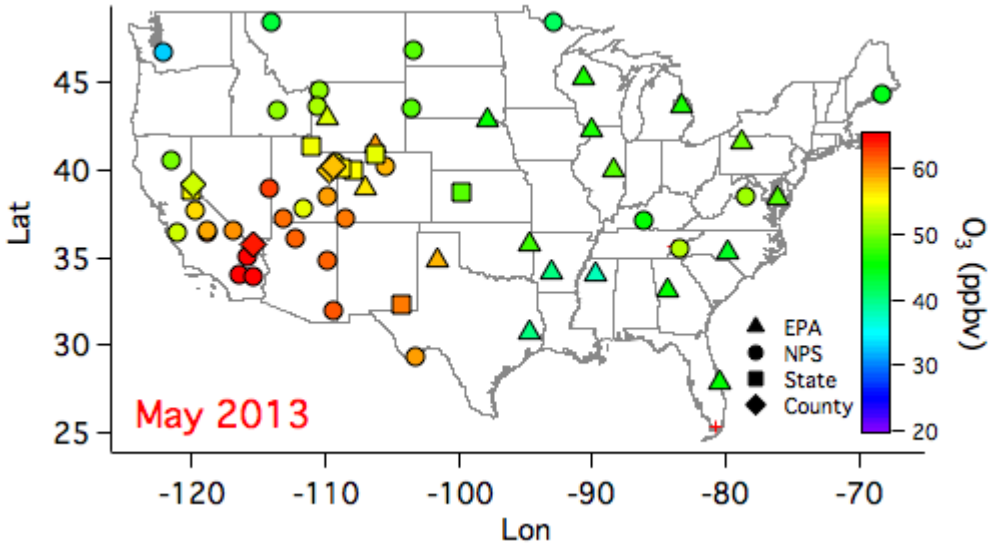
Regional surface ozone: is it locally controlled?

Andrew Langford

Springtime O_3 often exceeds National Ambient Air Quality Standard (NAAQS) in rural Southwest

Mean 8-h O_3 in May >60 ppbv in some remote areas



CSD research seeks to explain where this O_3 comes from

Los Angeles? Wildfires? Asia? Stratosphere?

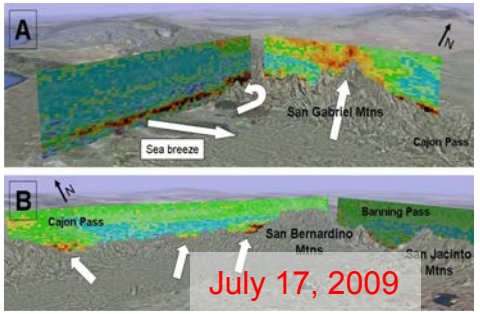
How does **CSD** address this question?

1. We combine unique ozone lidars developed at **CSD** with in situ **measurements** to investigate O_3 transport.

Airborne TOPAZ

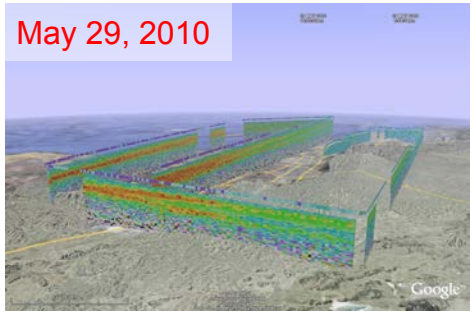
Alvarez et al. 2011

Pre-CalNex (2009)



Regional (Langford et al. 2010)

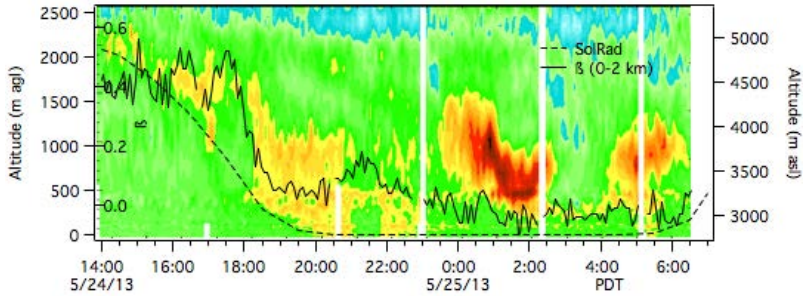
CalNex (2010)



Stratosphere (Langford et al. 2012)

Mobile TOPAZ

Las Vegas Ozone Study (2013)



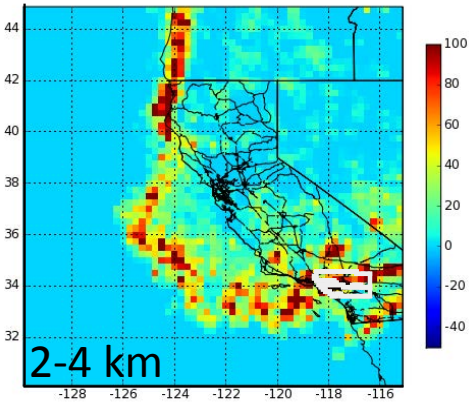
Stratosphere/Asia/fire (Langford et al. 2015)

How does **CSD** address this question?

2. We use NOAA **models** to help predict transport events in the field and interpret the measurements.

CSD FLEXPART model

May 29, 2010

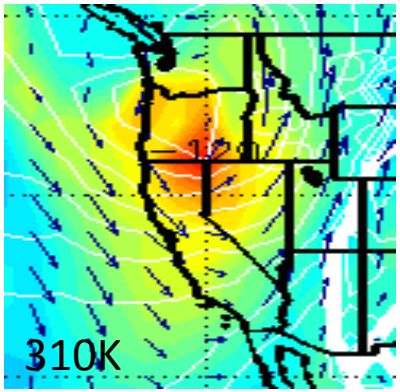


FLEXible PARTicle model

J. Brioude

NESDIS RAQMS model

May 29, 2010

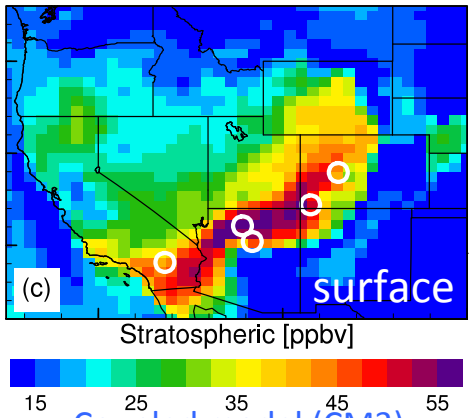


Real time Air Quality Model

R.B. Pierce

GFDL AM3 model

May 29, 2010



Coupled model (CM3)

M.-Y. Lin

Stratospheric intrusion event during CalNex 2010

What does **CSD** do with this information?

Working with stakeholders:
Las Vegas Ozone Study (LVOS)

Jan 2013: Clark County, NV asks **CSD** to help explain high springtime O_3.

Feb-Apr 2013: **CSD** *develops* research plan to be funded by Clark County.

May-June 2013: **CSD** *conducts* measurement campaign and begins analysis.

Jul-Aug 2014: **CSD** *publishes* LVOS findings in peer-reviewed journal.

2015: *Clark County uses* ***CSD*** *results to produce* ***Exceptional Events Report*** *for EPA.*

Future Plans

- Continue targeted O_3 process studies like LVOS.
- Coordinate with TOLNet (*Tropospheric Ozone Lidar Network).*
- Conduct fire plume analyses for FIREX campaign.

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Relevant Publications (2009-present)

A. O. Langford, K. C. Aikin, C. S. Eubank, E. J. Williams, Stratospheric contribution to high surface ozone in Colorado during springtime. *Geophys. Res. Lett.* **36**, (2009).

A. O. Langford, C. J. Senff, R. J. Alvarez, R. M. Banta, R. M. Hardesty, Long-range transport of ozone from the Los Angeles Basin: A case study. *Geophys. Res. Lett.* **37**, (2010).

R. J. Alvarez II *et al.*, Development and Application of a Compact, Tunable, Solid-State Airborne Ozone Lidar System for Boundary Layer Profiling. *J. Atmos. Oceanic Tech.* **28**, 1258 (2011).

A. O. Langford *et al.*, Comparison between the TOPAZ airborne ozone lidar and in situ measurements during TexAQS 2006. *J. Atmos. Oceanic Tech.* **28**, doi: 10.1175/JTECH (2011).

A. O. Langford *et al.*, Stratospheric influence on surface ozone in the Los Angeles area during late spring and early summer of 2010. *J. Geophys. Res.* **117**, (2012).

M. Y. Lin *et al.*, Springtime high surface ozone events over the western United States: Quantifying the role of stratospheric intrusions. *J. Geophys. Res.* **117**, (2012).

A. O. Langford *et al.*, An overview of the 2013 Las Vegas Ozone Study (LVOS): Impact of stratospheric intrusions and long-range transport on surface air quality. *Atmos. Environ.* **in press**, (2015).