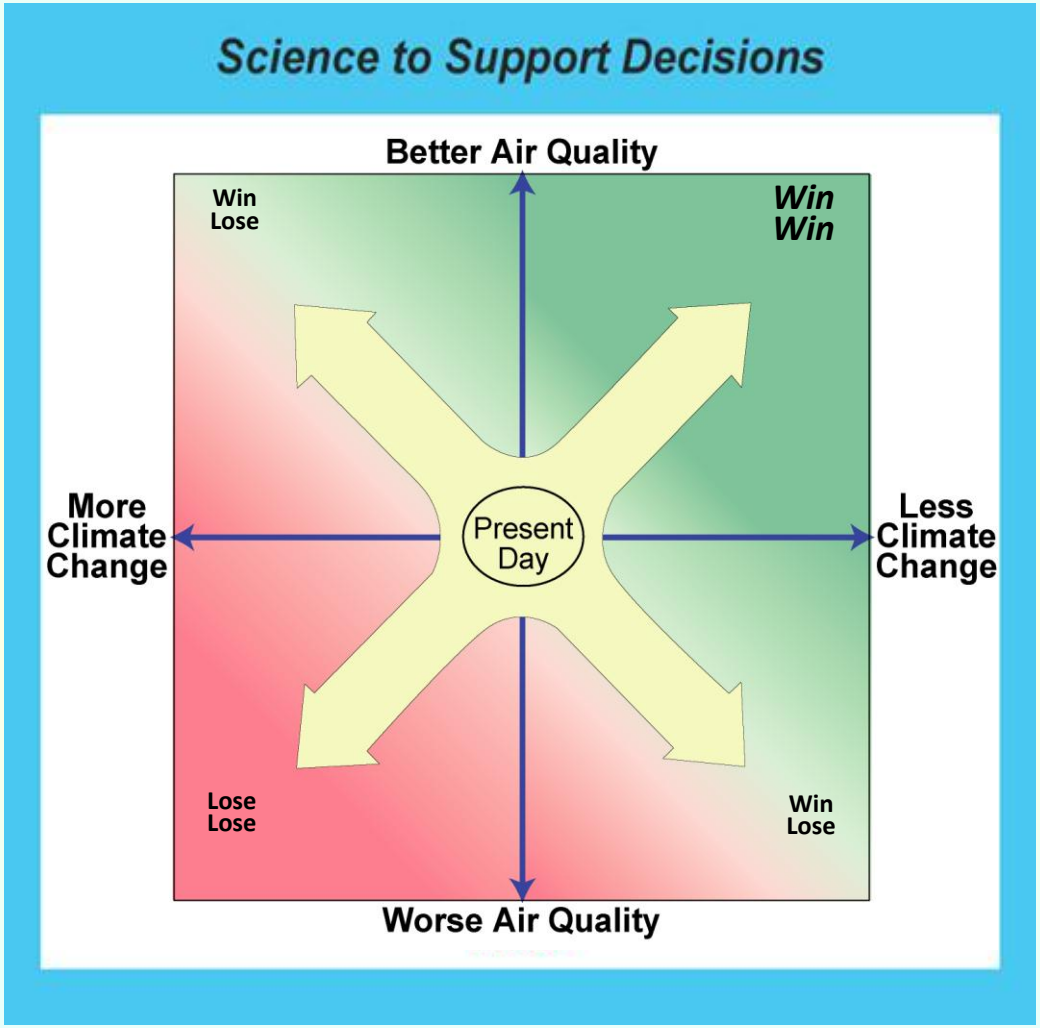
CalNex 2010 - *Research at the Nexus of Air Quality and Climate Change*

NOAA and CalNex: Goals and Contributions

David Parrish

NOAA/ESRL/Chemical Sciences Division



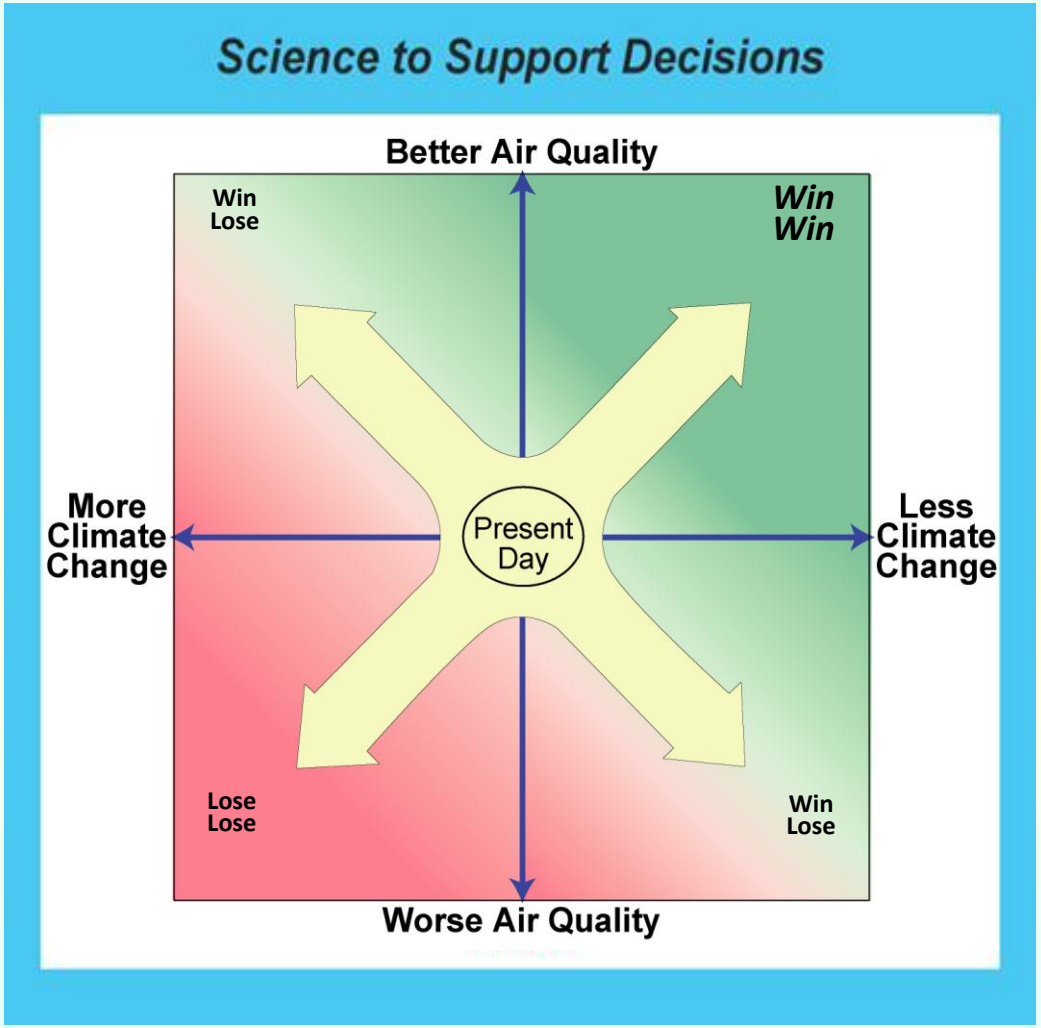
CalNex Data Workshop
Sacramento, 16 May 2011

http://esrl.noaa.gov/csd/calnex/

CalNex 2010 - *Research at the Nexus of Air Quality and Climate Change*

Today:

- Why is NOAA in CalNex?
- Review CalNex field measurements, including NOAA's
- NOAA's science issues



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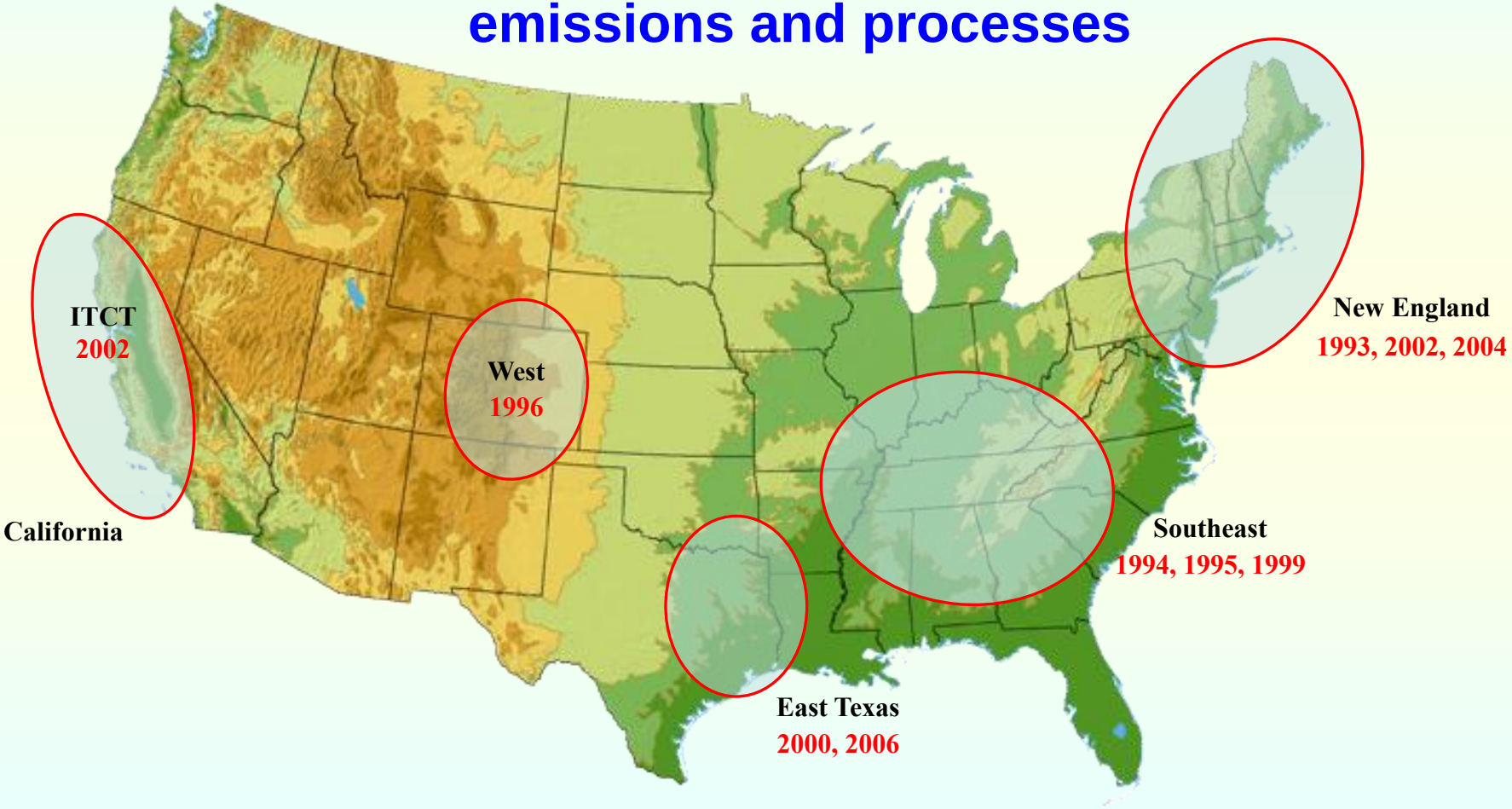
NOAA's Climate and Air Quality Regional Intensives

CalNex 2010 is our first effort in California with full capabilities, and with a major focus on regional emissions and processes

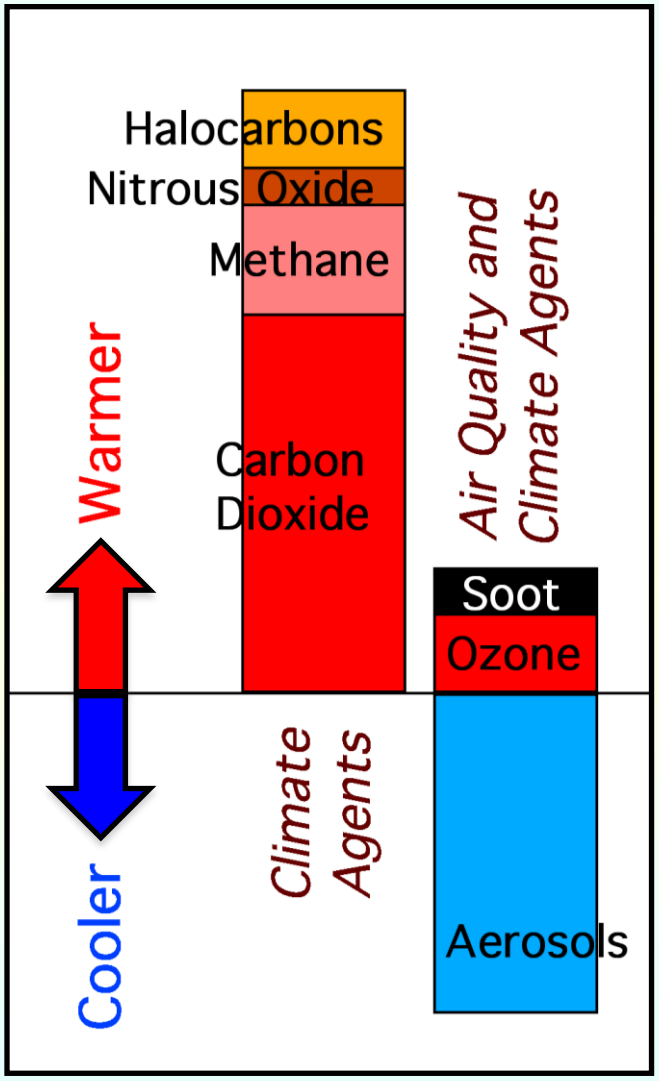


Chemically and Meteorologically Diverse

NOAA's Climate and Air Quality Regional Intensives
CalNex 2010: Focus on integrating these 2 issues

Benefits of dealing with climate change and air quality together

- **Major air pollutants—aerosols (including soot) and ozone—are also important climate change forcing agents.**
- **These "common agents" are short-lived (days to months), compared to centuries for CO_2. Can give quick payoffs for climate (years instead of many decades).**
- **Agents all have common sources (transportation, industry, agriculture, forests).**



IPCC 2007 AR4

CalNex: A step for the Nation toward providing information for integrated regional decision-making on air quality and climate

Why California?

- **California's leadership on these issues and its diversity of emissions make it an ideal testbed.**
- **Science information needed to support California's efforts at integrated climate and air quality management.**
- **California already has considerable efforts and capabilities that CalNex can leverage to benefit the Nation**

Payoffs from CalNex

- **Science-based options for air quality and climate decision-makers in California.**
- **Information that can be extended to other regions of the Nation.**

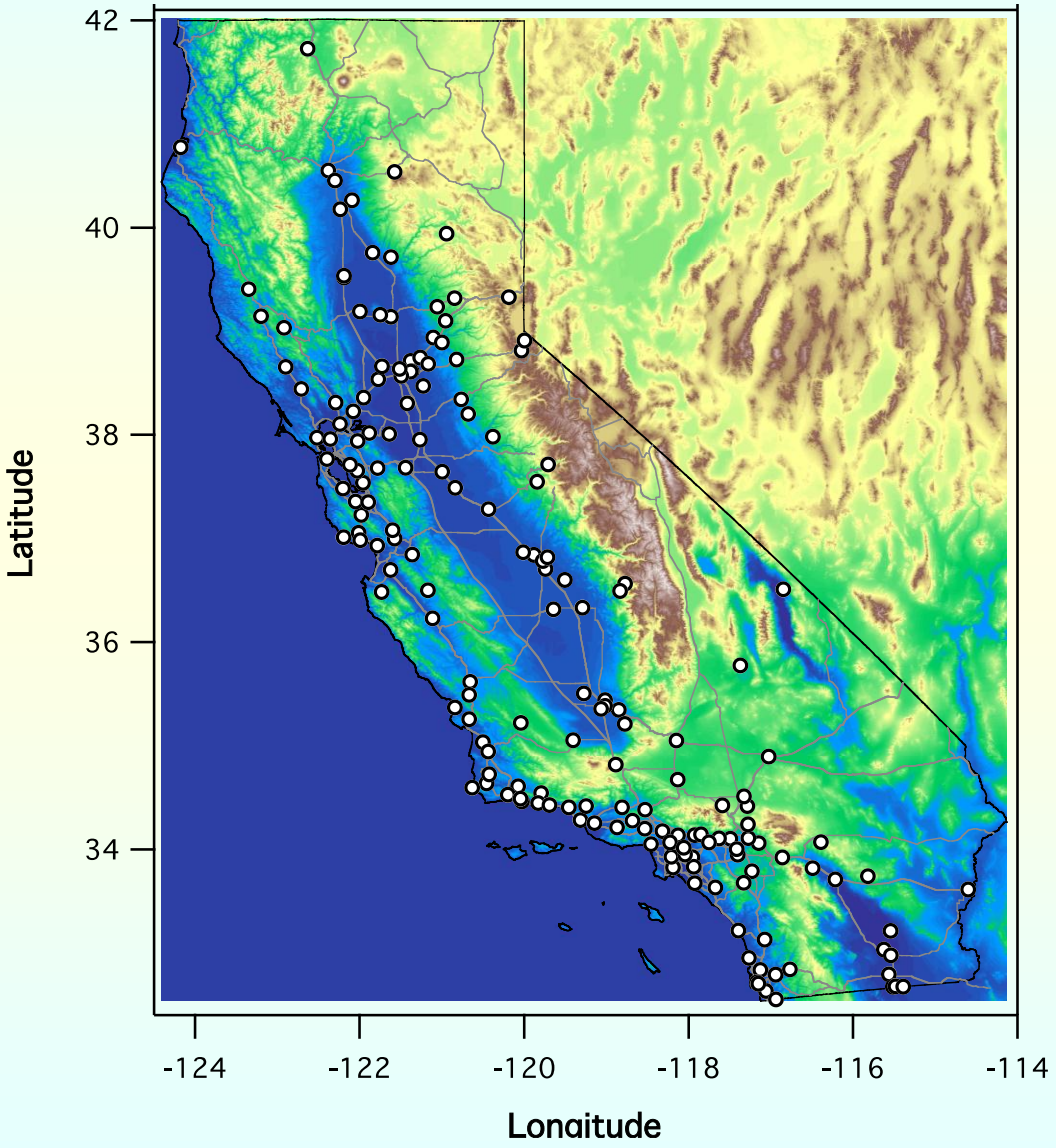
CalNex 2010: Field measurements

Ground-based monitoring stations

Long-term surface observations

http://www.arb.ca.gov/aqd/aqdpage.htm

Air Resources Board



CalNex 2010: Field measurements

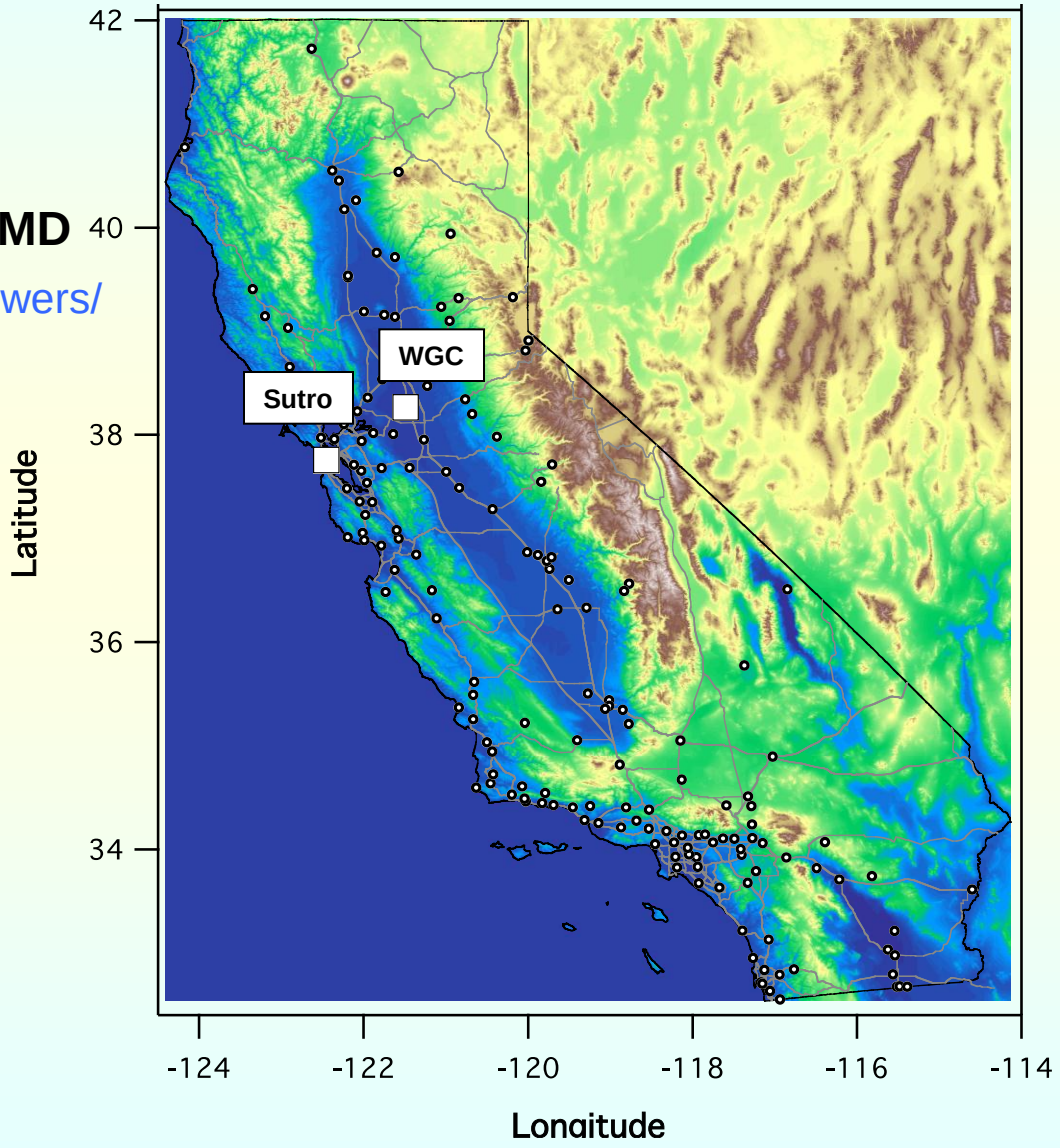
Long-term surface observations

Instrumented tall towers

Marc Fischer/LBL and NOAA/GMD

http://www.esrl.noaa.gov/gmd/ccgg/towers/

CALGEM (LBNL/NOAA) tall tower sites



CalNex 2010: Field measurements

Long-term surface observations

Instrumented tall towers

Major intensive ground sites

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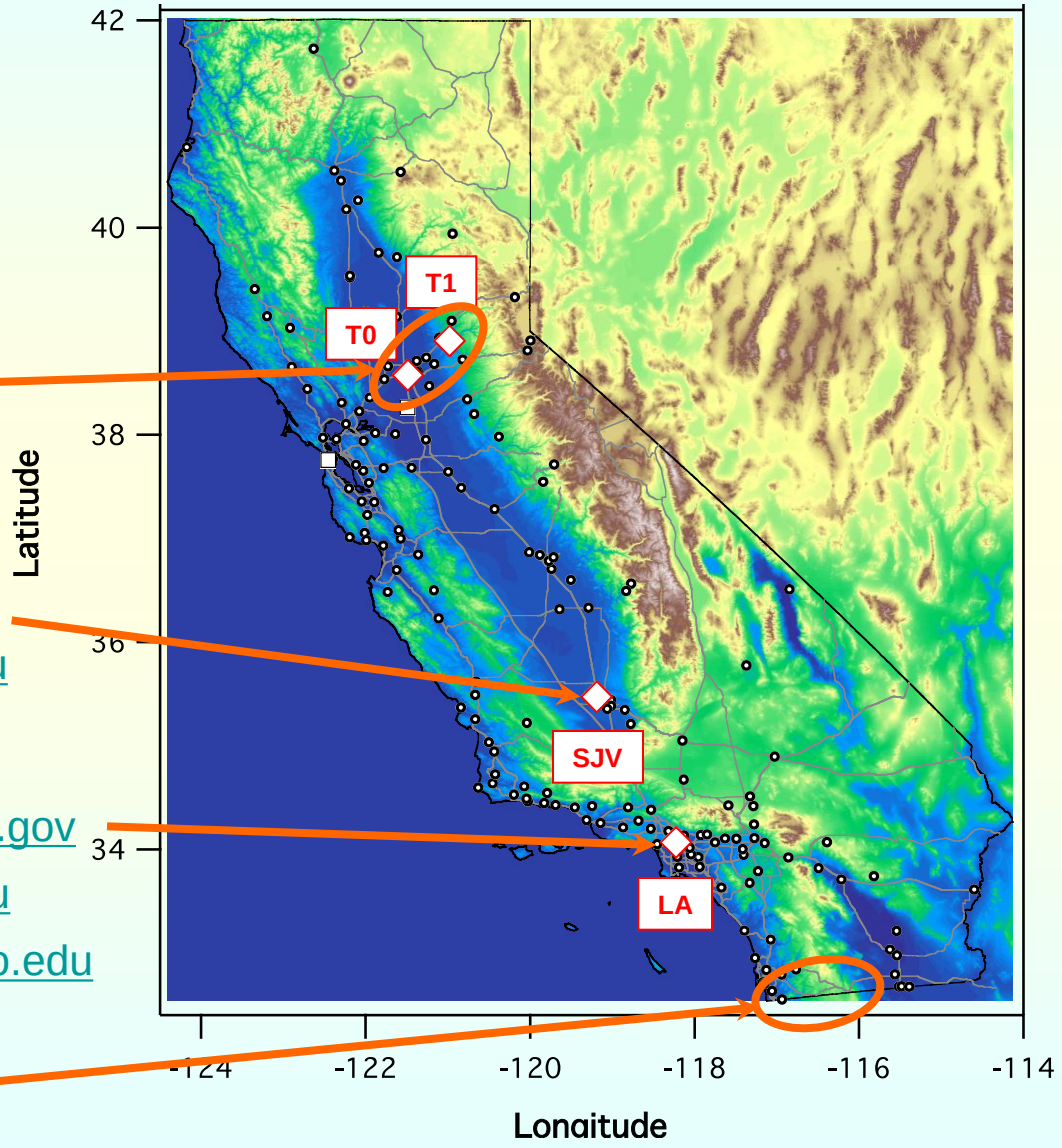
Major ground sites



CalNex 2010: Field measurements

Long-term surface observations

Instrumented tall towers

Major intensive ground sites

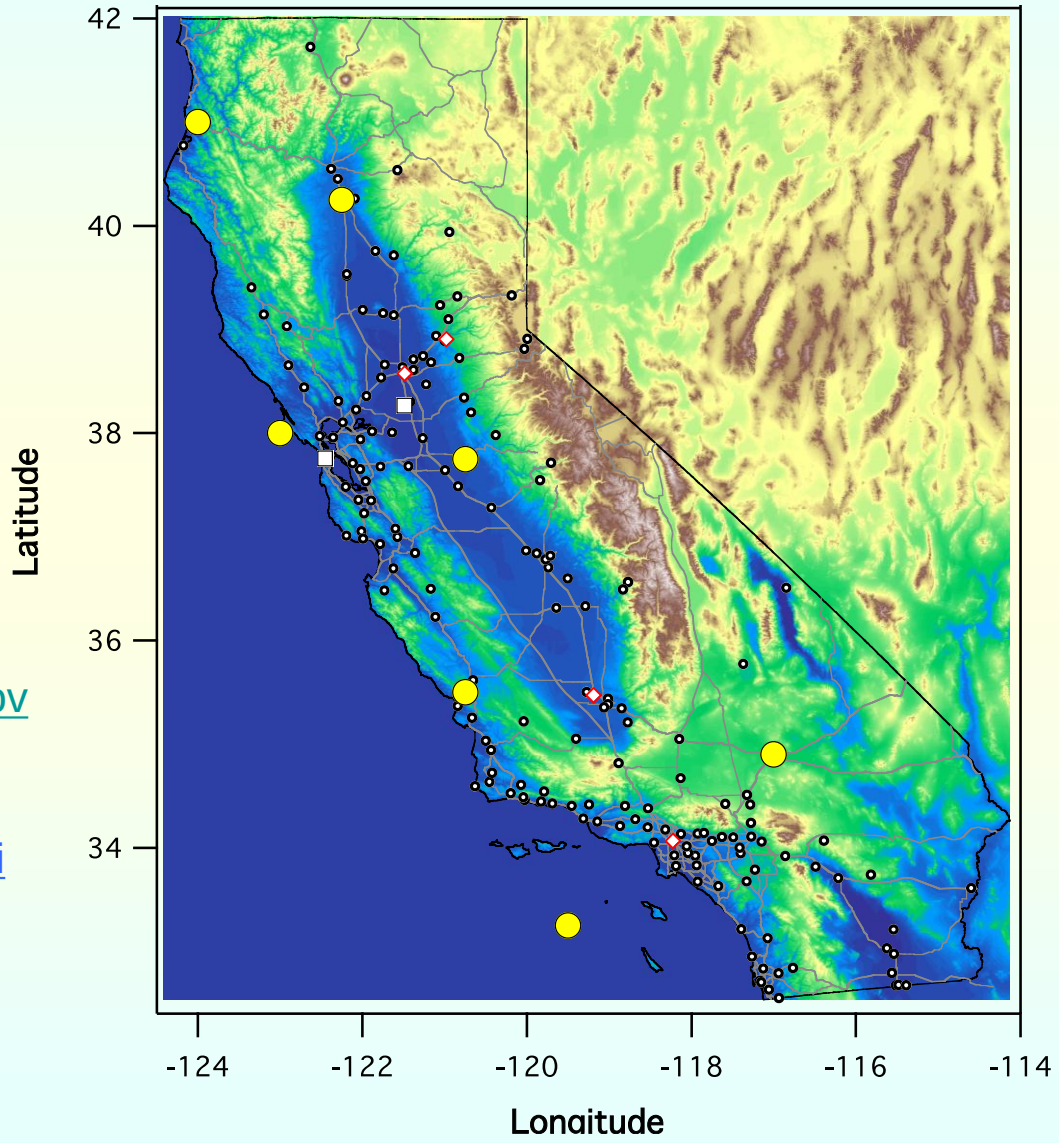
Daily ozonesonde launches

NOAA GMD, NOAA NWS, NASA, U.S. Navy

Owen Cooper Owen.R.Cooper@noaa.gov

http://www.esrl.noaa.gov/csd/metproducts/calnex/calnex_web/gif_archive/o3sondes/

IONS-2010 ozonesonde network



CalNex 2010: Field measurements

Long-term surface observations

Instrumented tall towers

Major intensive ground sites

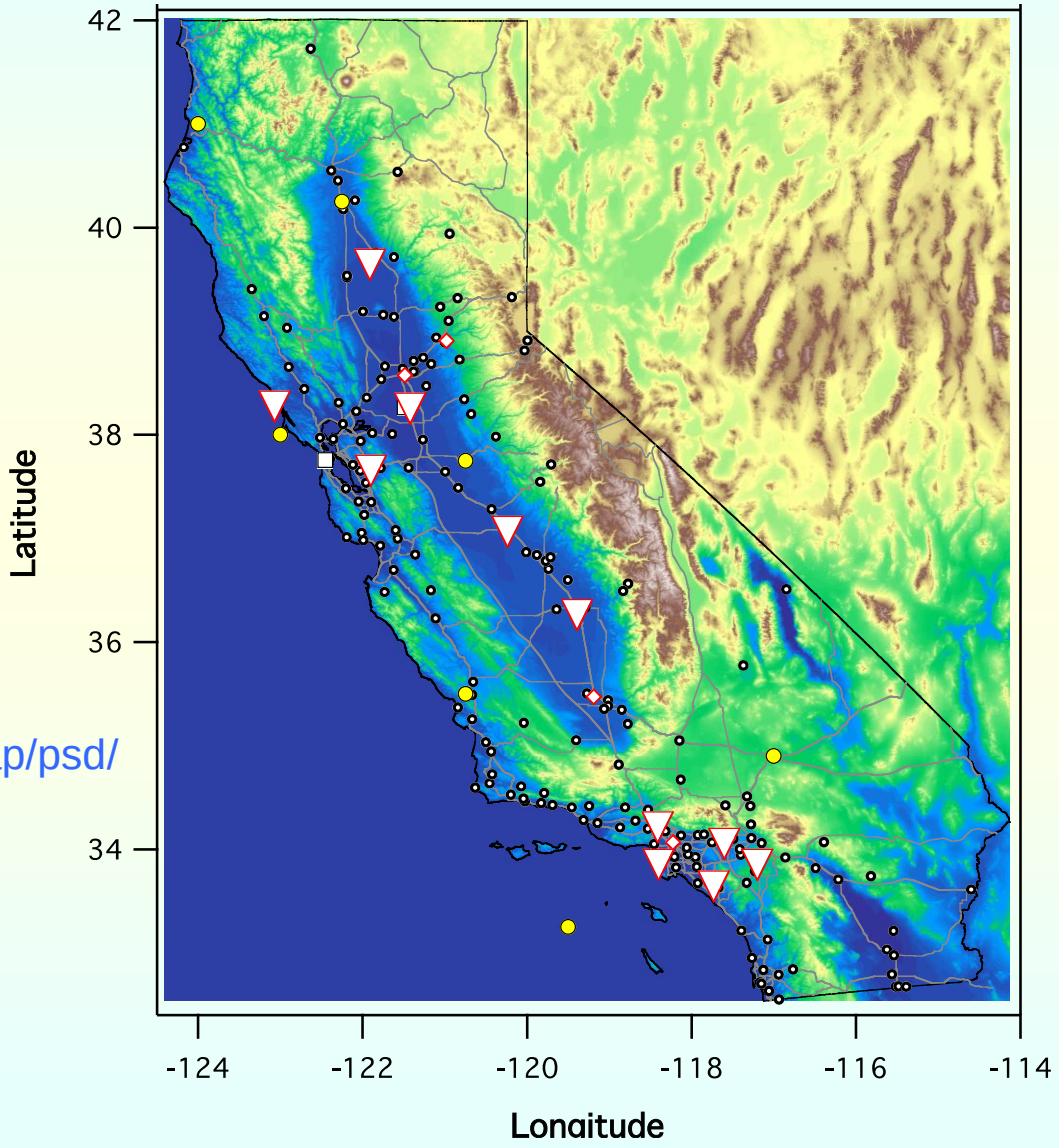
Daily ozonesonde launches

Radar wind profiler network

Allen White Allen.B.White@noaa.gov

http://esrl.noaa.gov/psd/data/obs/sitemap/psd/

NOAA, Air Districts, others



CalNex 2010: Field measurements

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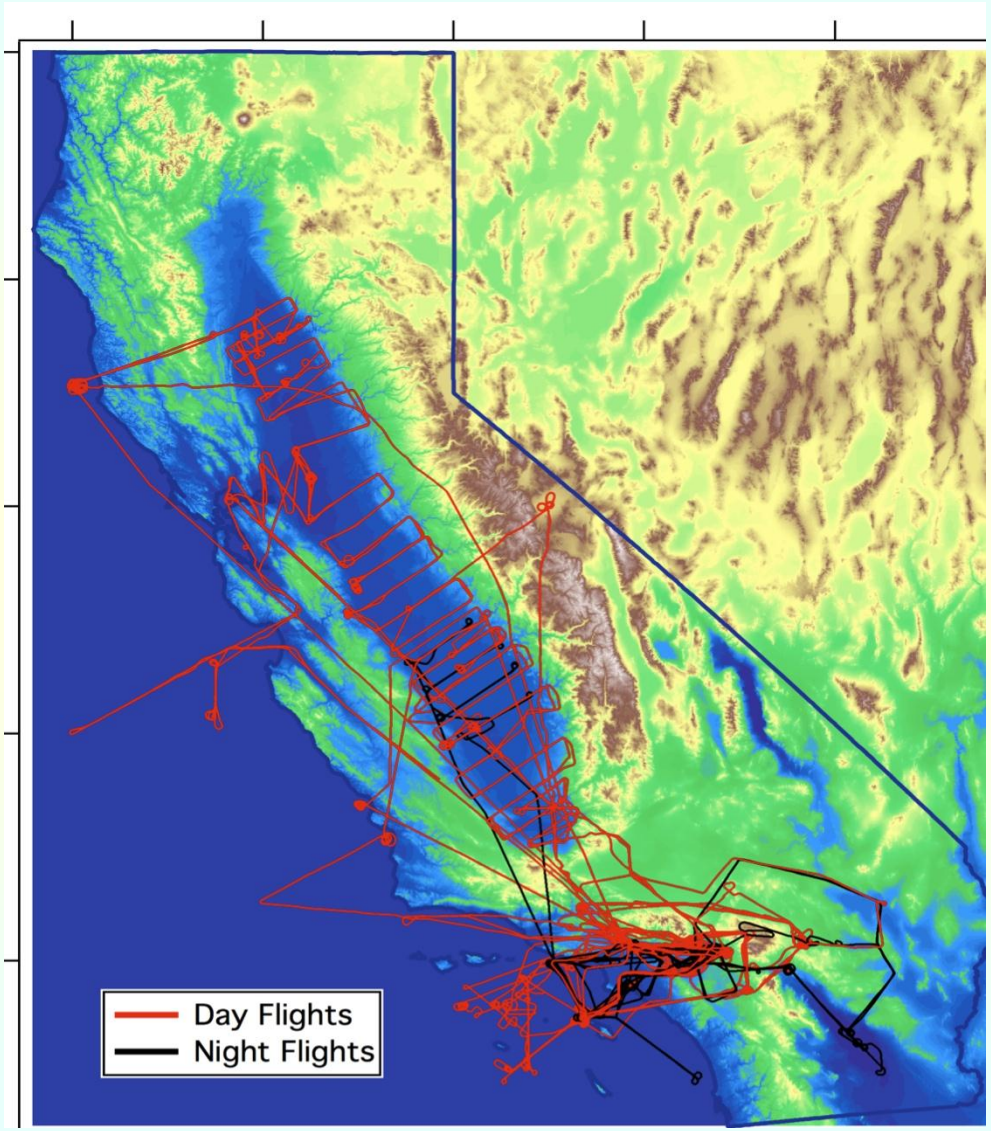
Mobile research platforms

- **NOAA WP-3D**
- **NOAA Twin Otter**
- **CIRPAS Twin Otter**
- **NASA King Air**
- **DOE G-1**
- ***R/V Atlantis***

Satellite observations

- **TES, OMI, Sciamachy, IASI**

NOAA WP-3D flights

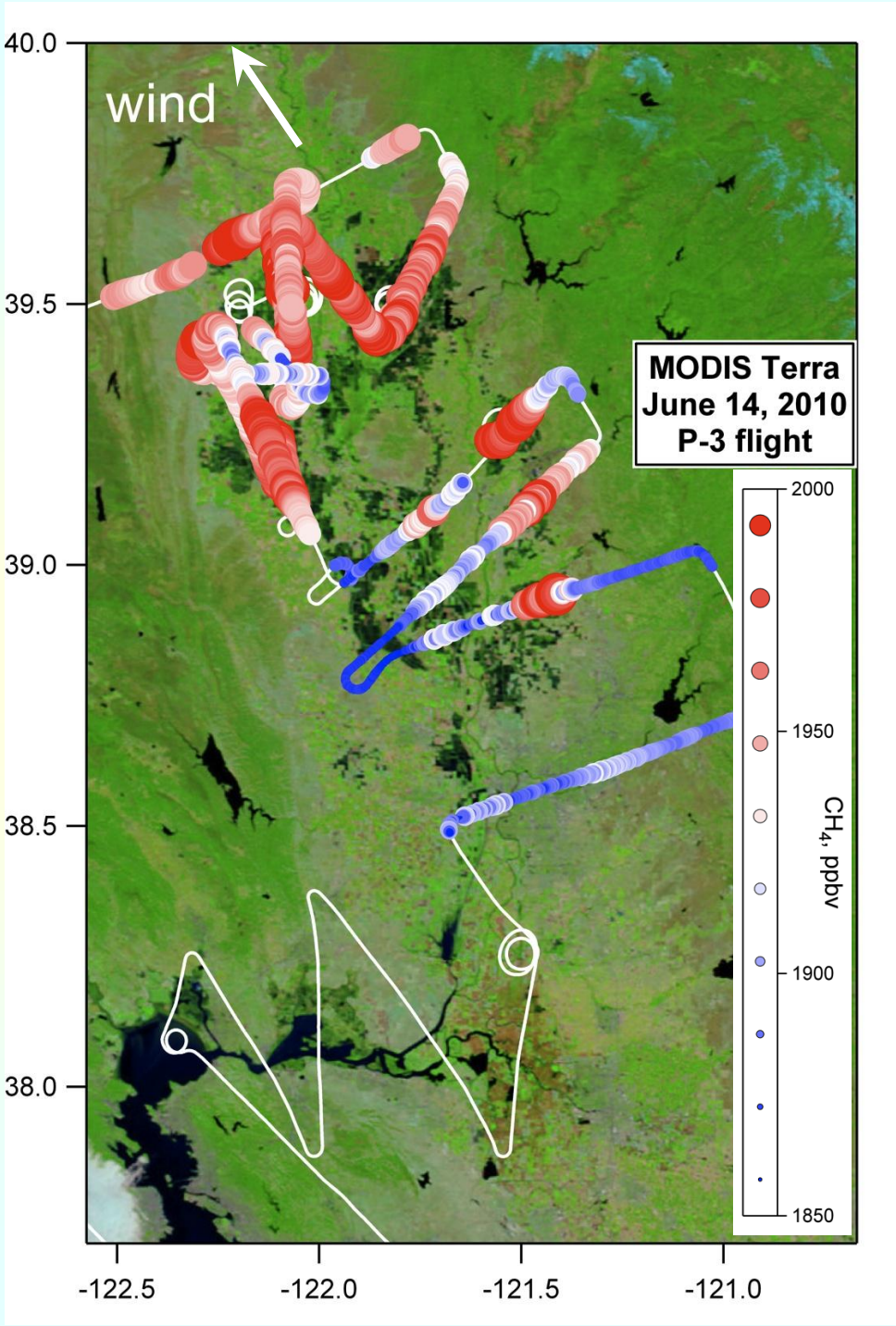


NOAA's Science Issues

- **Emissions Quantification** - Greenhouse Gases and O_3 and Aerosol Precursors – **improved emission inventories, particular focus on GHG,** soot **and sulfur emissions.**

- **Example:** Methane emissions from rice agriculture

  Jeff Peischl – Tues. am

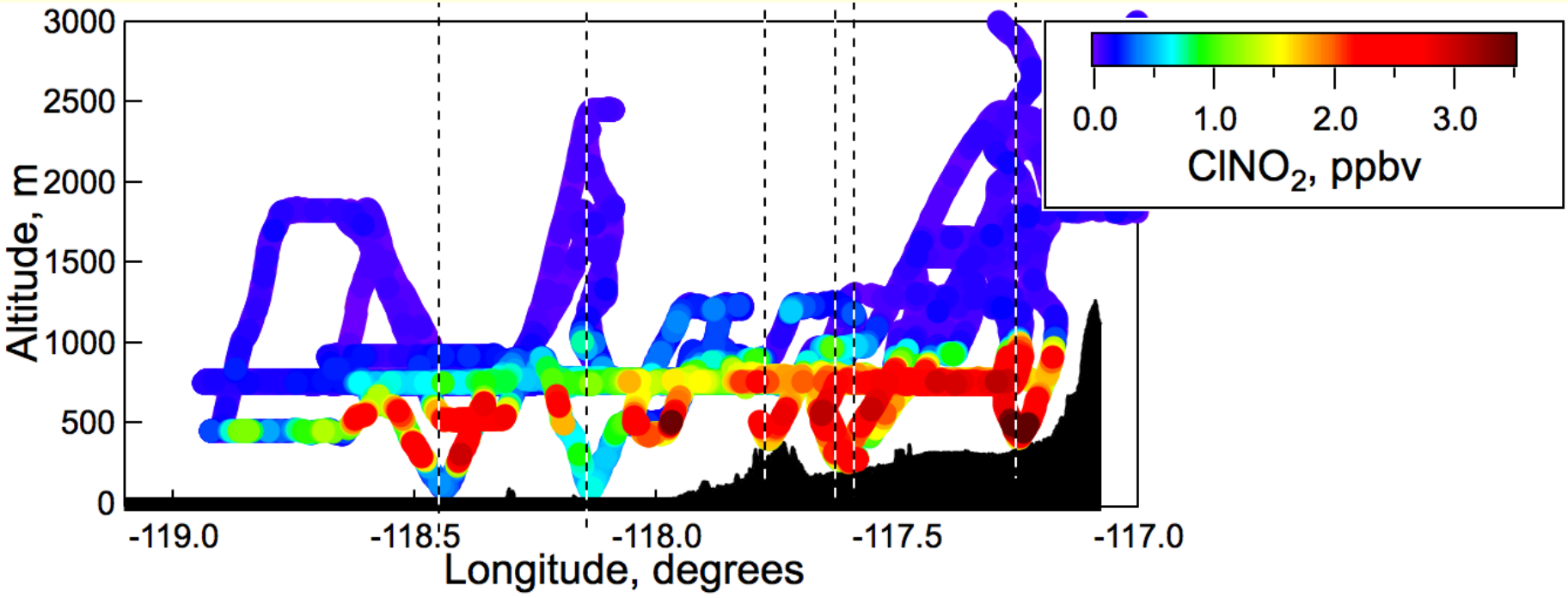


NOAA's Science Issues

- **Chemical Transformation** - O_3 and Aerosols, Day and Night, Gas-Phase and Heterogeneous – improved chemical mechanisms for air quality modeling, particular focus on organic and sulfate formation.

- **Example:** Nighttime formation of nitryl chloride

Jim Roberts – Tues. PM

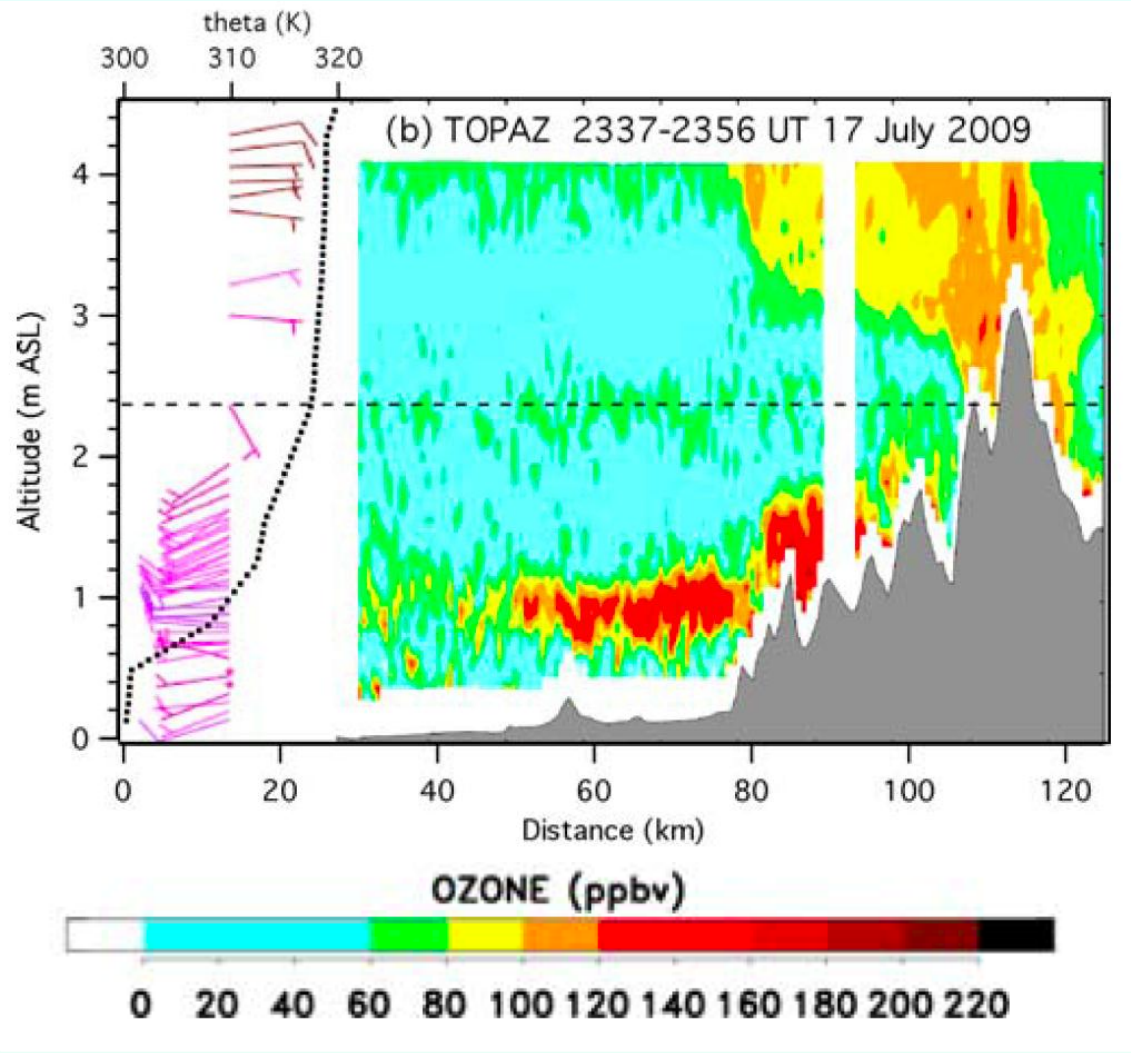


NOAA's Science Issues

Langford, A. O., et al. (2010), Geophys. Res. Lett., 37, L06807, doi:10.1029/2010GL042507.

- **Transport and Mixing - Intercontinental, Inter- and Intra-state, Boundary Layer/Free Troposphere – improved understanding of how we are affected, and affect, our neighbors.**

- **Use chemical measurements with models to define pathways for export of LA Basin and Central Valley pollution**



Chris Senff, Andy Langford – Wed. AM

NOAA's Science Issues

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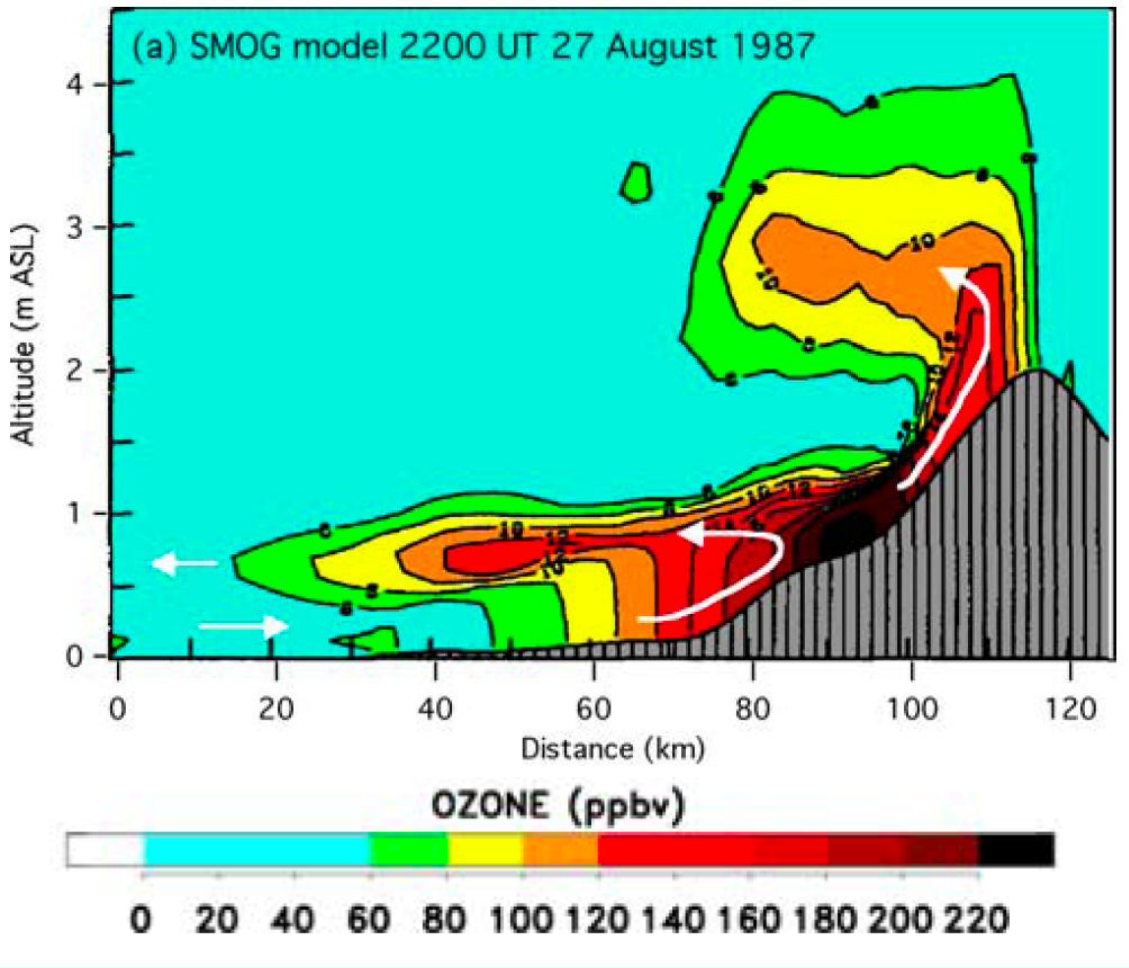
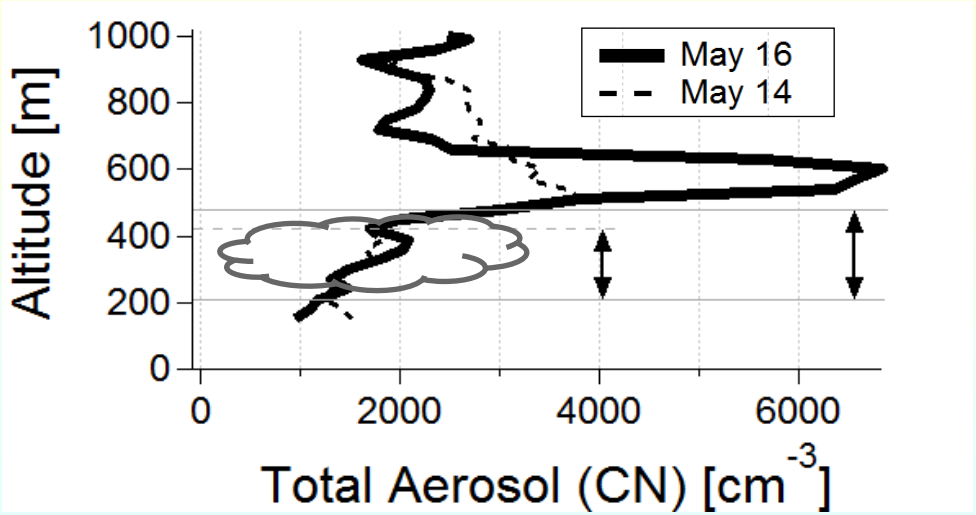


Chris Senff, Andy Langford – Wed. AM

NOAA's Science Issues

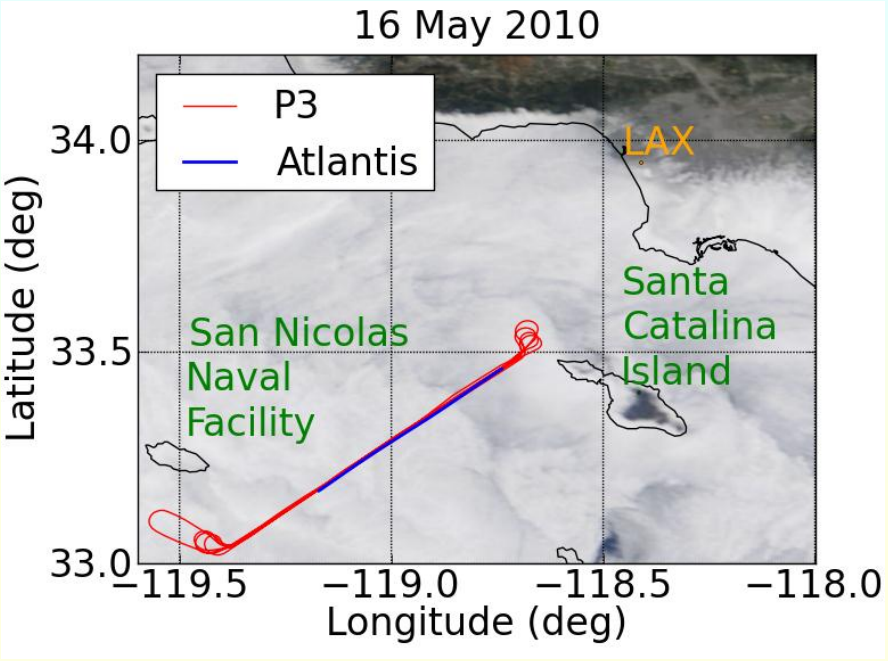
- **Aerosol Properties and Radiative Effects - Regional Haze, Direct Radiative Forcing, Cloud-Aerosol Interactions, Satellite Validation – Reduced uncertainty in the role of aerosols in climate – Improved understanding of role black carbon plays in climate**

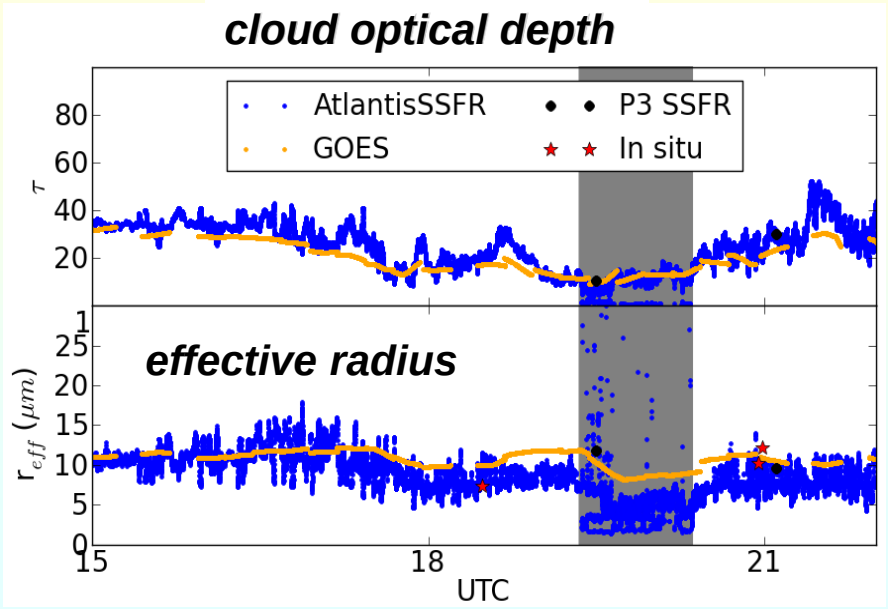
Effect of marine stratus on new particle formation (NPF) rates



Sara Lance et al.

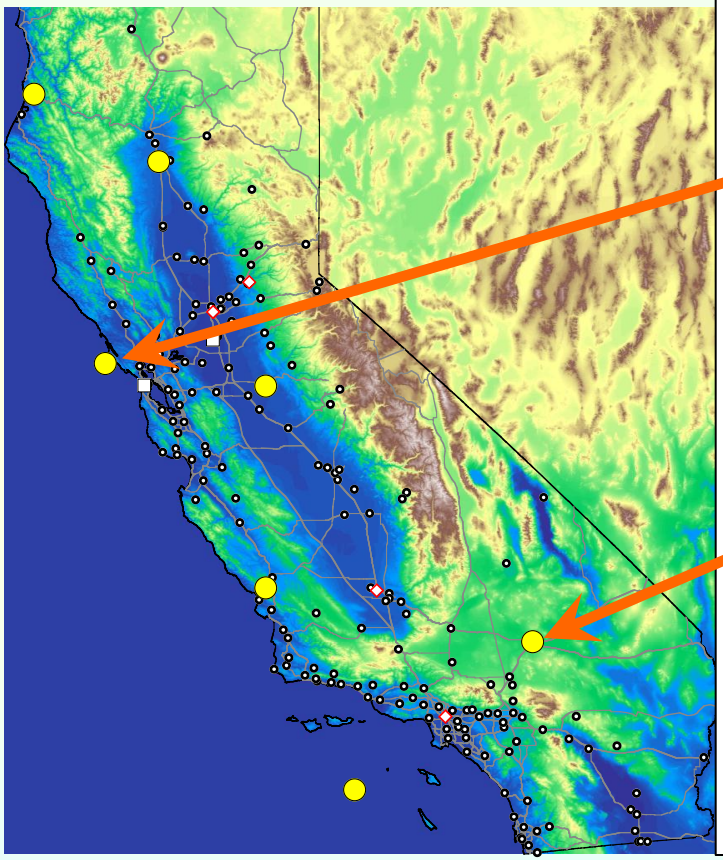
Ship-Plane-Satellite Intercomparisons **of Cloud Measurements**

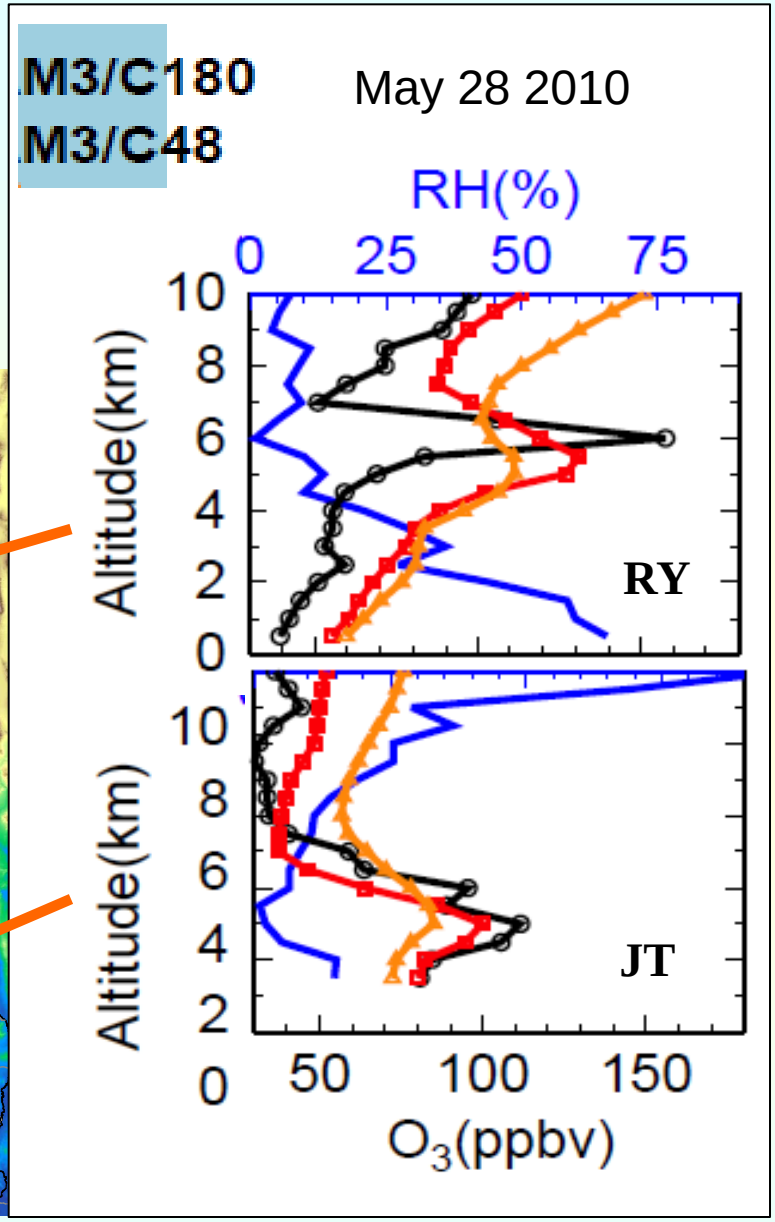




NOAA's Science Issues

- **Model Development – Diagnostic Evaluation of Global and Regional Climate Models, Forecast Models, Chemical Data Assimilation.**



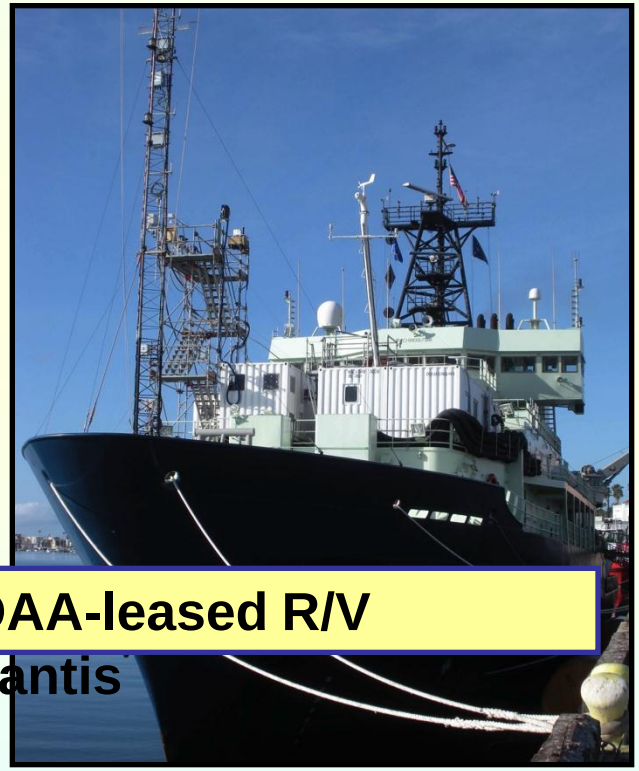


Meiyun Lin and Arlene Fiore – Preliminary results from NOAA GFDL AM3 Global Climate Model at high-res (c180) and coarse-res (c48)

NOAA's Contributions

NOAA WP-3D

Contributions to Los Angeles surface site instrumentation and Tall Towers



NOAA-leased R/V Atlantis

Funding for CIRPAS Twin Otter aircraft – SOA formation in California

NOAA O_3 and Aerosol LIDAR Aircraft

Contributions to O_3-sonde and radar wind profiler networks