMBC, Howard U.)
California, January 2013 (EPA, CARB, UC-Davis&Irvine)
Texas, September 2013 (EPA, TCEQ, U. of Houston)
Colorado, Summer 2014 (EPA, CDPHE, NSF, NOAA)





Current Nonattainment Areas





Deployment Strategy



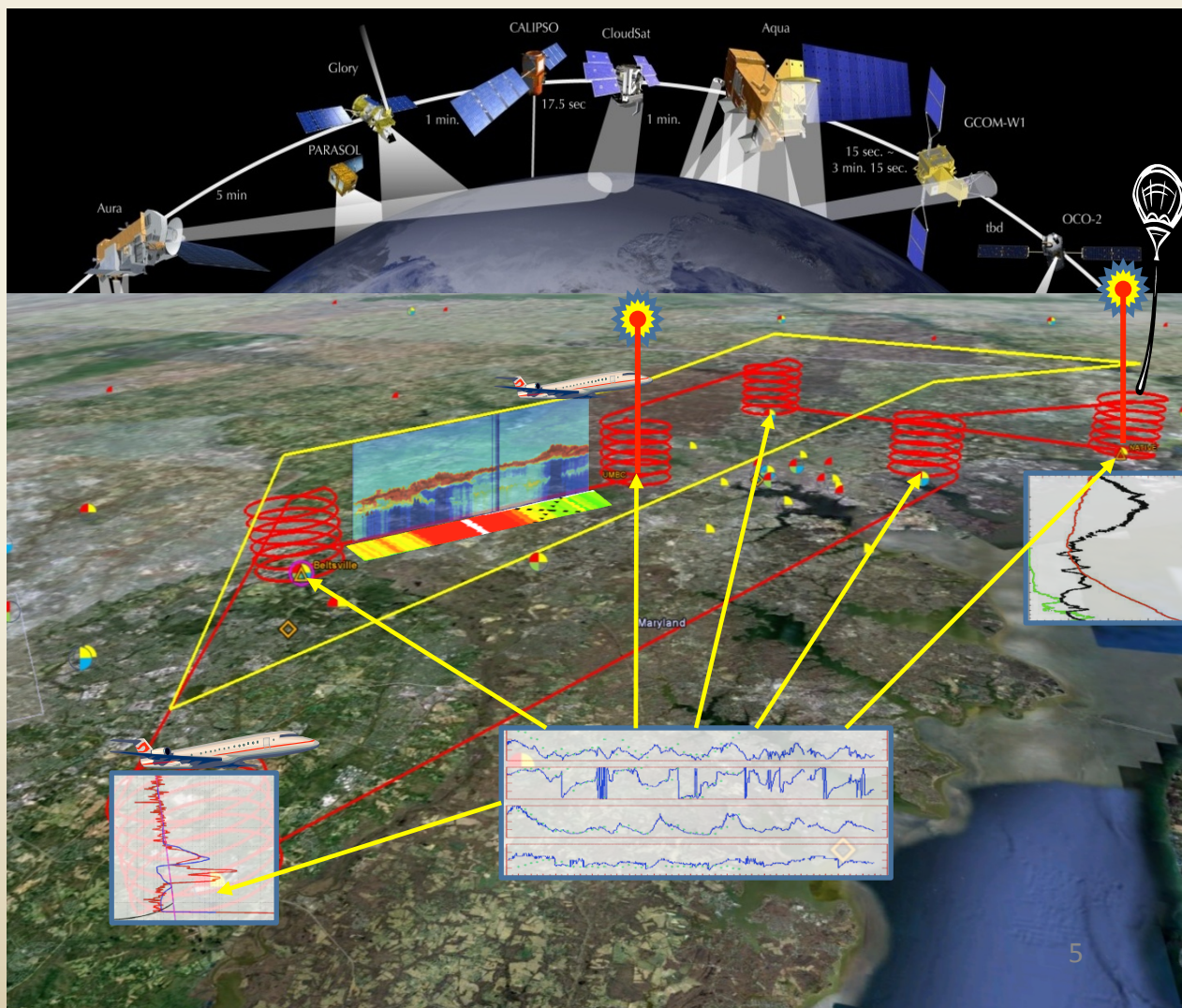
Systematic and concurrent observation of column-integrated, surface, and vertically-resolved distributions of aerosols and trace gases relevant to air quality as they evolve throughout the day.

Three major observational components:

NASA King Air (Remote sensing)
Continuous mapping of aerosols with HSRL and trace gas columns with ACAM

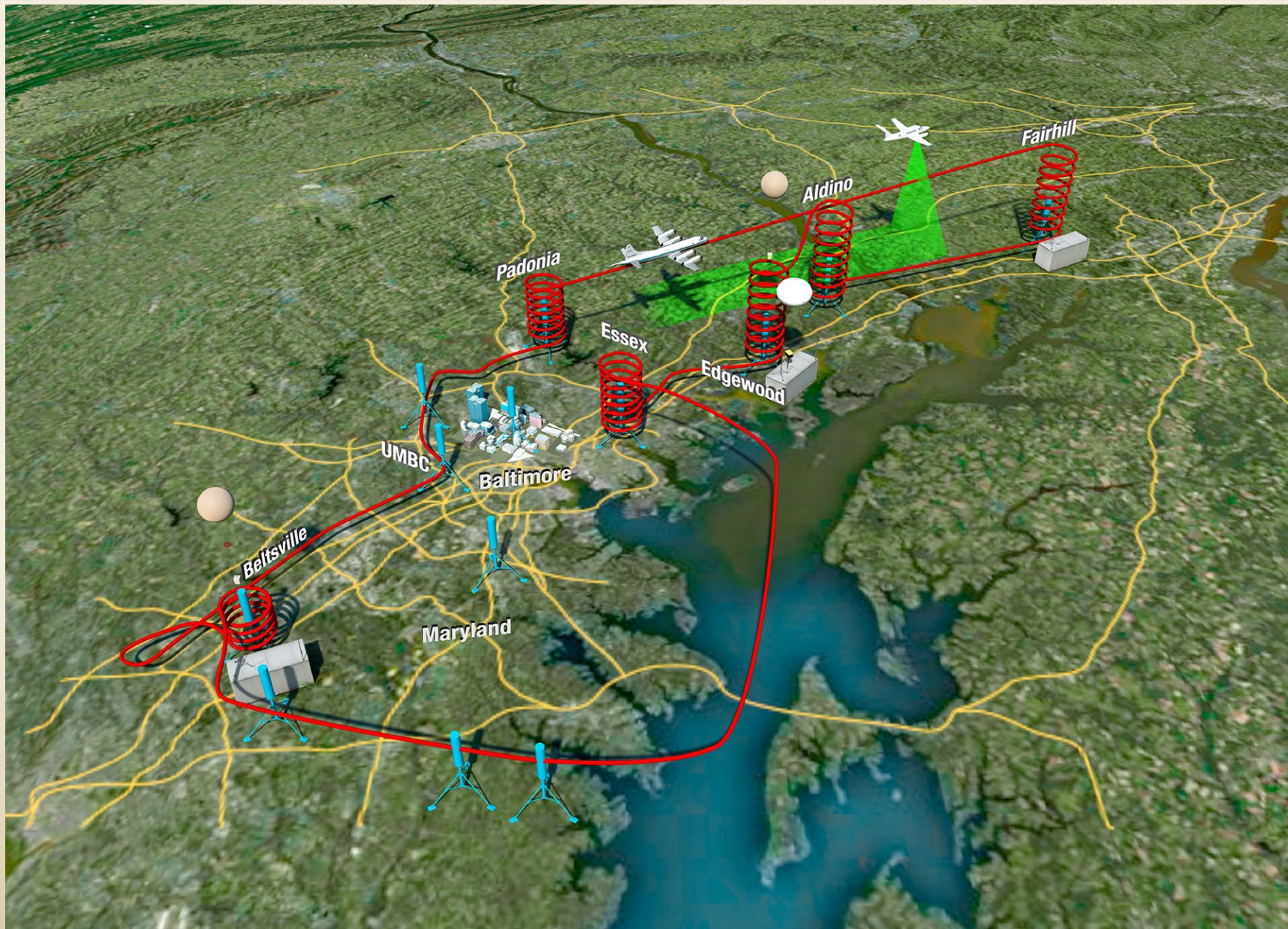
NASA P-3B (in situ meas.)
In situ profiling of aerosols and trace gases over surface measurement sites

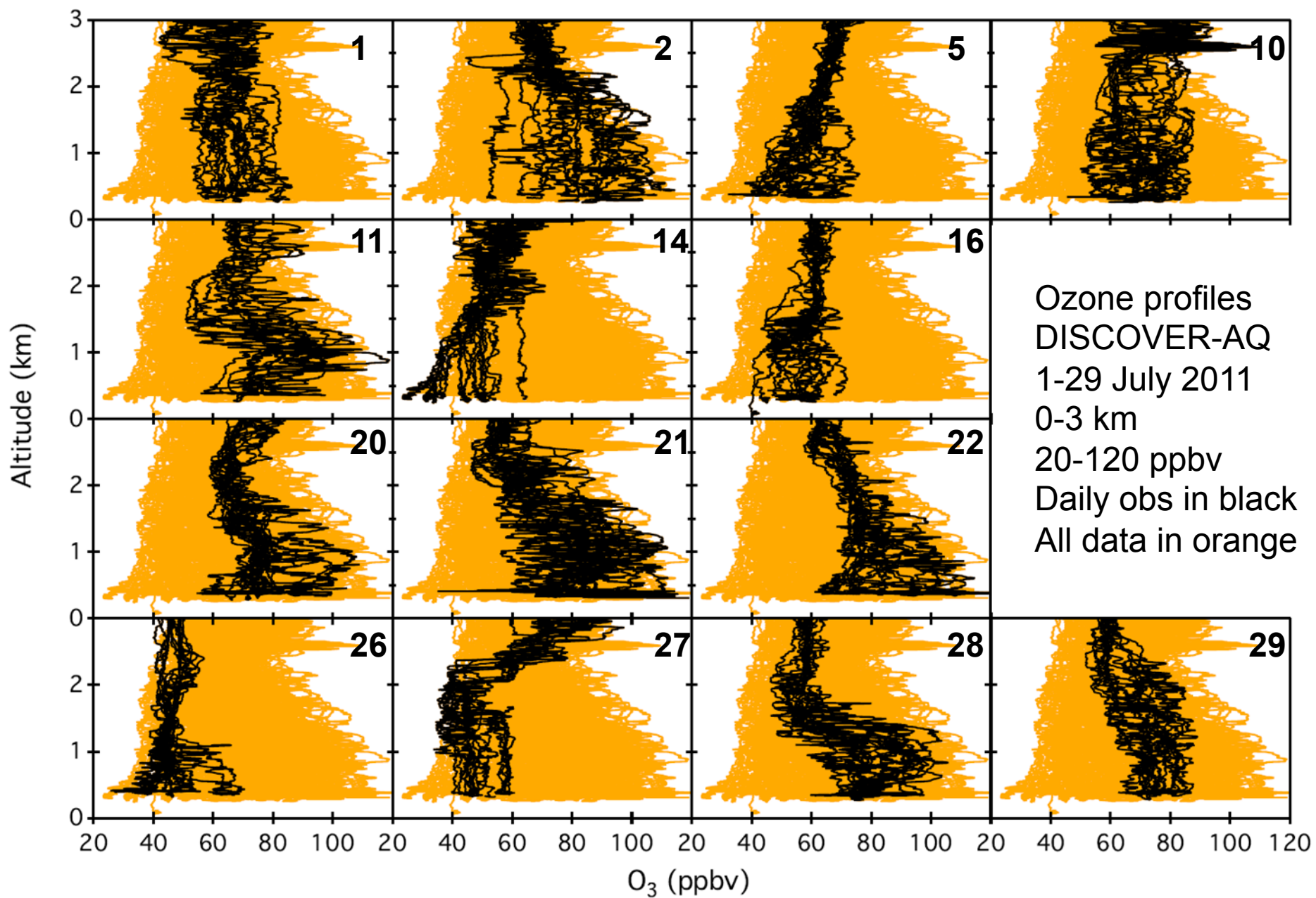
Ground sites
In situ trace gases and aerosols
Remote sensing of trace gas and aerosol columns
Ozonesondes
Aerosol lidar observations





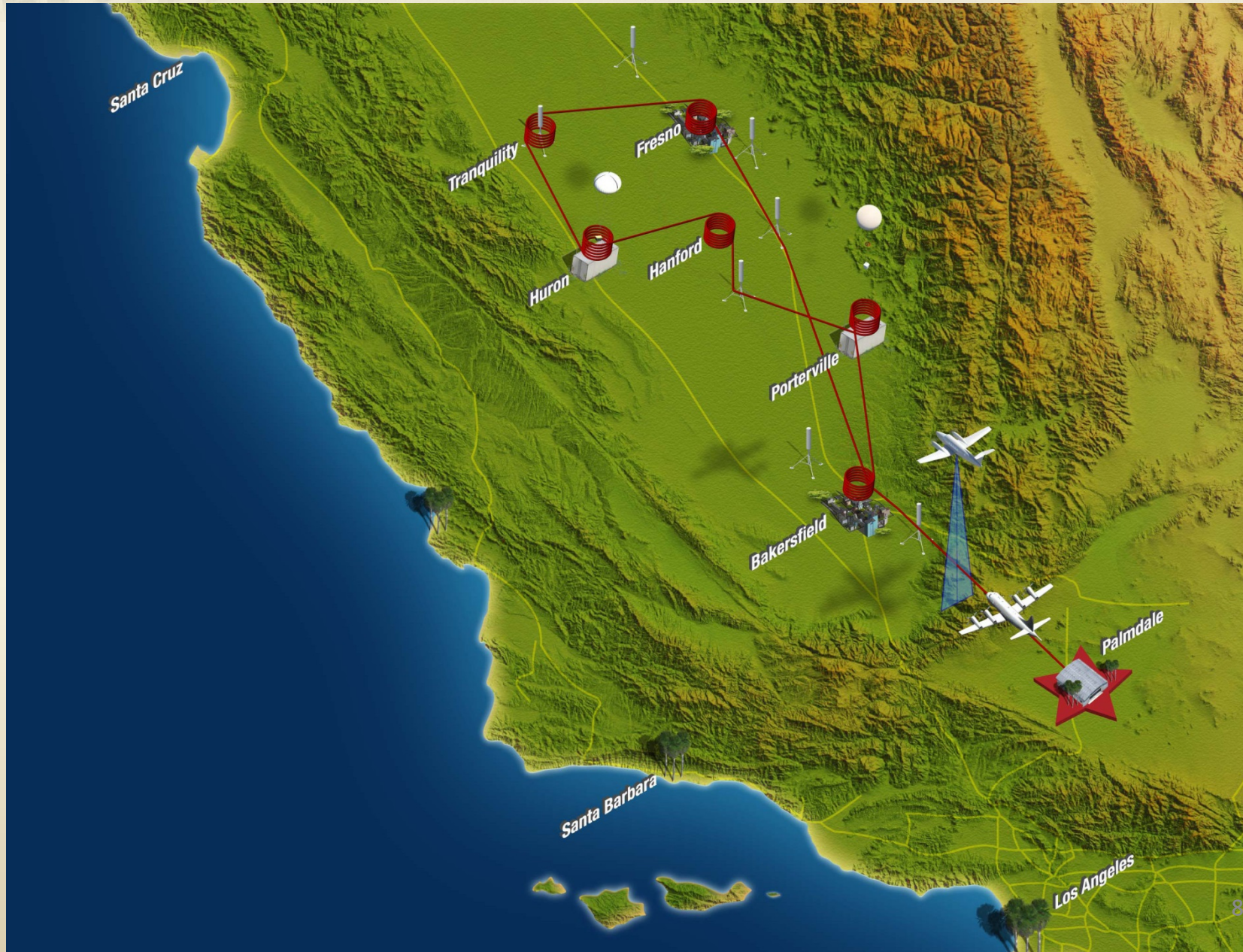
Maryland Flight Strategy







California Flight Strategy

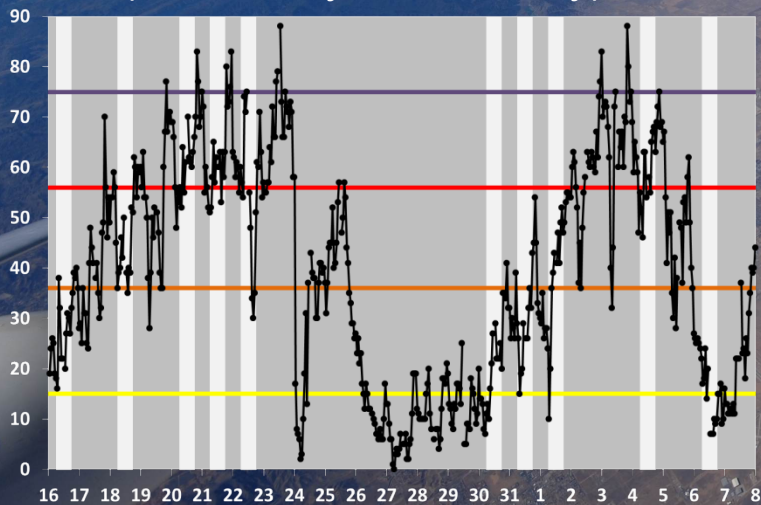


Ten science flights documented the details of two successive PM2.5 episodes in the San Joaquin Valley

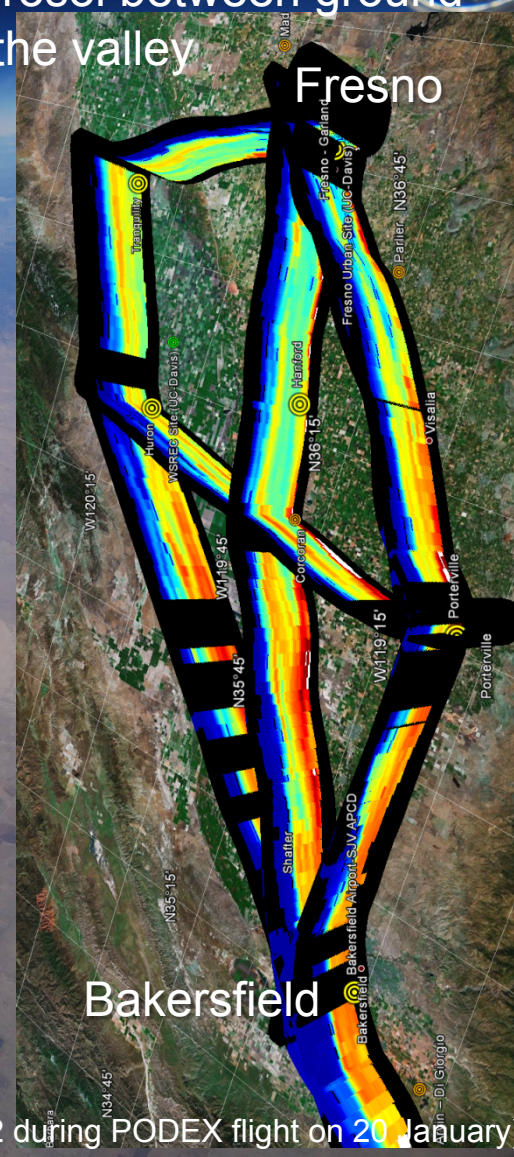
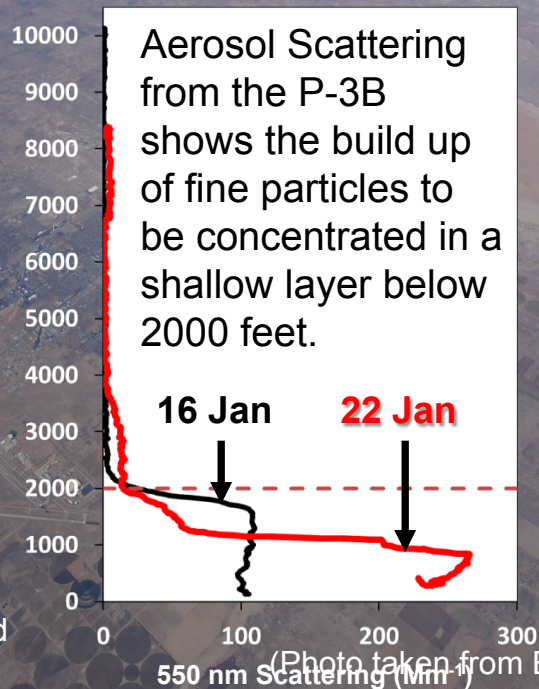
HSRL-2 on the King Air Maps the Spatial Distribution of Aerosol between ground monitors across the valley



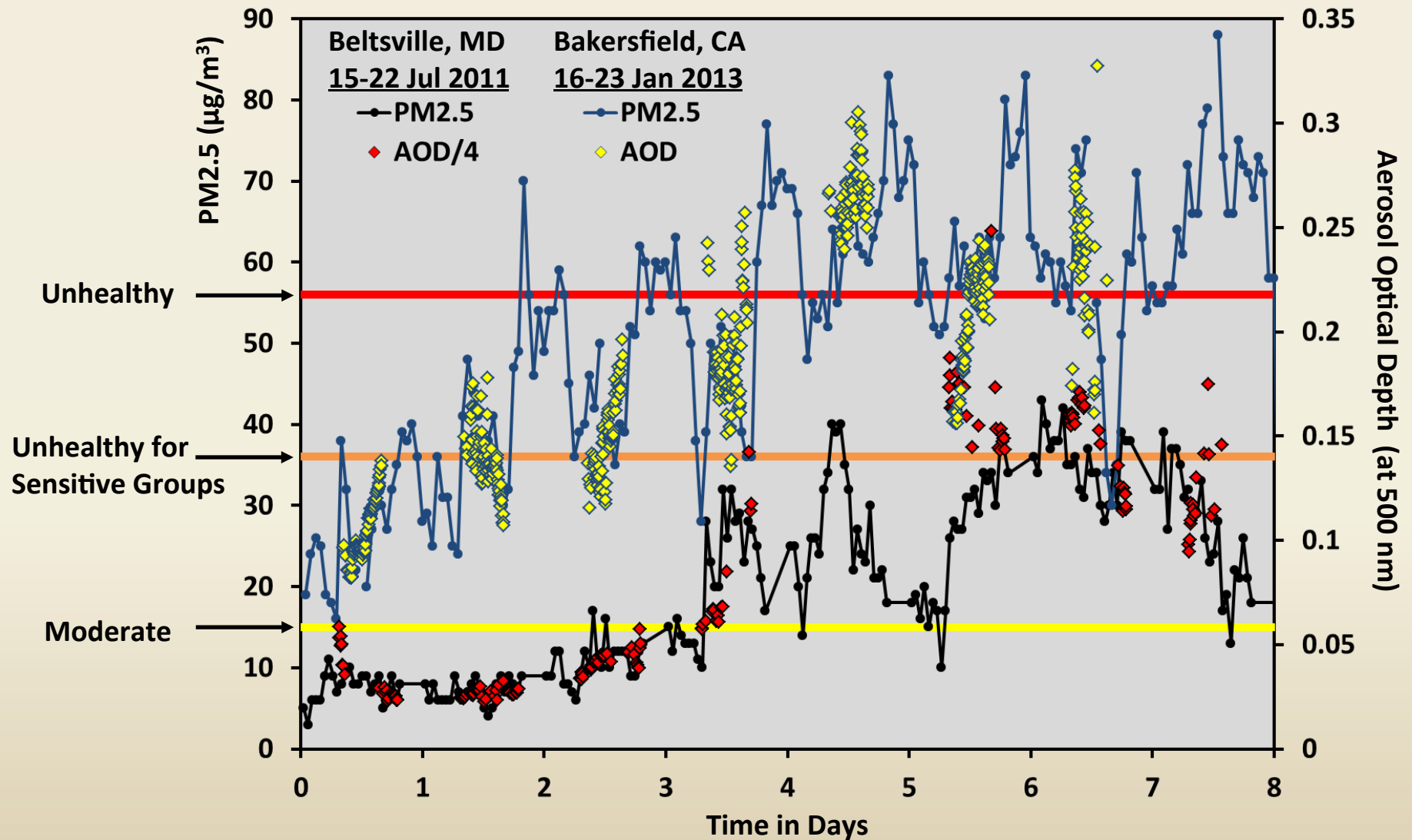
Bakersfield PM2.5
(16 January - 7 February)



*Orange line ($36 \mu\text{g}/\text{m}^3$) is the 24hr average threshold for violating National Ambient Air Quality Standards

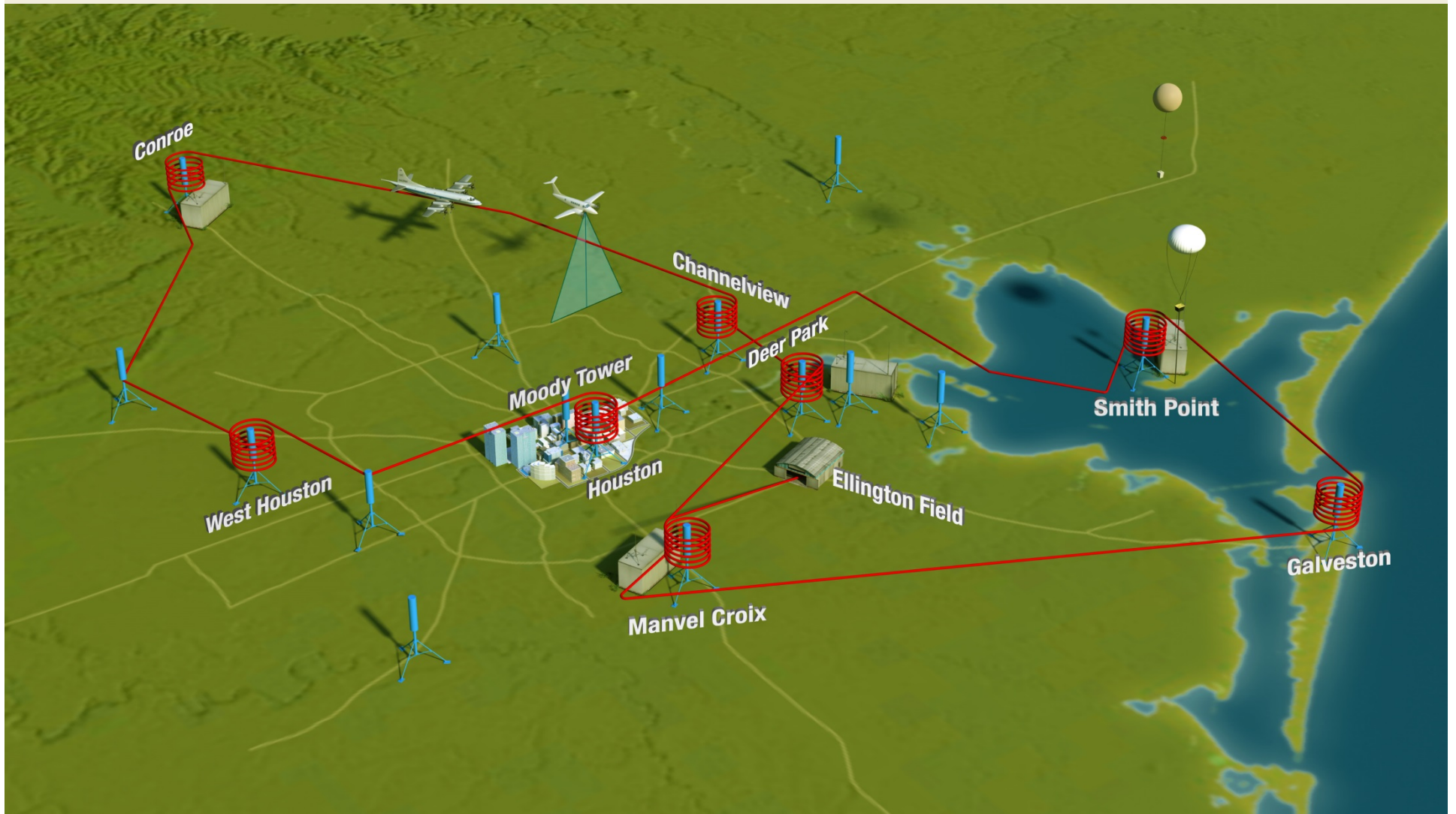


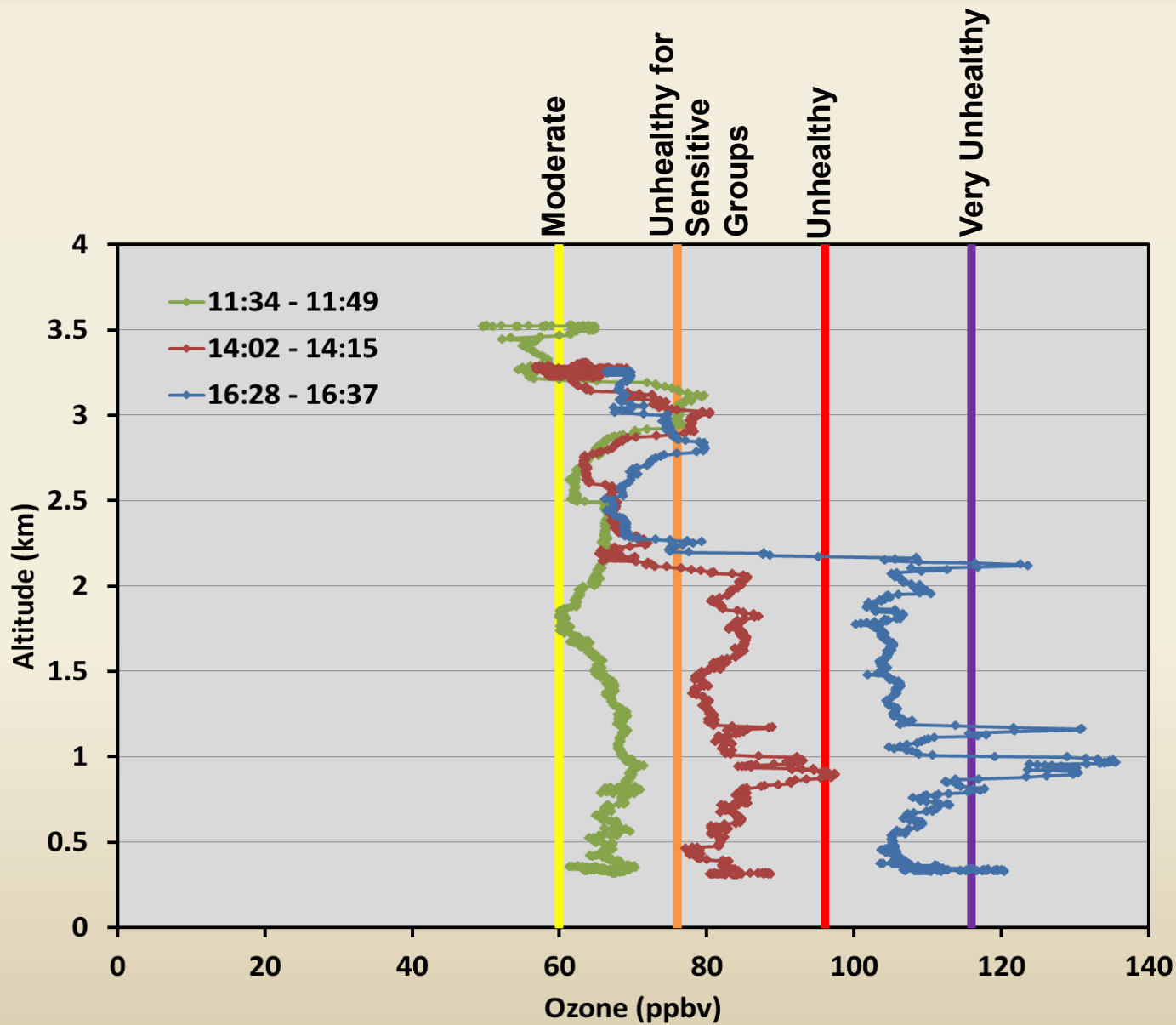
Comparing California in winter to Maryland in summer





Houston Flight Strategy







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 \(ALL Flights\)*](#)

DISCOVER-AQ_P3B_2013_ALL_Jan16-Feb08

P3B Flight Tracks

DISCOVER-AQ_B200_2013_ALL_Jan16-Feb08

B200 Flight Tracks

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>