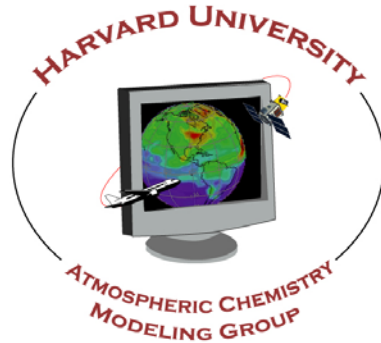


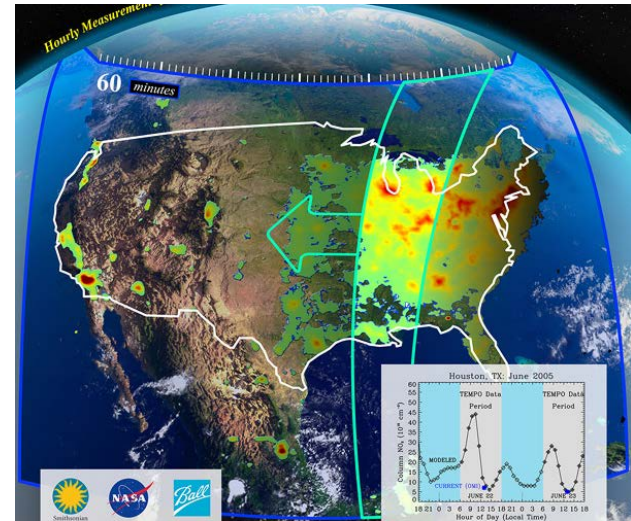
Observing North American background ozone from geostationary orbit



Peter Zoogman, Daniel J. Jacob, Kelly Chance,
Arlene Fiore, Meiyun Lin
GEOS-Chem User's Meeting
May 9, 2013

Viewing the Background from GEO

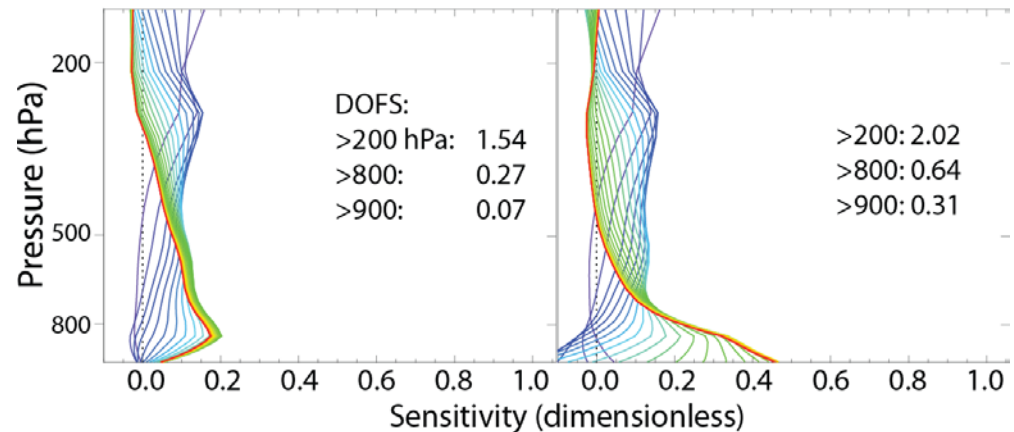
TEMPO 2017-2018



Ozone sensitivities, TEMPO

UV

UV+Vis

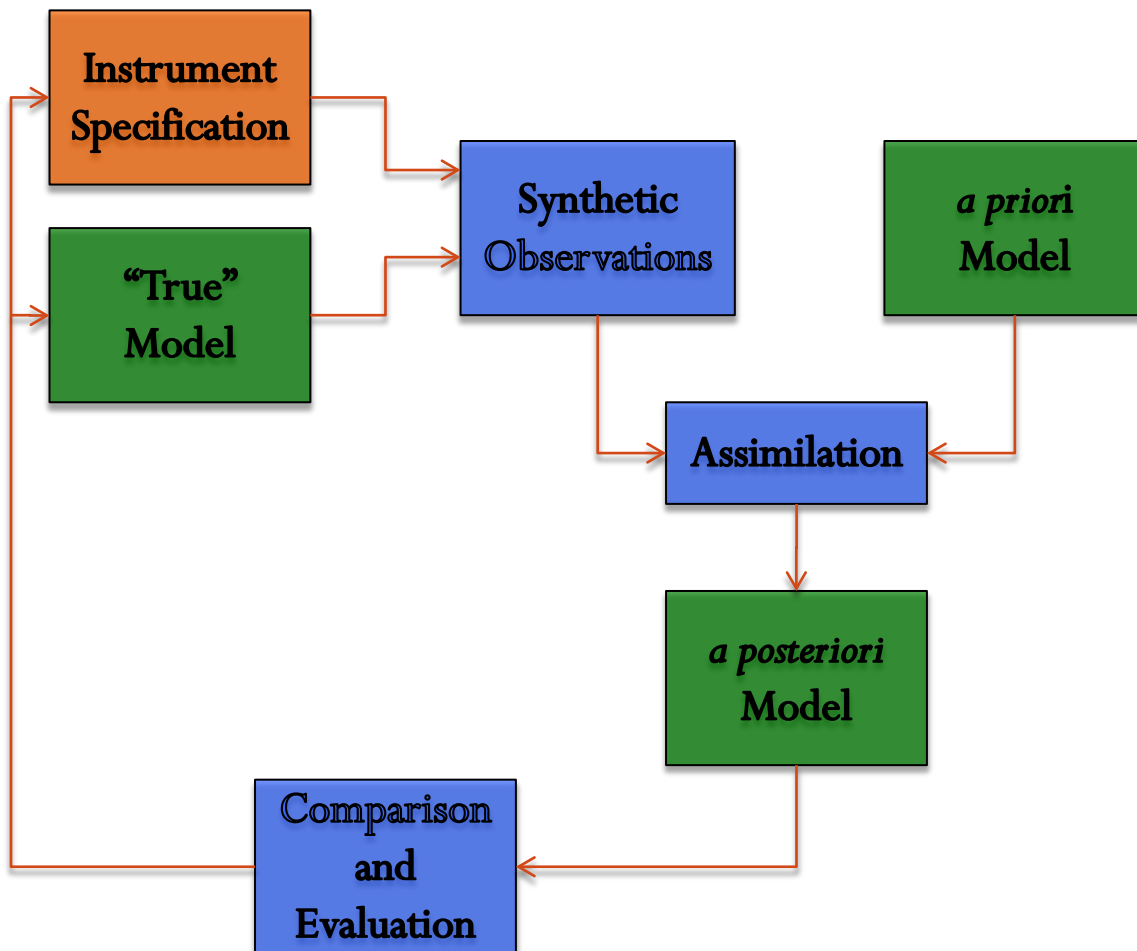


[Natraj et al, 2011]

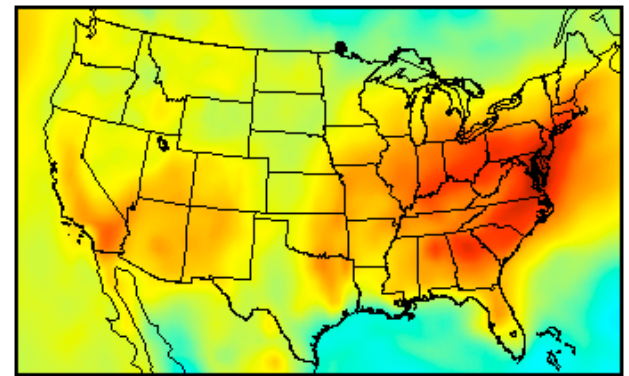
- O_3 that would occur in the absence of anthropogenic emissions in the U.S., Canada, and Mexico.
- Sets limit on levels achievable through domestic controls
- How can we quantify the gain from adding geostationary observations?

Observing System Simulation Experiment

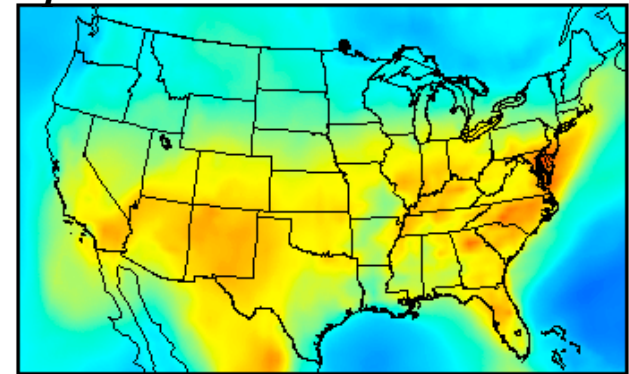
- What additional information is provided by addition of a new instrument to an existing observing system?



"Truth" = AM3-Chem model

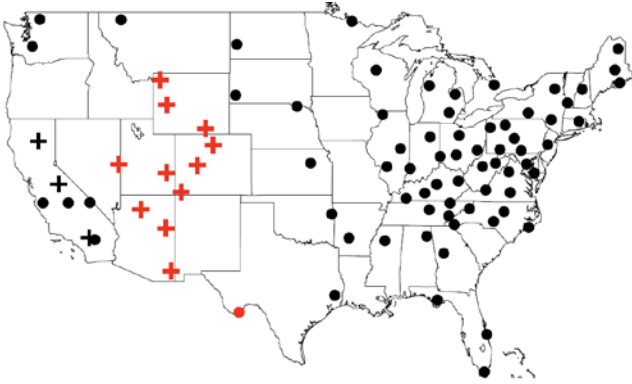


a priori = nested GEOS-Chem



0 16 32 48 64 80 ppbv

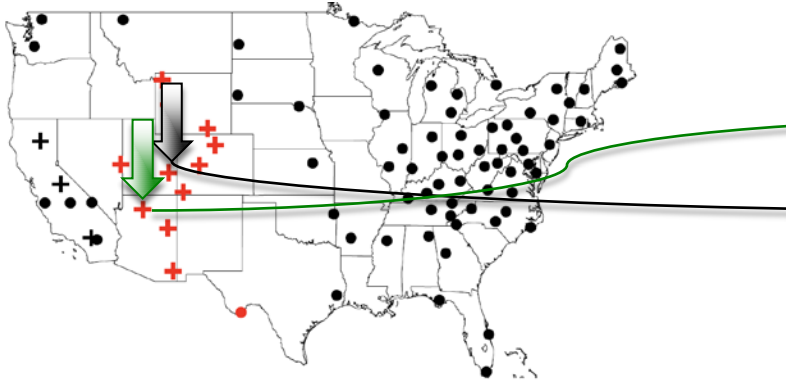
Surface Measurements



CASTNET ozone monitoring sites
in the continental United States

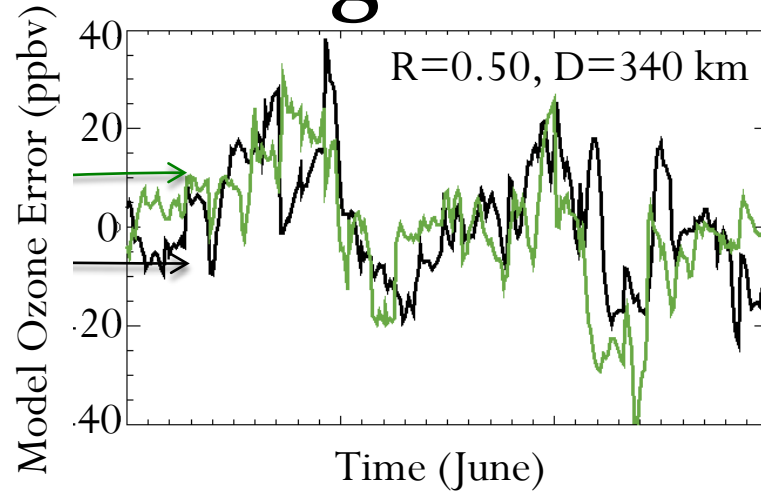
- Surface measurements can provide information in the vicinity, but how far away?
- Magnitude of correction is quantified by the ozone error correlation

Error Correlation Length Scale

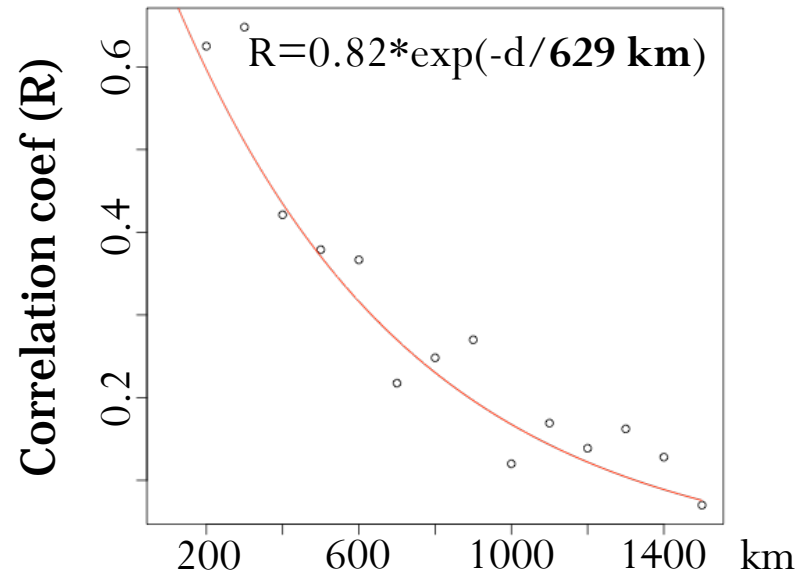


CASTNET ozone monitoring sites in the continental United States

- Surface measurements can provide information in the vicinity, but how far away?
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Horizontal Scale

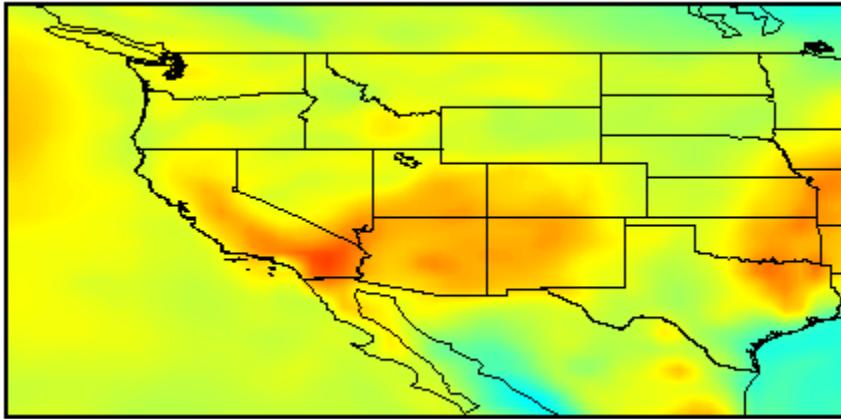


Vertical Scale: $R=0.84*\exp(-z/2.2 \text{ km})$

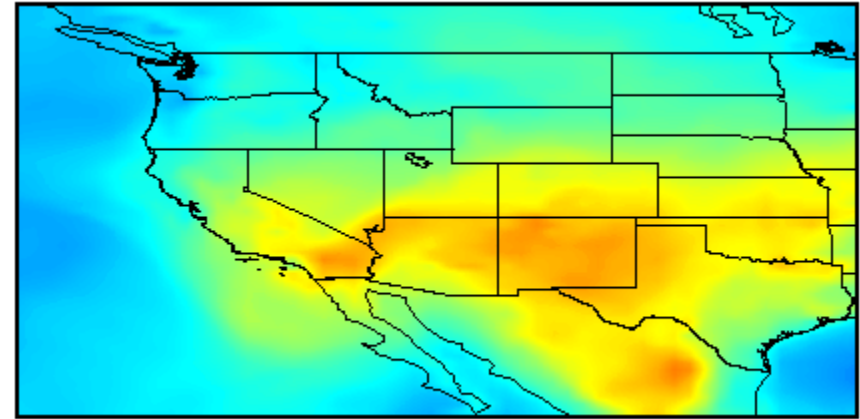
Correction to Ozone Air Quality

MDA8 Ozone, June 1-15 2010

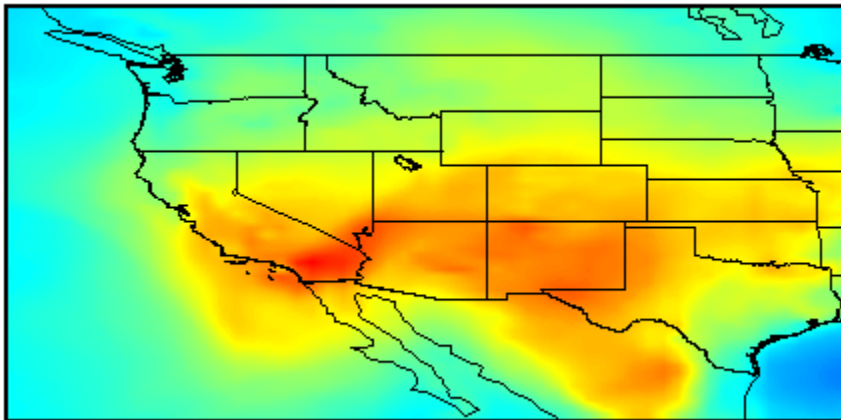
“Truth”



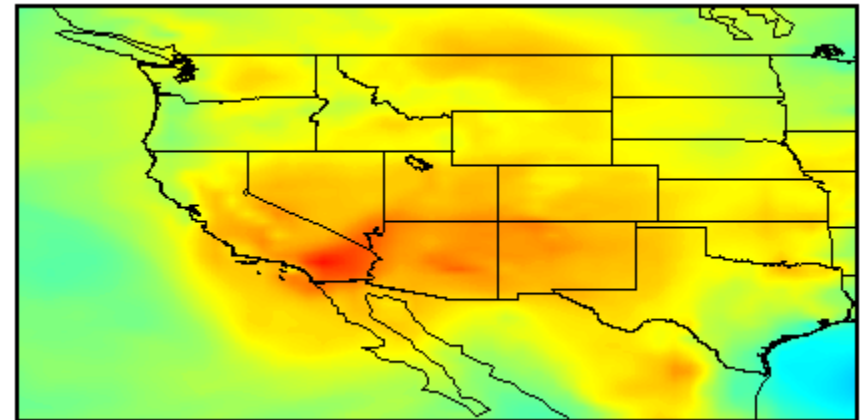
GEOS-Chem



GEOS-Chem + Surface Stations



GEOS-Chem + Surface + GEO Satellite



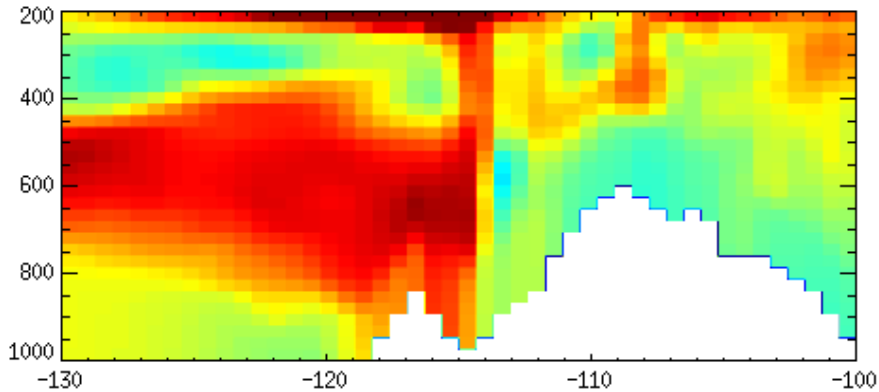
Surface stations correct mean bias – leads to overestimates where ozone is high
Satellite measurements better capture spatial variability

Observing a Transpacific Plume

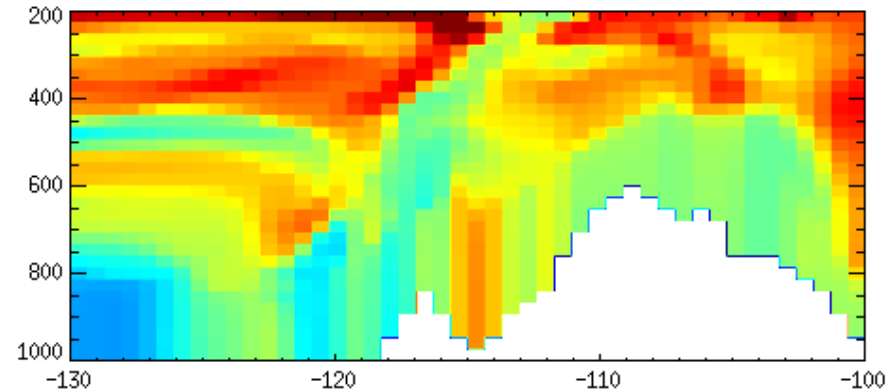
Ozone, 10 June 2010, 1800 GMT

Latitude Transect at 34° N (Through LA)

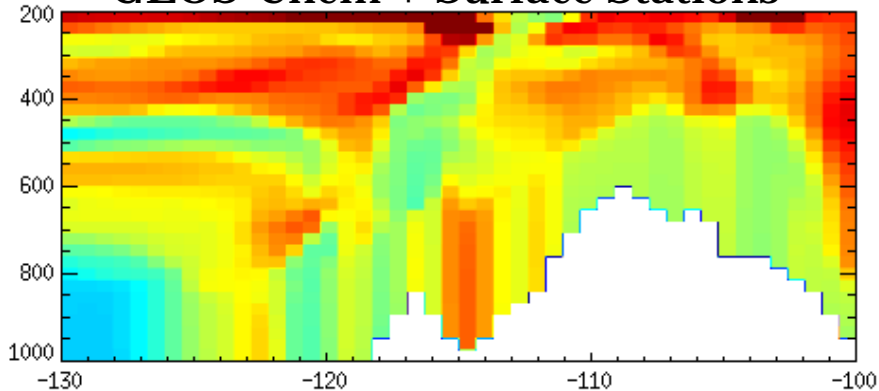
“Truth”



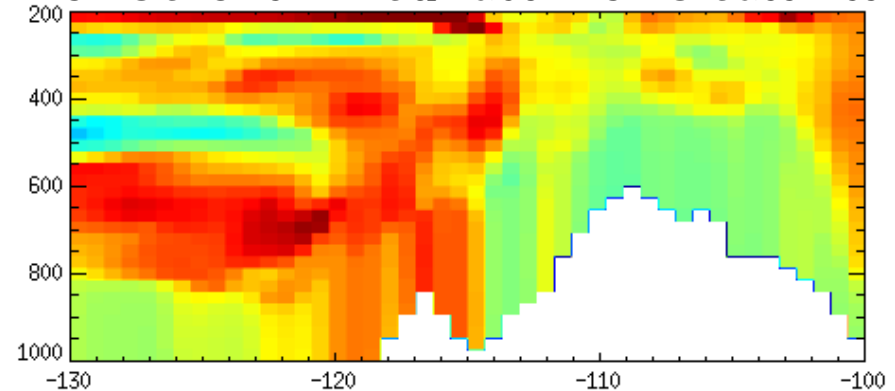
GEOS-Chem



GEOS-Chem + Surface Stations



GEOS-Chem + Surface + GEO Satellite



GEO Satellite measurements allow model to capture large transpacific plume and its influence on California surface ozone

