
# *Project Overview*
# *FRAPPÉ Science Team Meeting*
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**Jim Crawford**
**Principal Investigator**
**NASA LaRC**
**James.H.Crawford@nasa.gov**

**Ken Pickering**
**Project Scientist**
**NASA GSFC**
**Kenneth.E.Pickering@nasa.gov**

**Mary Kleb**
**Project Manager**
**NASA LaRC**
**Mary.M.Kleb@nasa.gov**

**Gao Chen**
**Data Manager**
**NASA LaRC**
**Gao.Chen@nasa.gov**

**Webpage: http://discover-aq.larc.nasa.gov/**

# The Problem

**Near-surface pollution is one of the most challenging problems for Earth observations from space…**

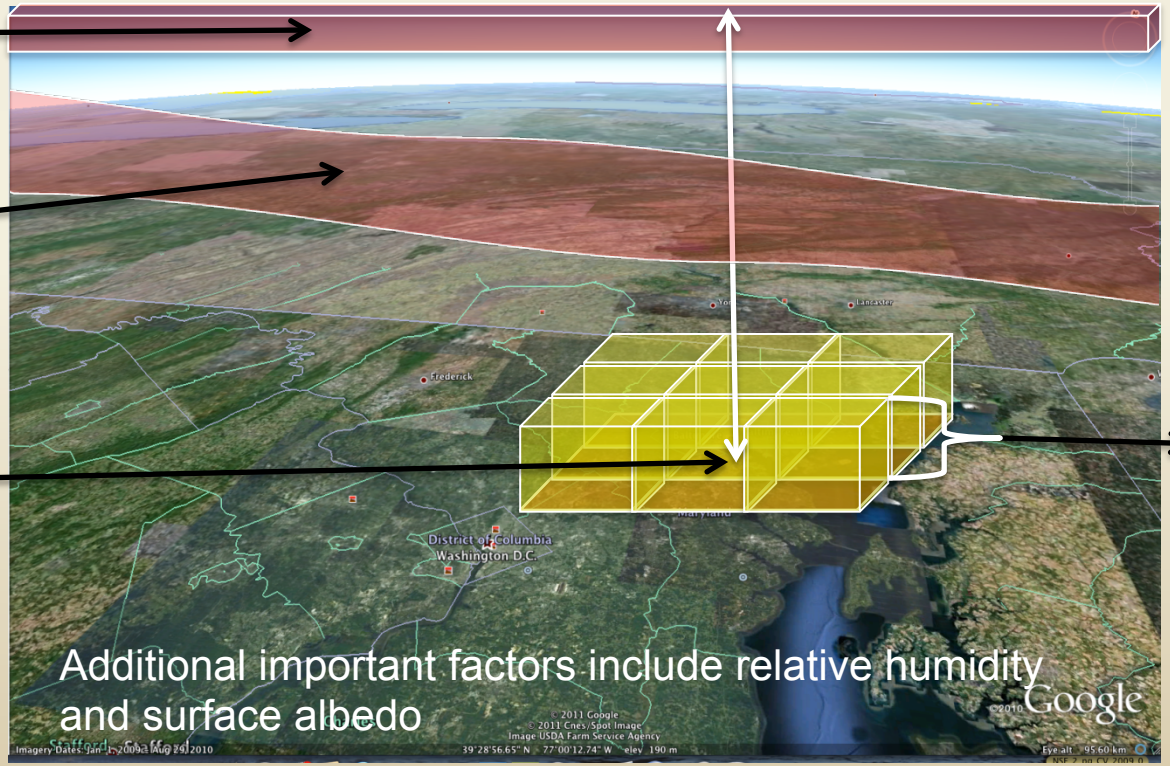
Near-surface information must be inferred from column-integrated quantities obtained by passive remote sensing from downward-looking satellite instruments.

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

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# 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)




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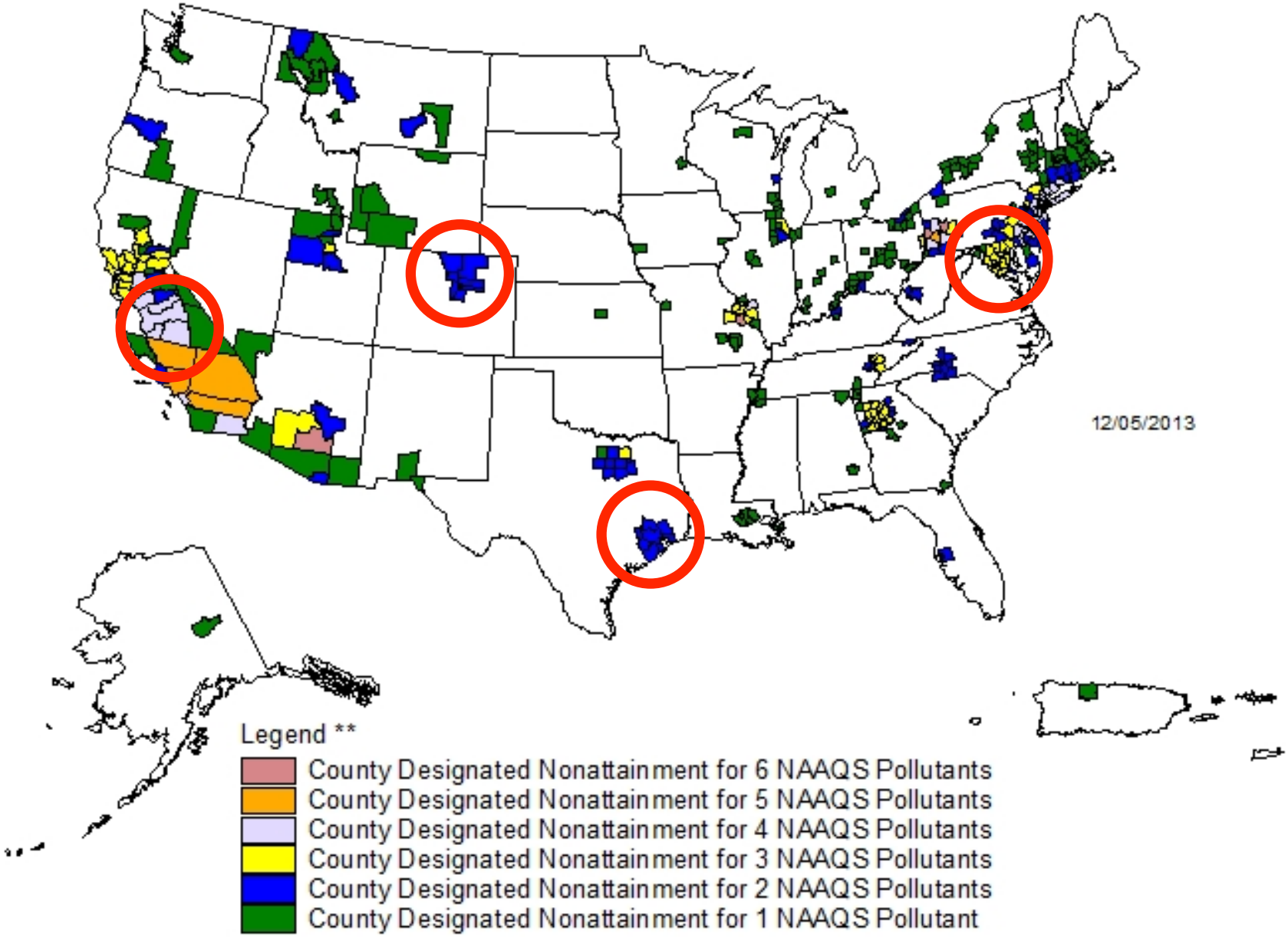
# Current Nonattainment Areas



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# Deployment Strategy

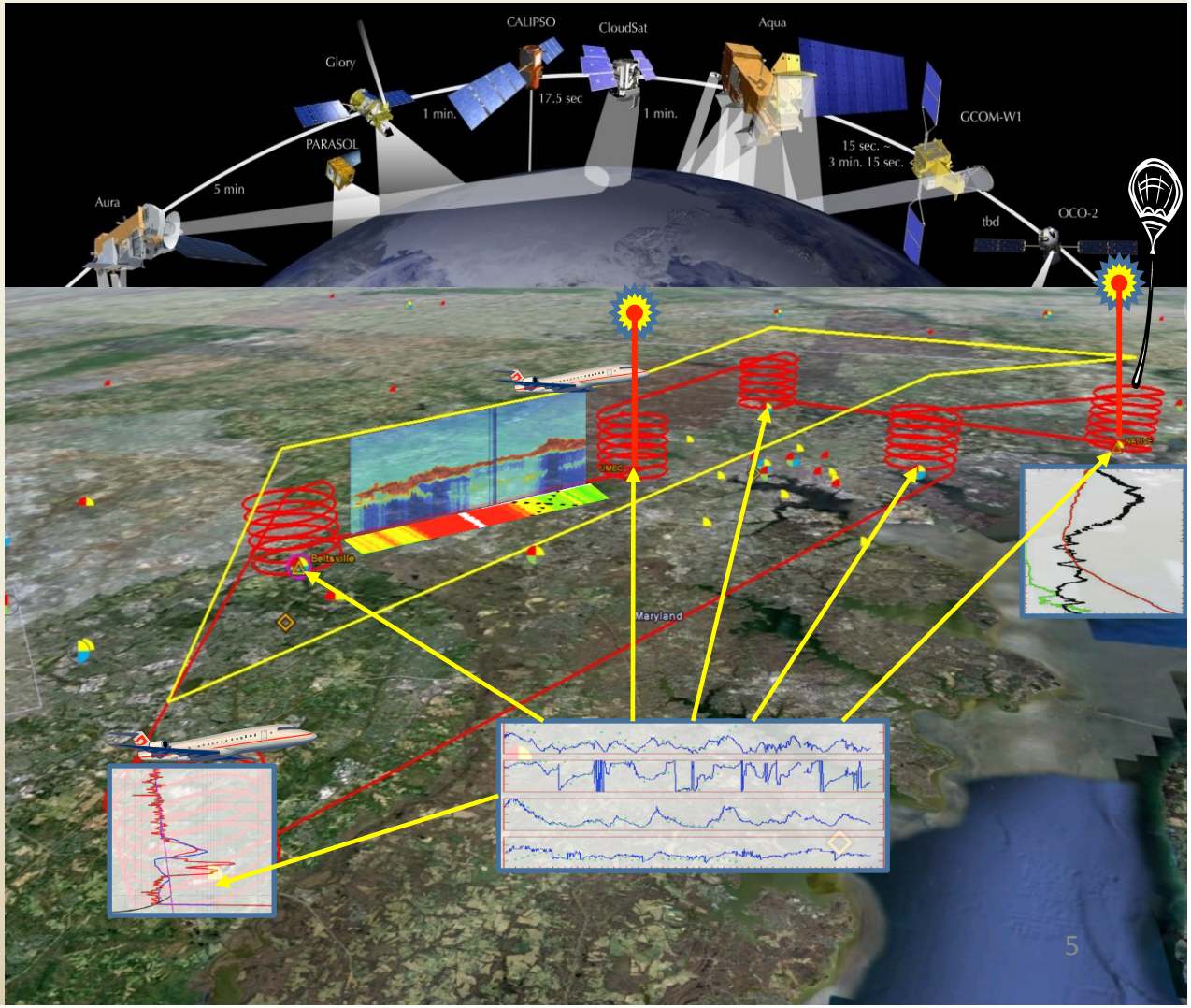
***Systematic and concurrent observation of column-integrated, surface, and vertically-resolved distributions of aerosols and trace gases relevant to air quality as they evolve throughout the day.***

***Three major observational components:***

***<u>NASA King Air (Remote sensing)</u>***
***Continuous mapping of aerosols with HSRL and trace gas columns with ACAM***

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

***<u>Ground sites</u>***
***In situ trace gases and aerosols***
***Remote sensing of trace gas and aerosol columns***
***Ozonesondes***
***Aerosol lidar observations***



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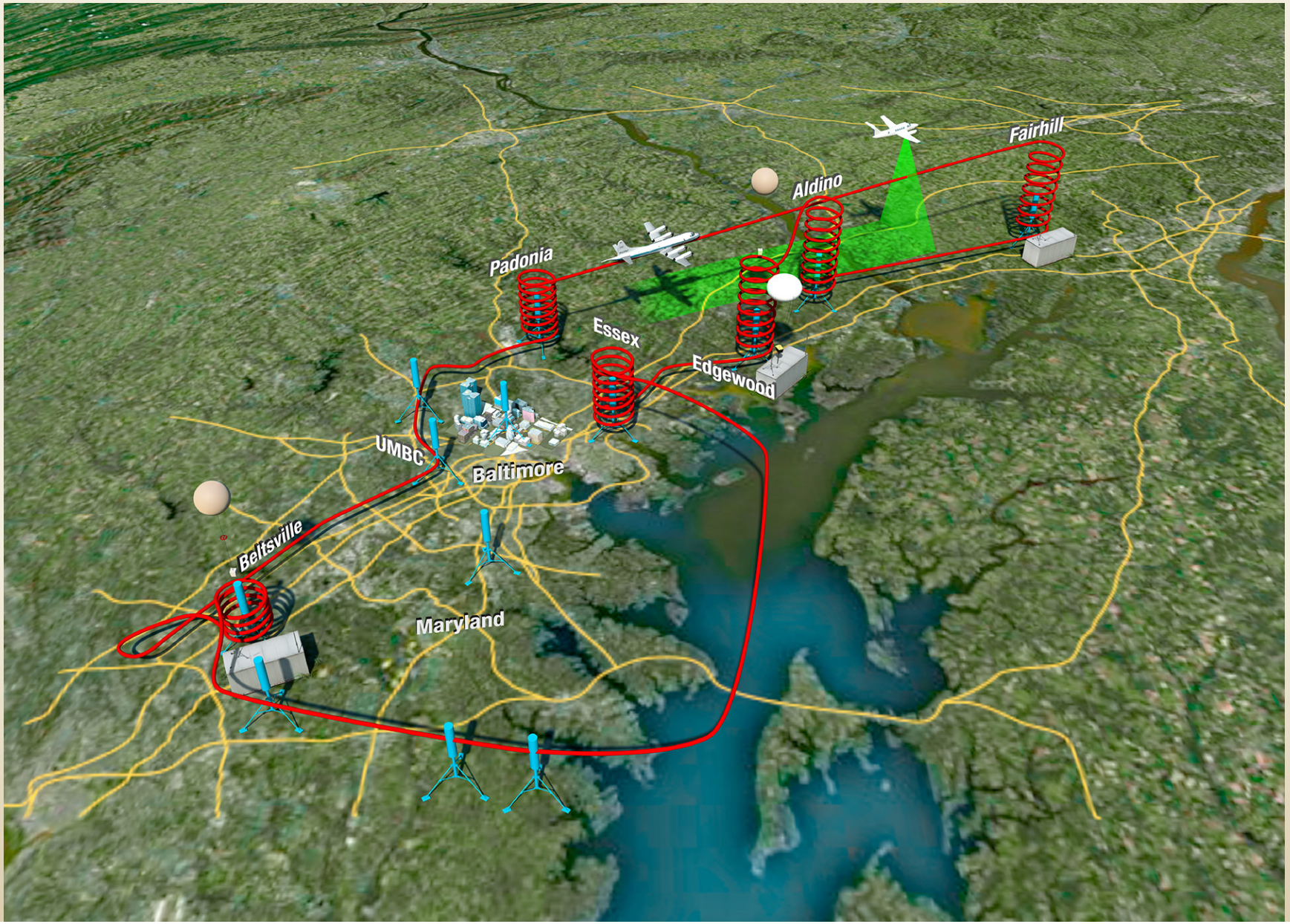
# Maryland Flight Strategy



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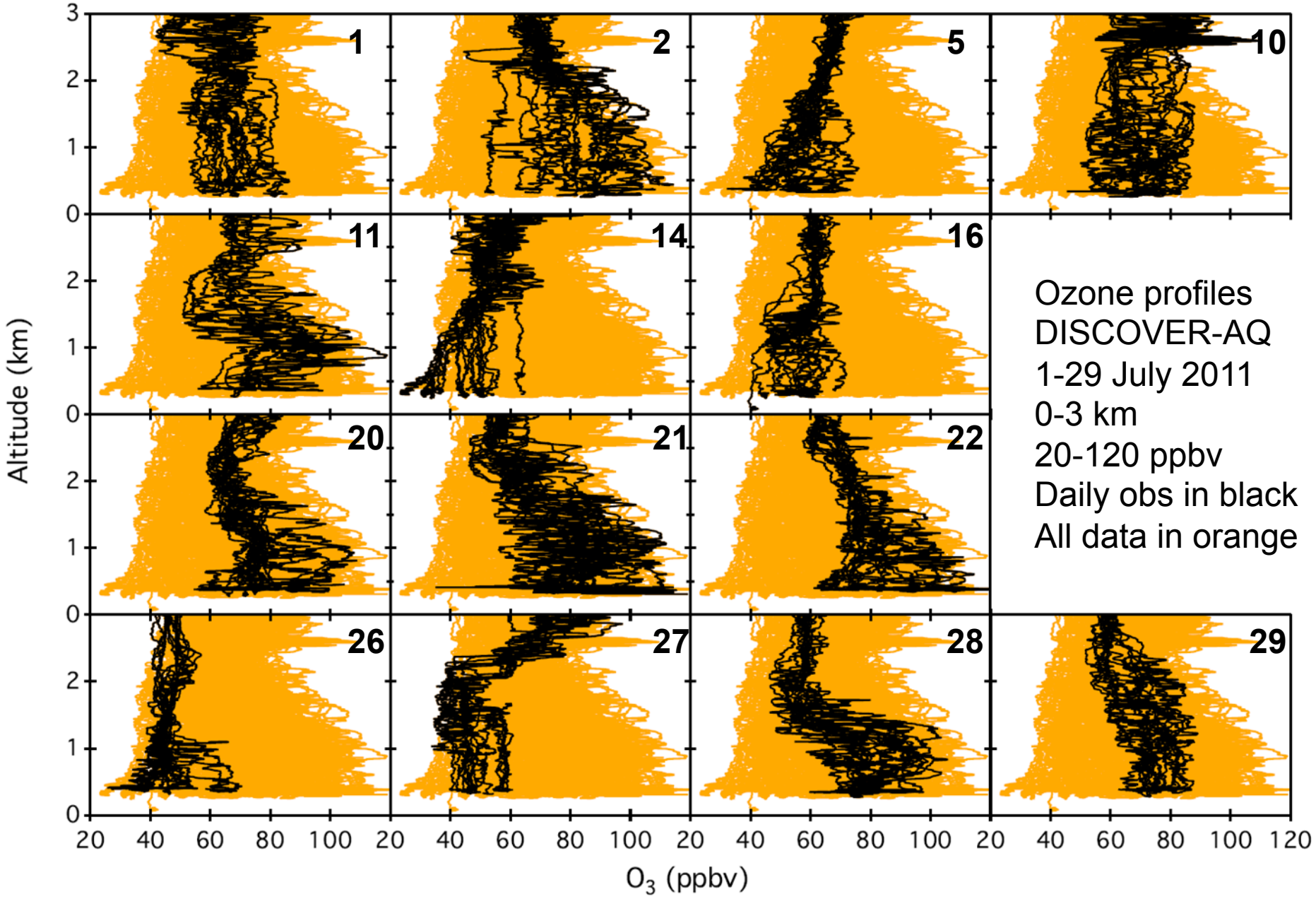
# Daily Ozone Distributions



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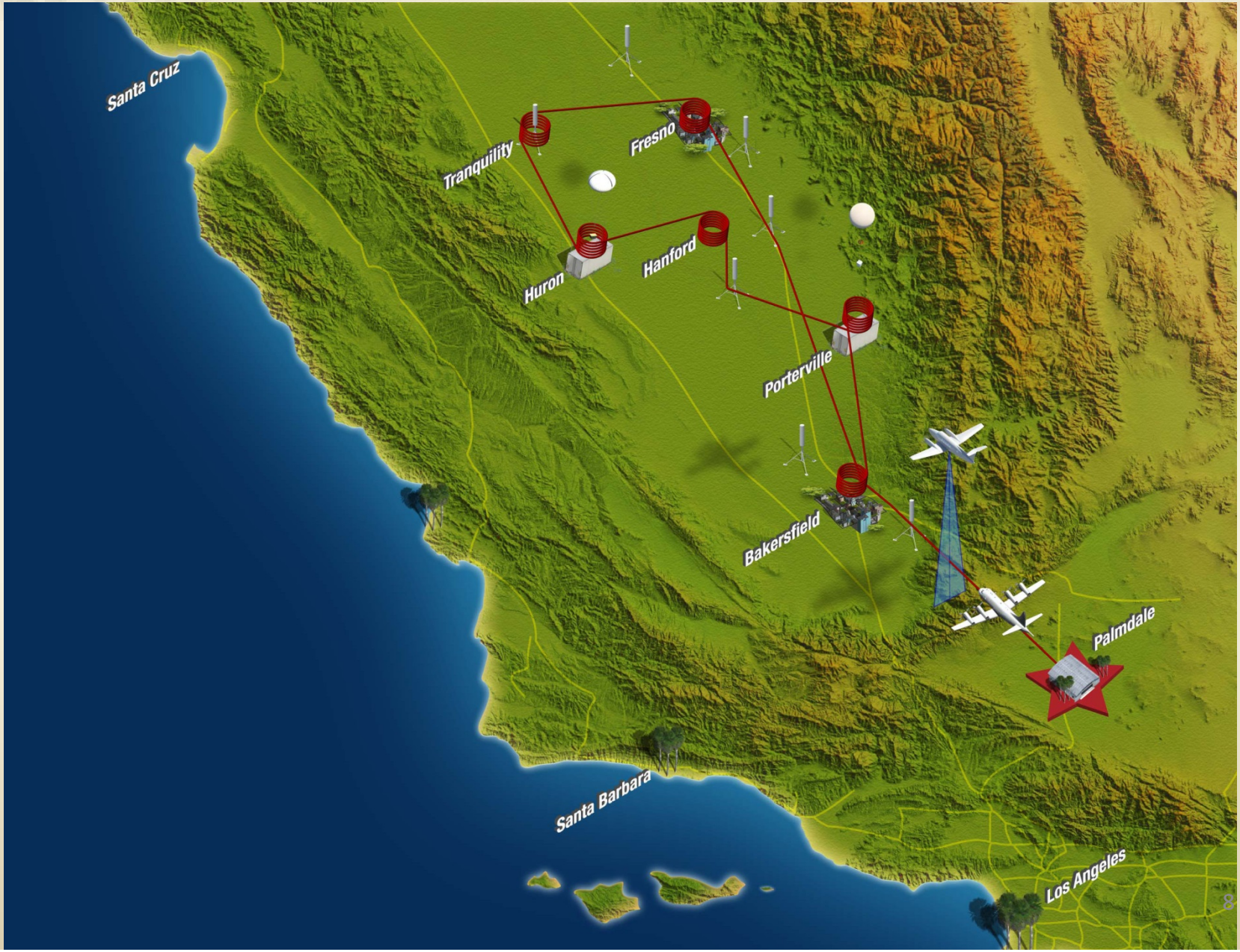
# California Flight Strategy



# DISCOVER-AQ California

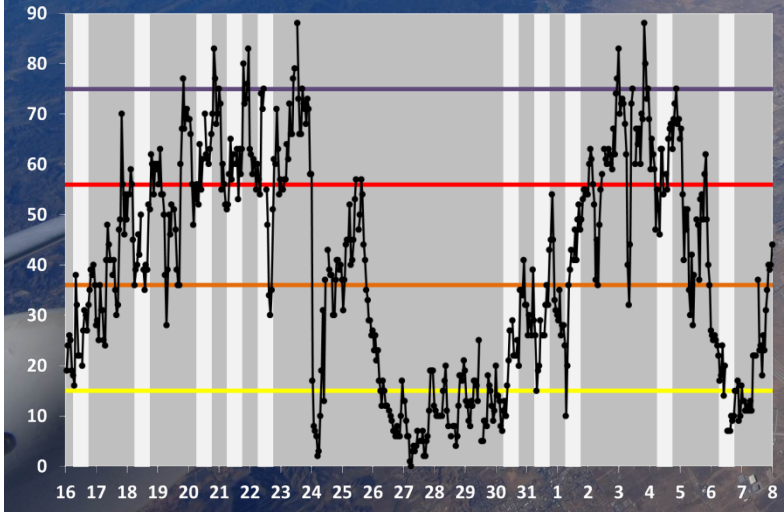
Ten science flights documented the details of two successive PM2.5 episodes in the San Joaquin Valley

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

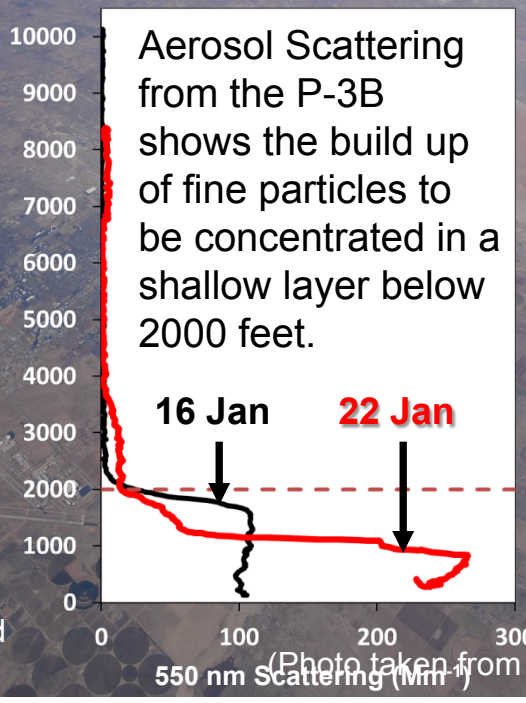
Fresno

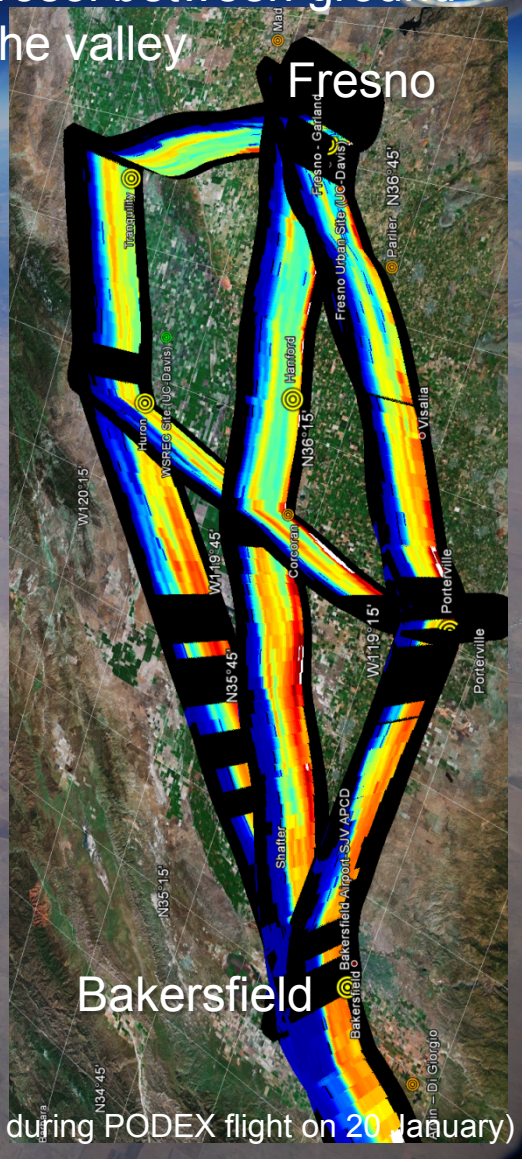
Bakersfield

## Bakersfield PM2.5
(16 January - 7 February)




*Orange line (36 ug/m$^3$) is the 24hr average threshold for violating National Ambient Air Quality Standards




(Photo taken from ER-2 during PODEX flight on 20 January)

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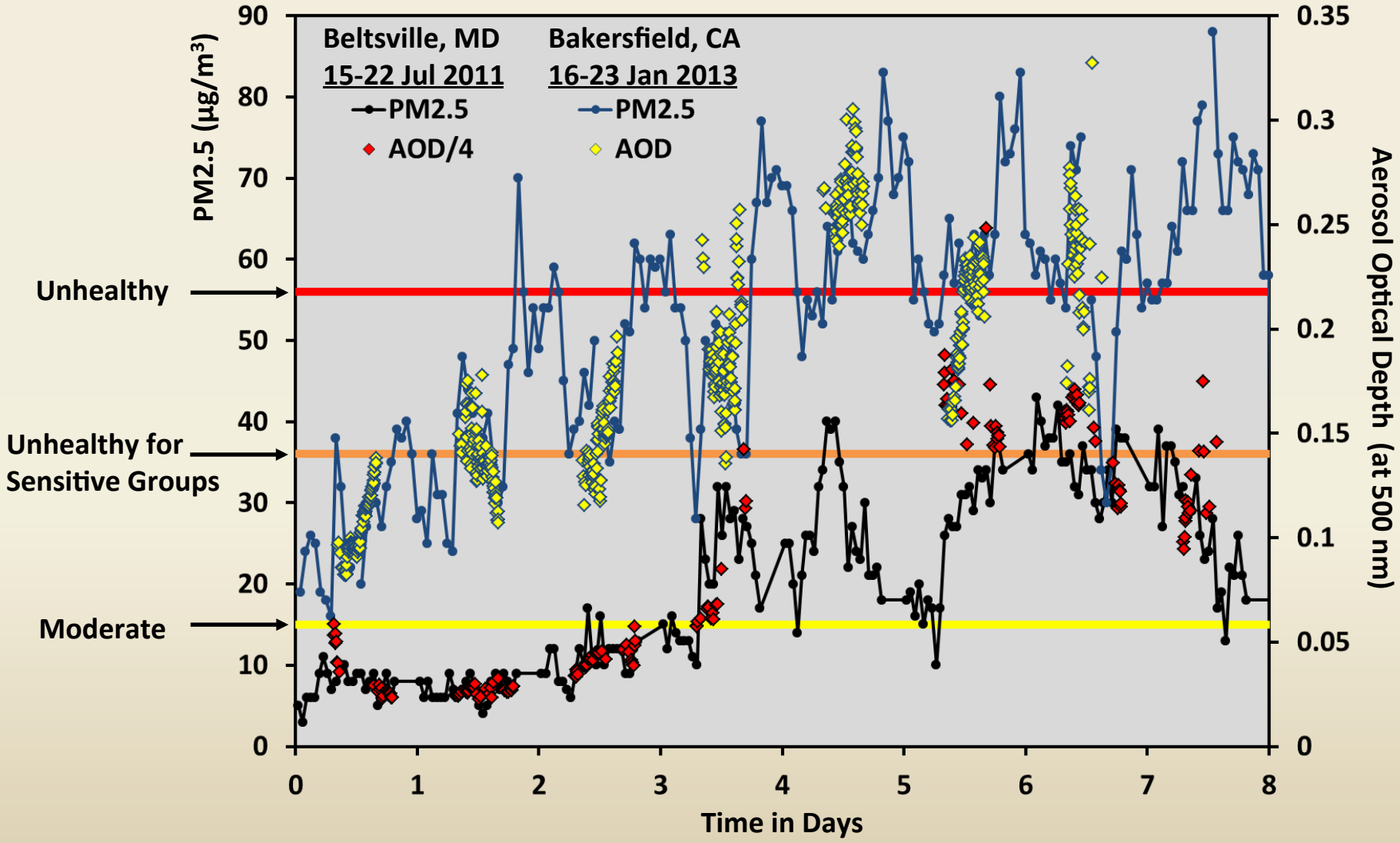
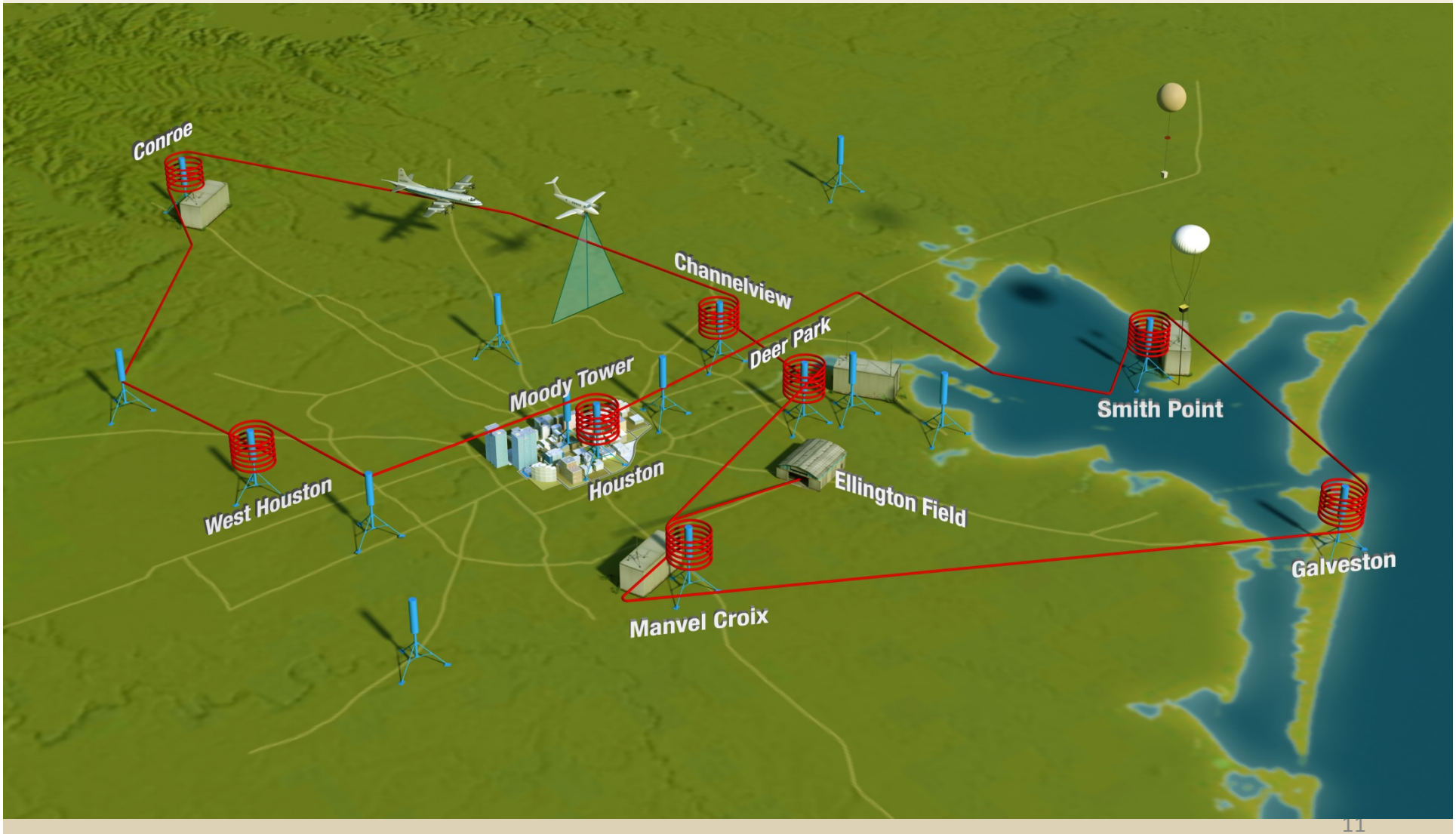
# Comparing California in winter to Maryland in summer



# Houston Flight Strategy



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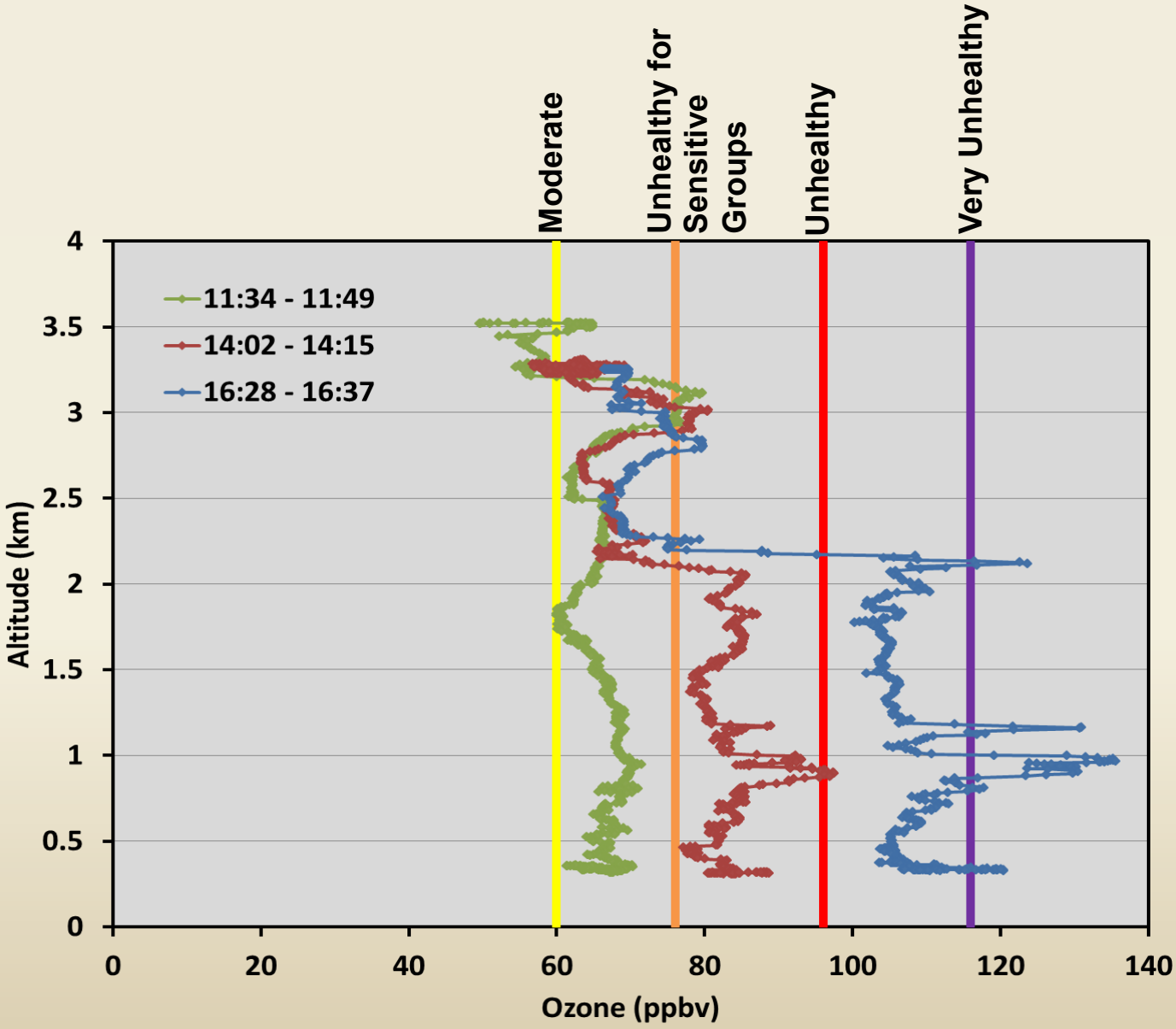
# Manvel Croix Ozone, 25 Sep



# Information and Data Management


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


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