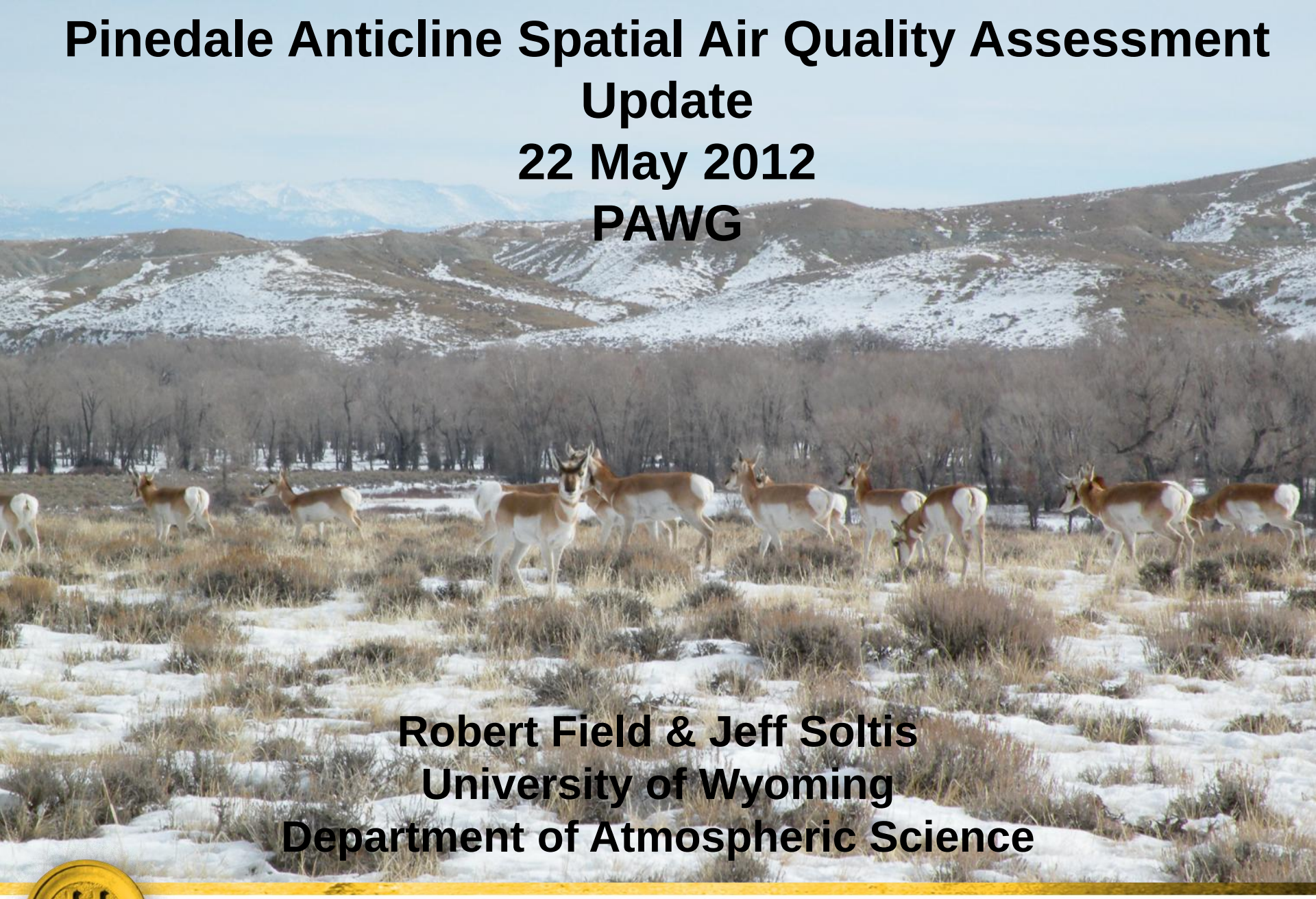
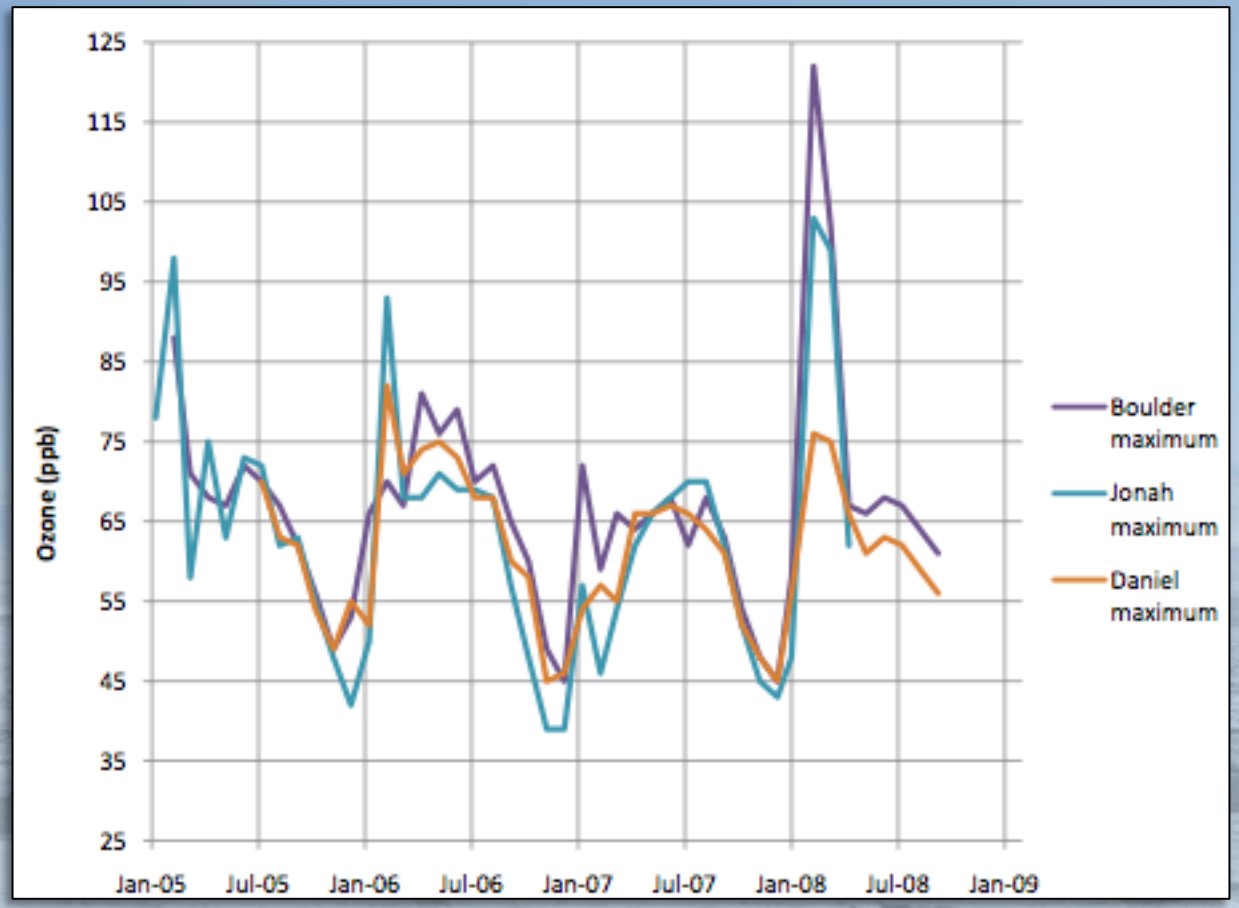
Pinedale Anticline Spatial Air Quality Assessment Update
22 May 2012
PAWG



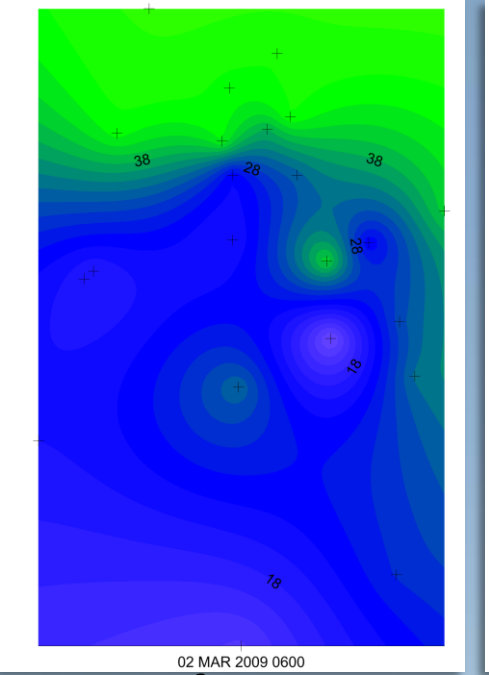
Robert Field & Jeff Soltis
University of Wyoming
Department of Atmospheric Science

UNIVERSITY OF WYOMING



Monthly 8-Hour Maximum Ozone Within the UGRB

Source: State of Wyoming, 2009



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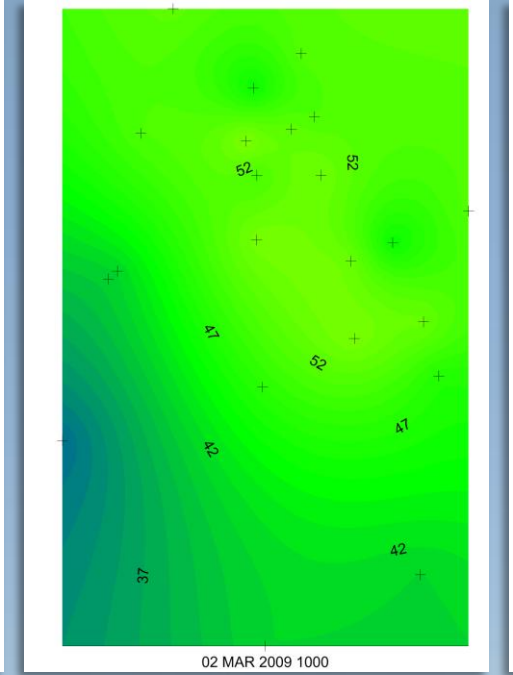

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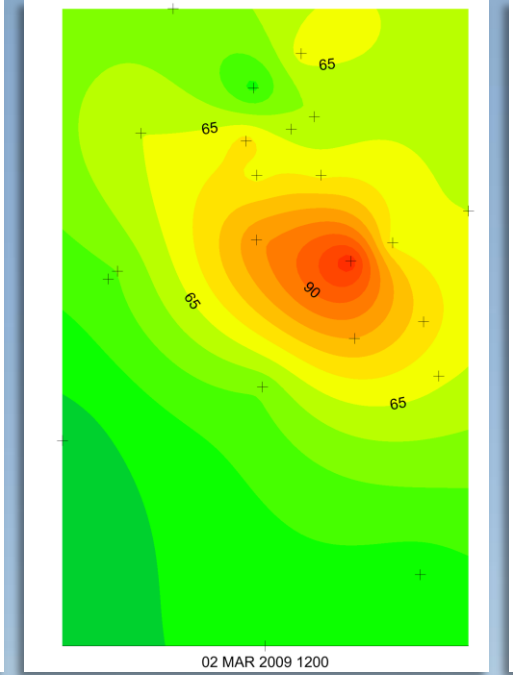

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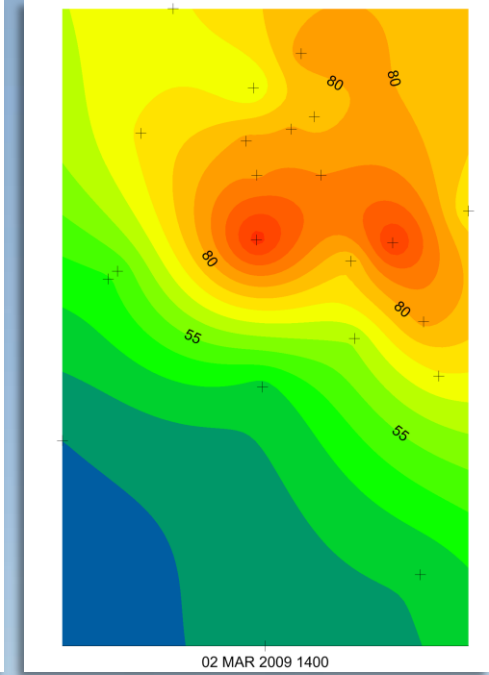

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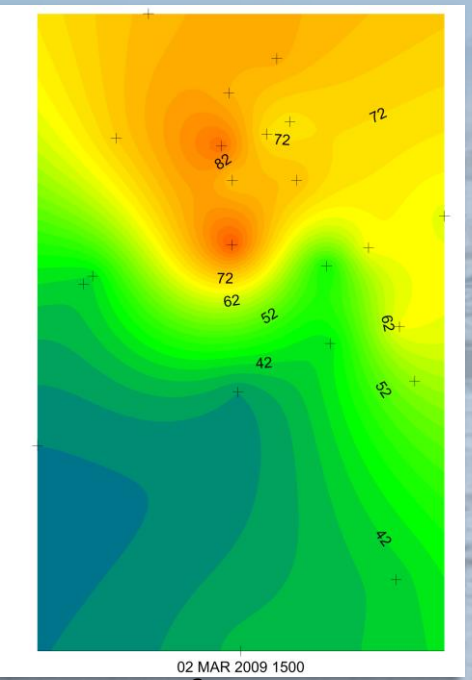

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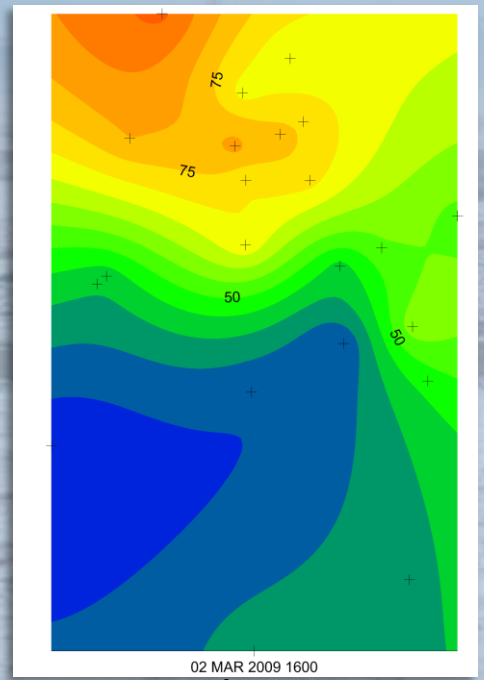

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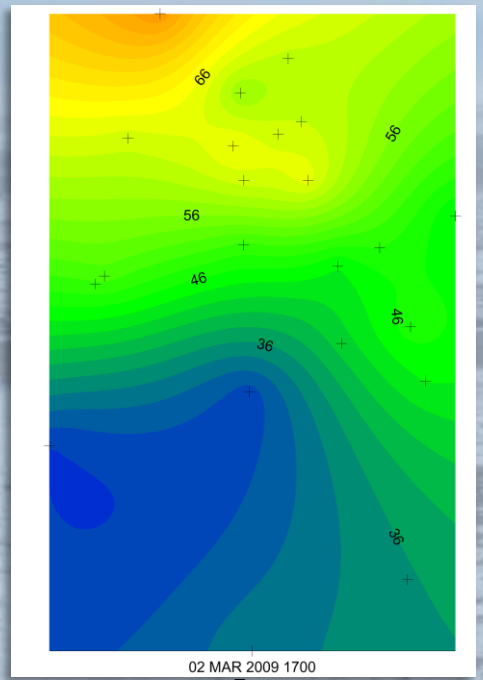

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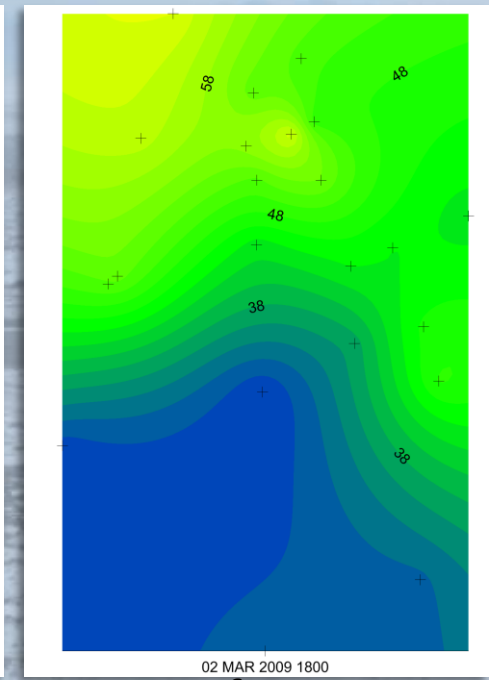
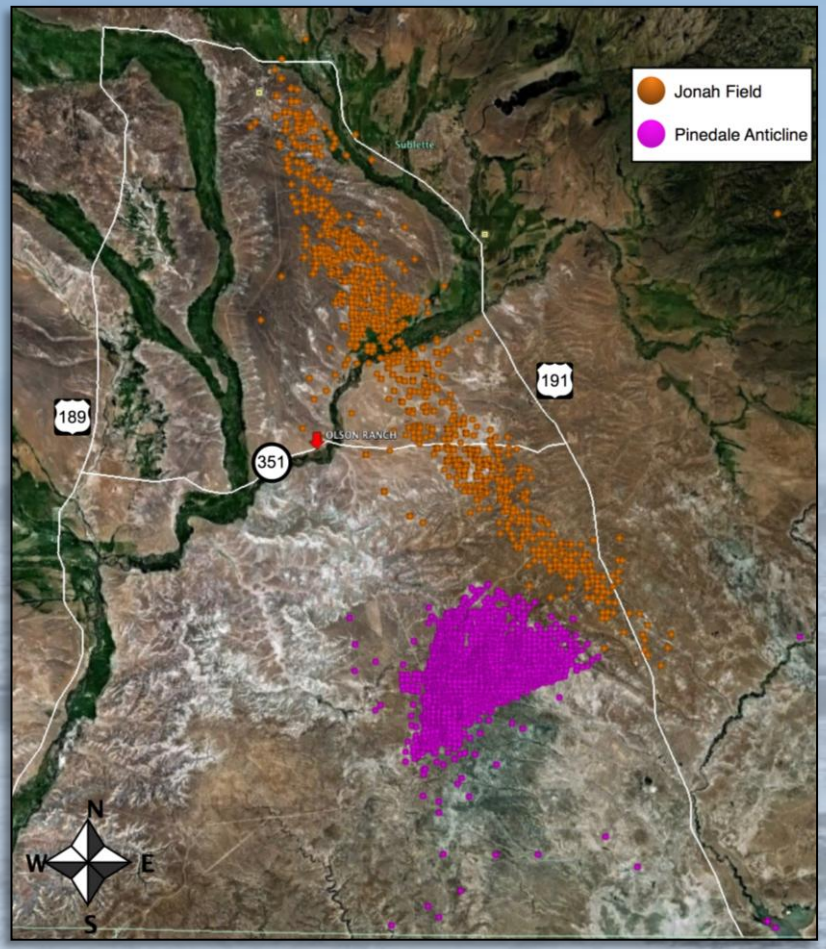


6pm

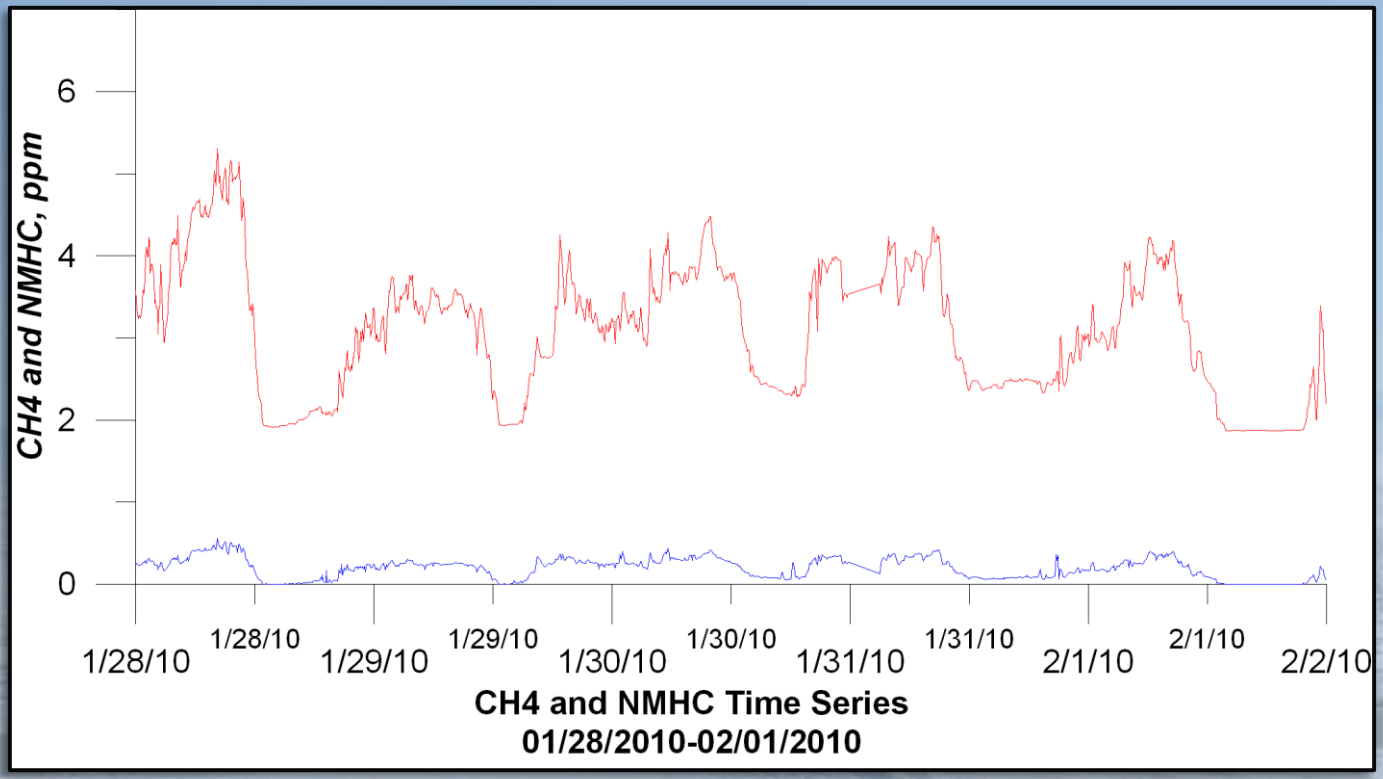
O3i Year Two

Mobile Laboratory



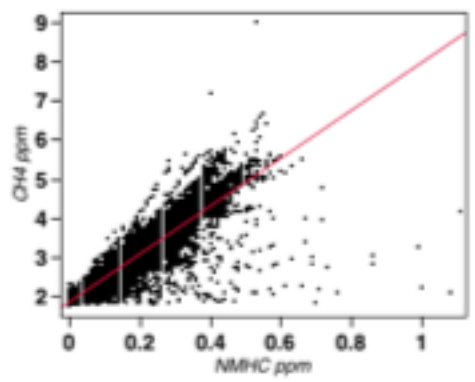
O3i Year Two

Mobile Laboratory



O3i Year Two

Mobile Laboratory



CH4 ppm = 1.8608231 + 6.0973174 × NMHC ppm; Intercept = 1.86.

Pinedale Anticline Spatial Air Quality Study

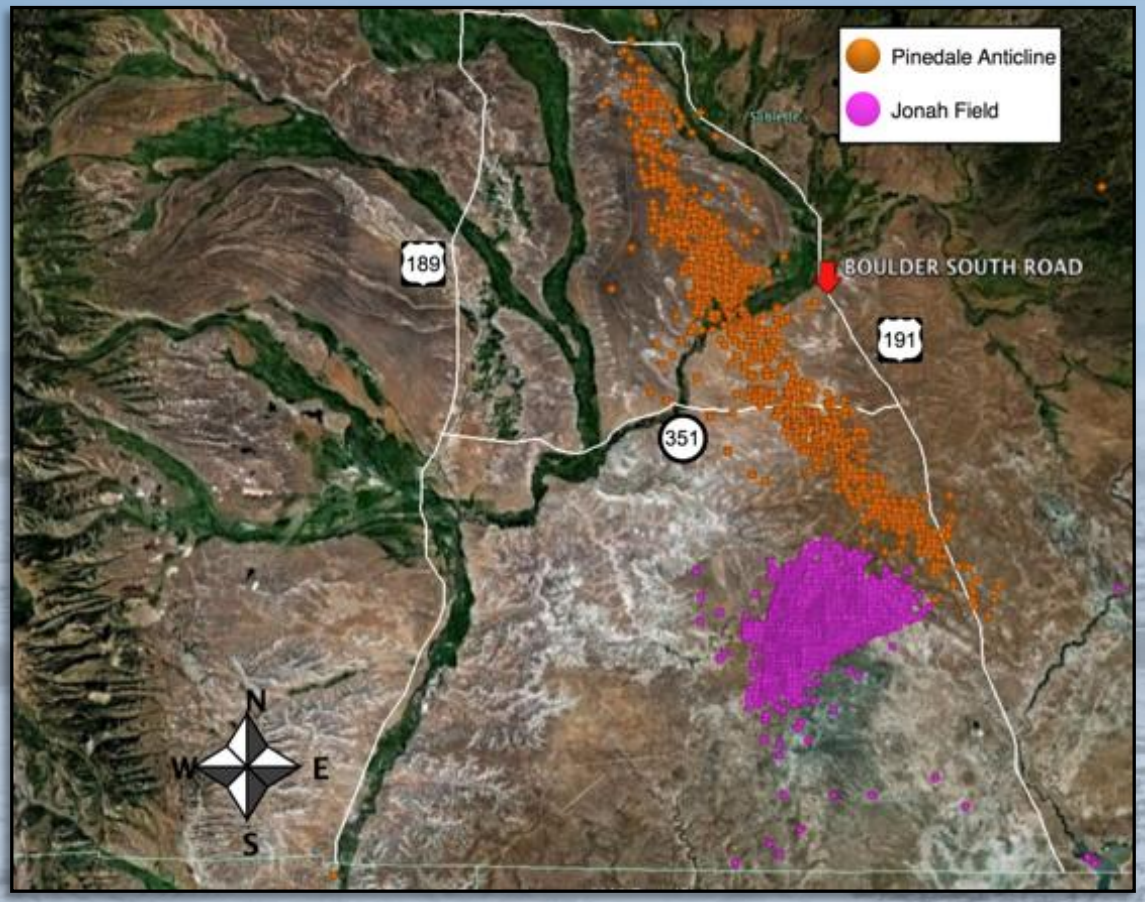
PASQUA

PASQUA Components

- Mobile Laboratory
- Online Precursor Analysis
- Spatial VOC
- Spatial BTEX & NOx

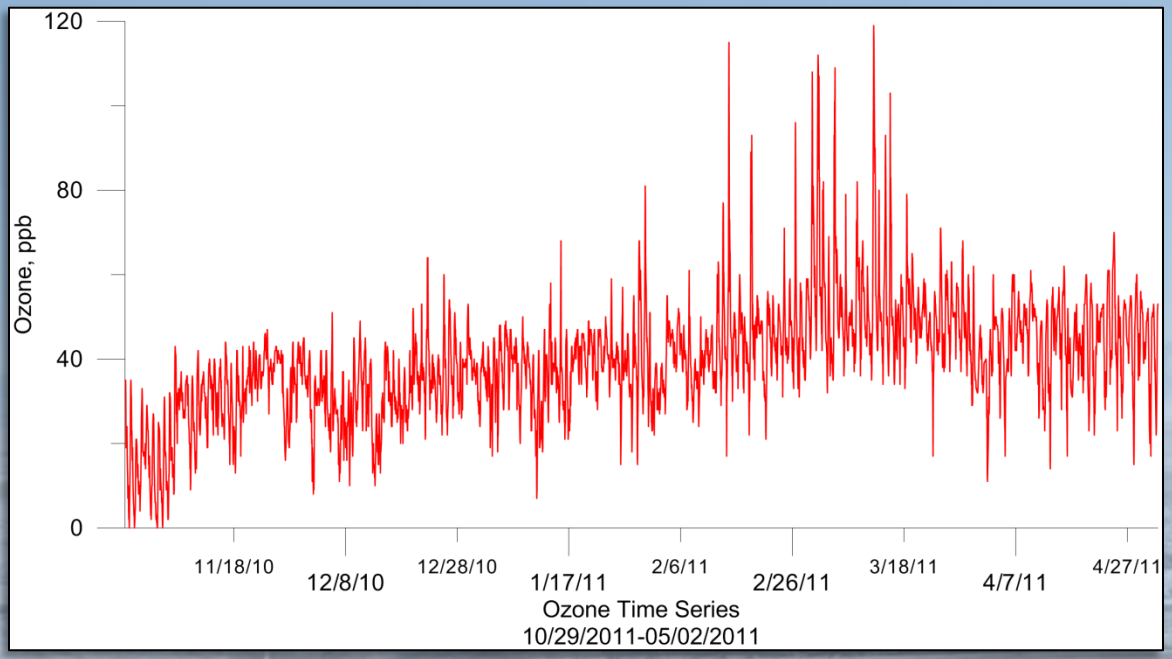
PASQUA Year One

Mobile Laboratory



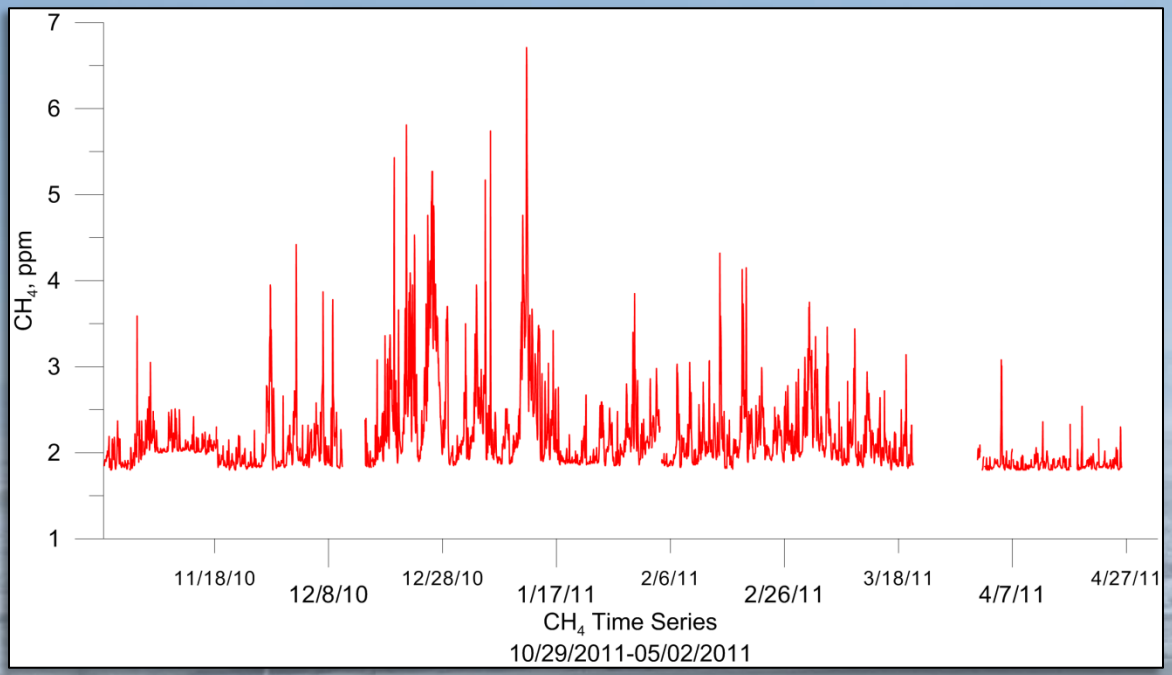
PASQUA Year One

Mobile Laboratory



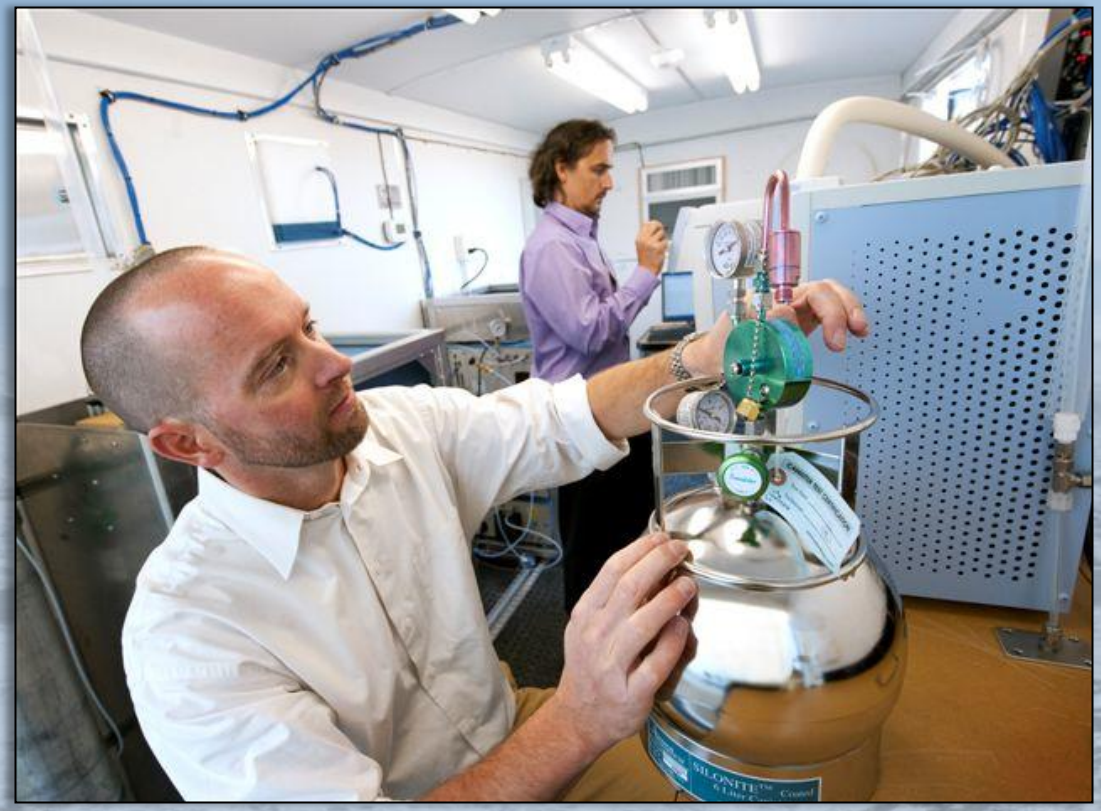
PASQUA Year One

Mobile Laboratory



PASQUA Year One

Online Precursor Analysis



PAPA Wet Gas vs. Ambient air

% contribution based on ppb

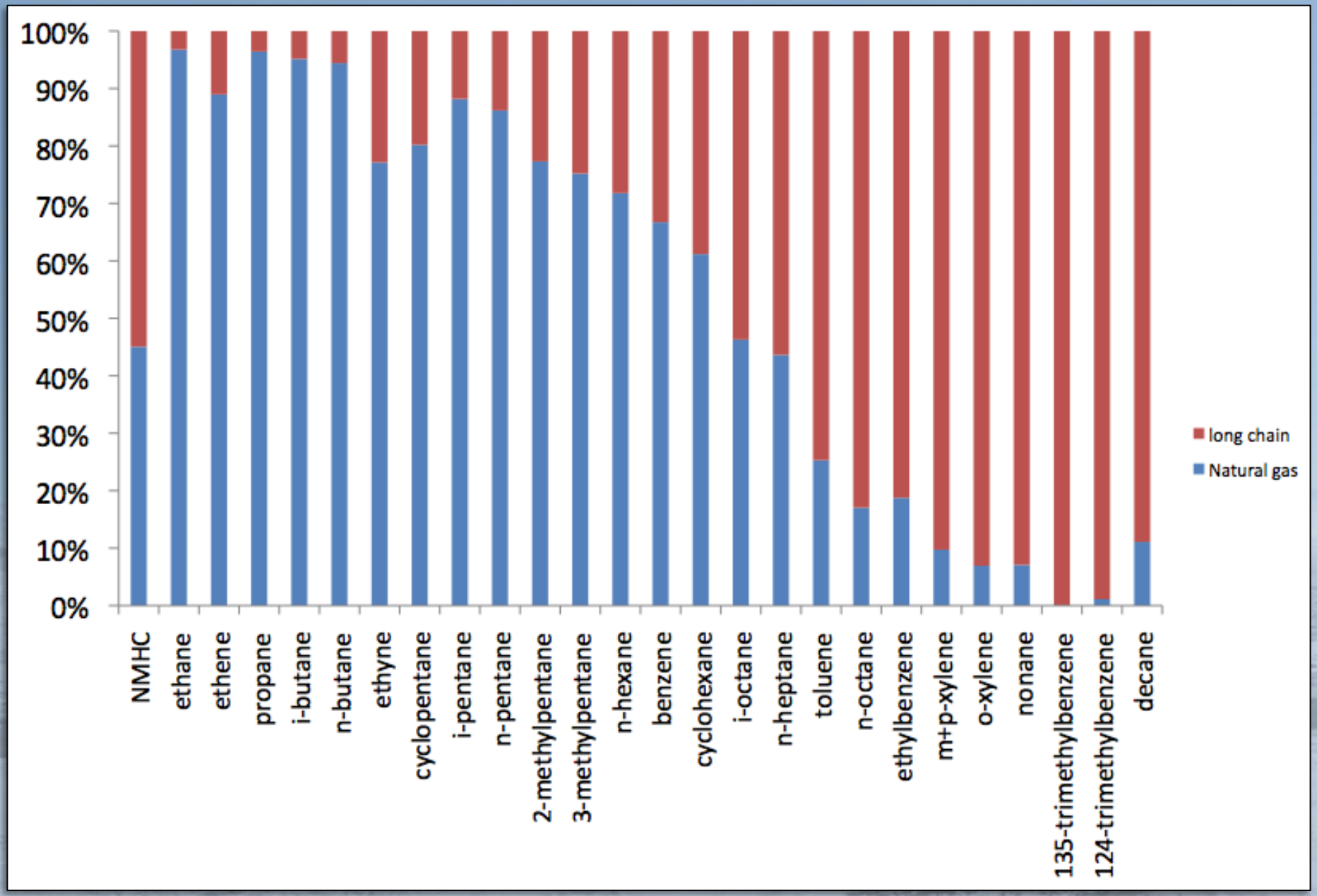
PAPA		UW
51.6	Ethane	51.0
22.7	Propane	18.9
7.0	i-Butane	5.2
6.1	n-Butane	5.4
0.4	Cyclopentane	0.2
3.4	i-Pentane	2.6
1.6	n-Pentane	1.8
	2-methylpentane	0.7
	3-methylpentane	0.4
1.1	n-Hexane	1.0
0.4	Benzene	2.0
1.0	Cyclohexane	1.1
2.6	Heptanes	1.0
0.1	i-octane	0.3
0.3	Methylcyclohexane	
0.7	Toluene	4.1
0.6	n-octane	0.9
0.0	Ethylbenzene	0.4
0.4	Xylenes	2.8

Positive Matrix Factorization (PMF) UW 2011 Data

A two factor solution:

1. Wet gas fugitive short chain VOC
2. Aromatic and long chain VOC*

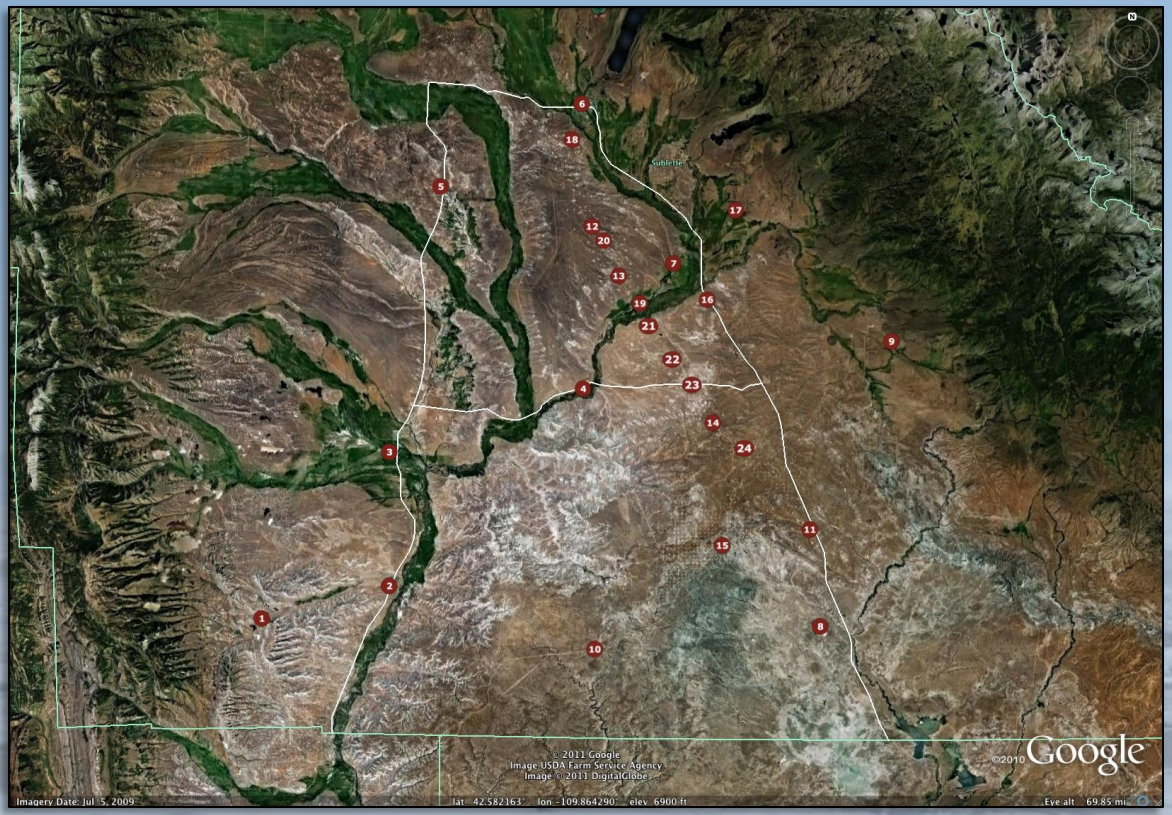
*in March 2011 factor 2 tracks ozone



Collaboration with Dr. M. McCarthy

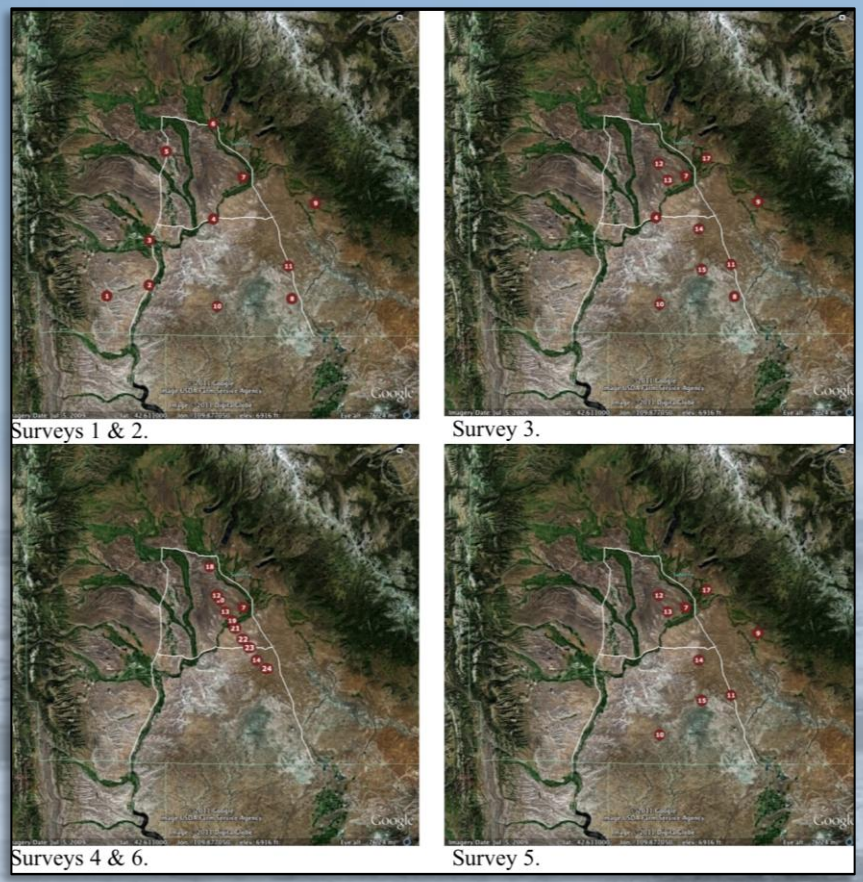
PASQUA Year One

Spatial VOC

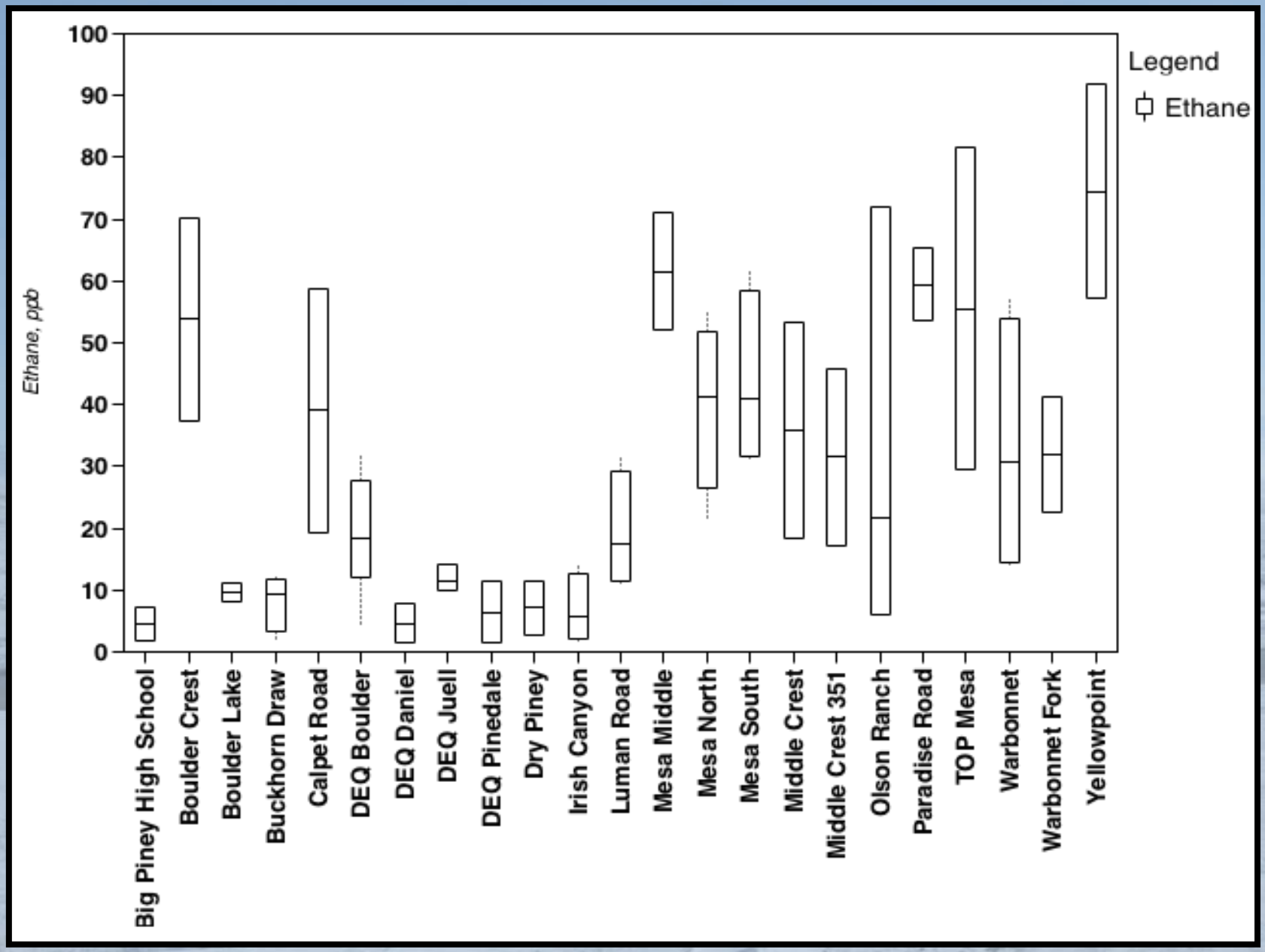


PASQUA Year One

Spatial VOC

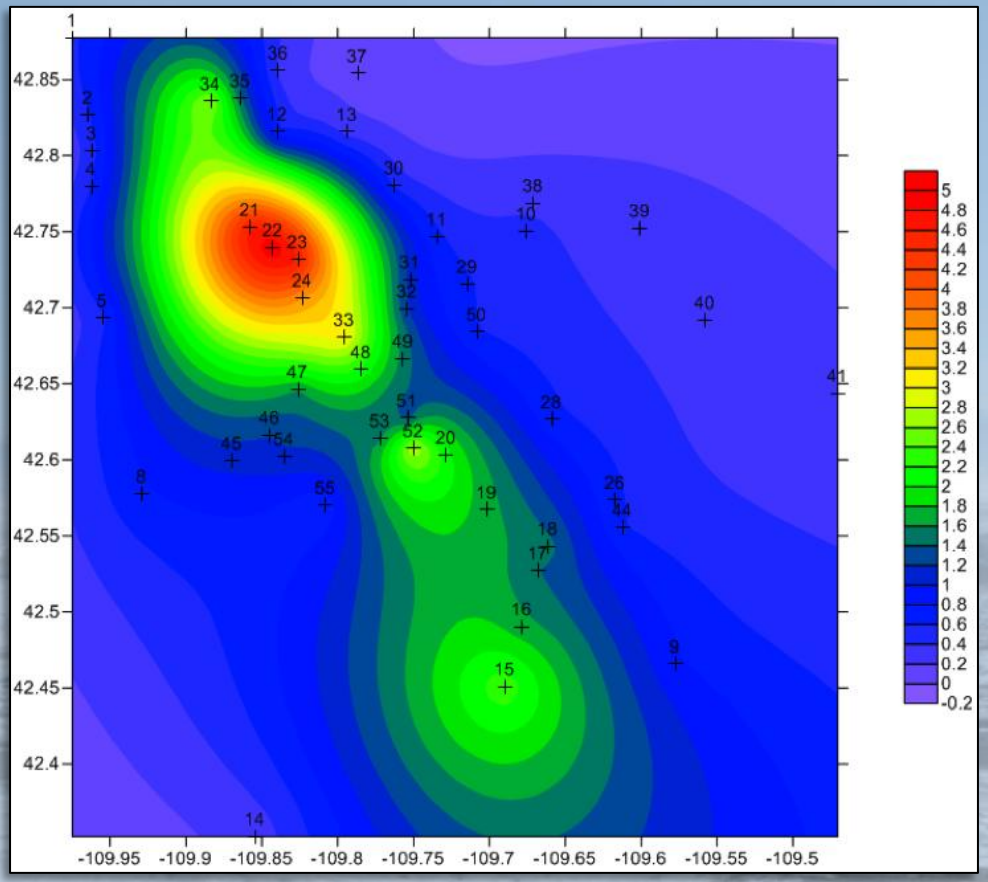


ETHANE VARIATION BY LOCATION



PASQUA Year One

Spatial BTEX

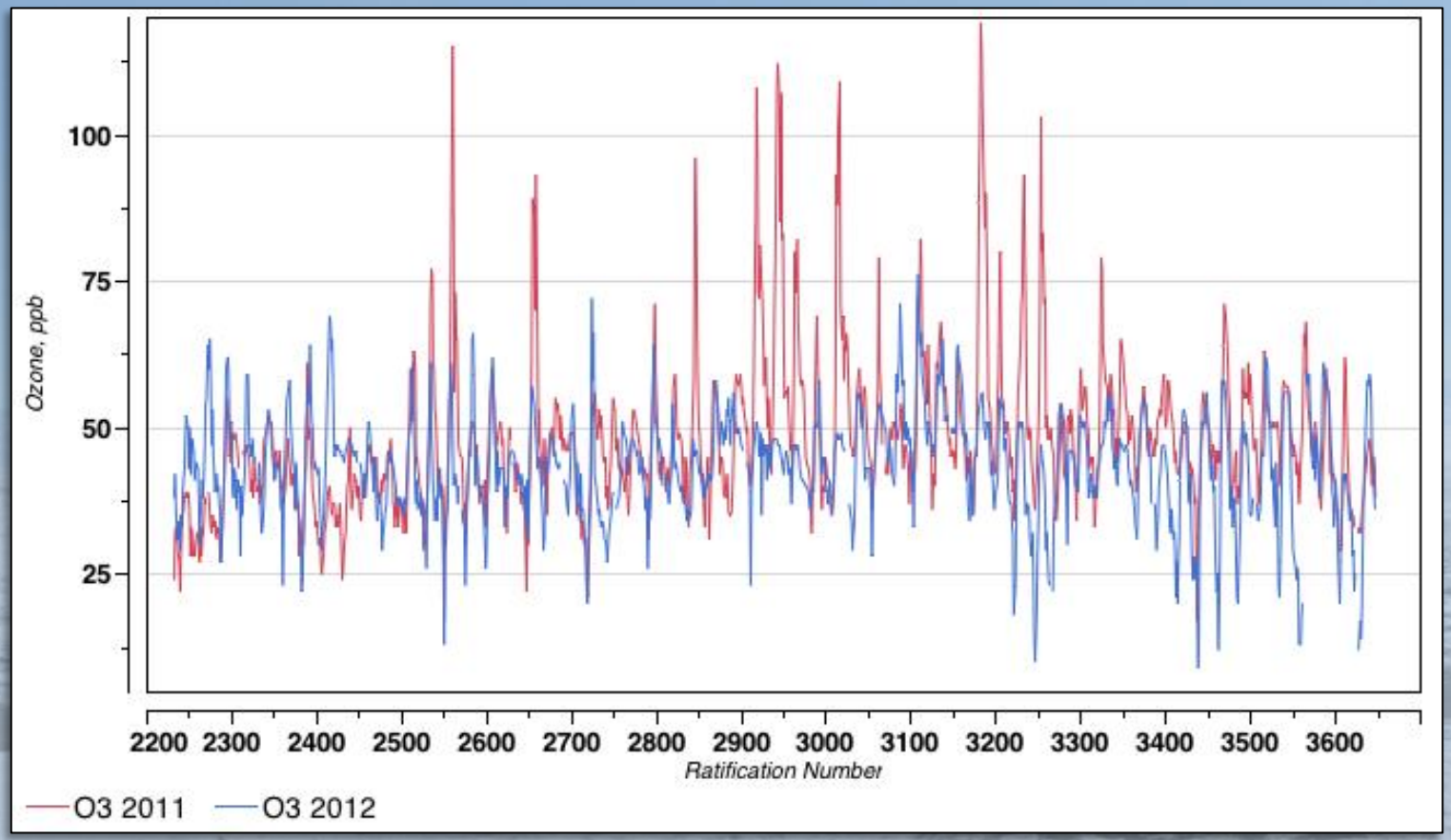


22 FEB – 01 MAR 2011

Benzene ppb

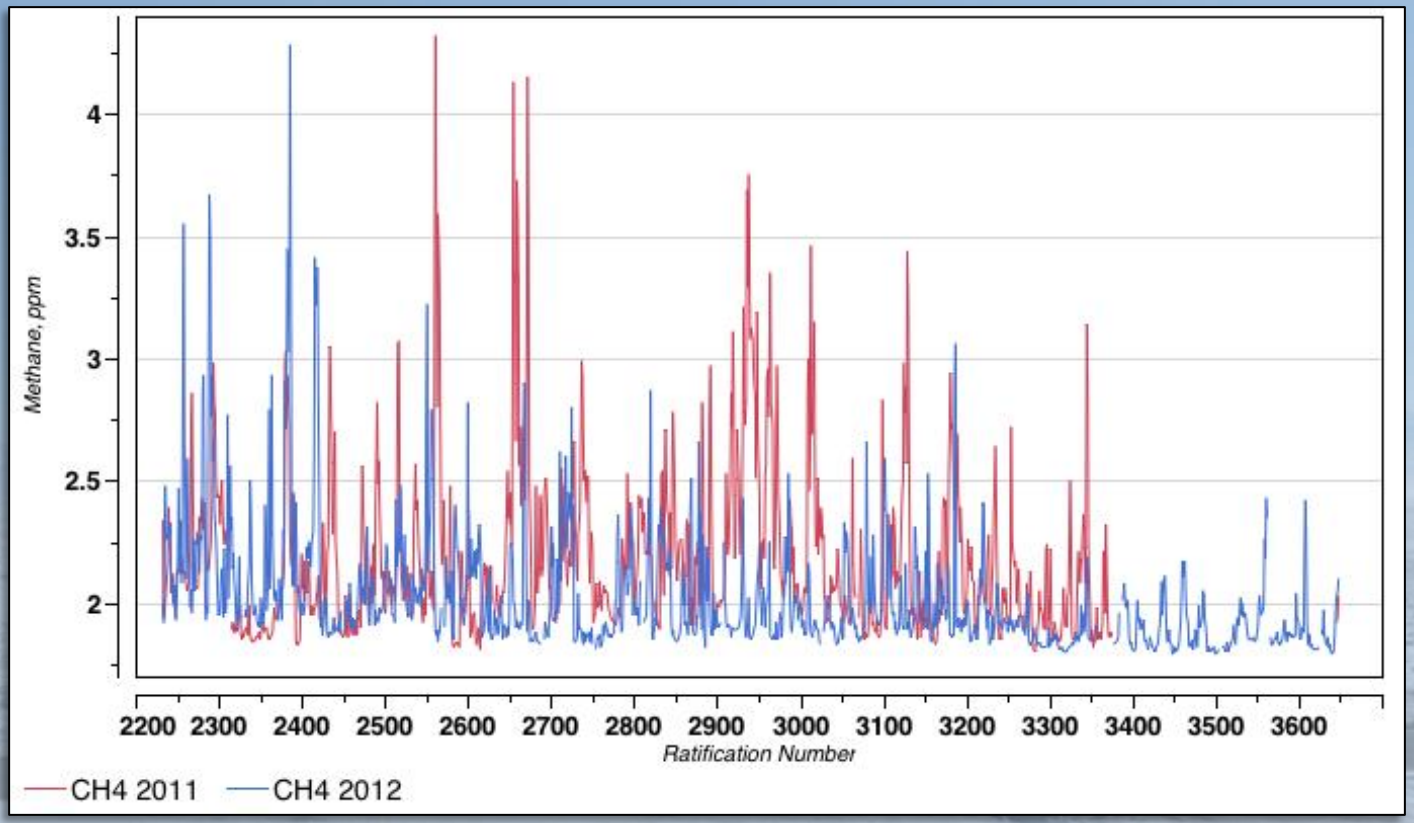
PASQUA Year Two

Mobile Laboratory



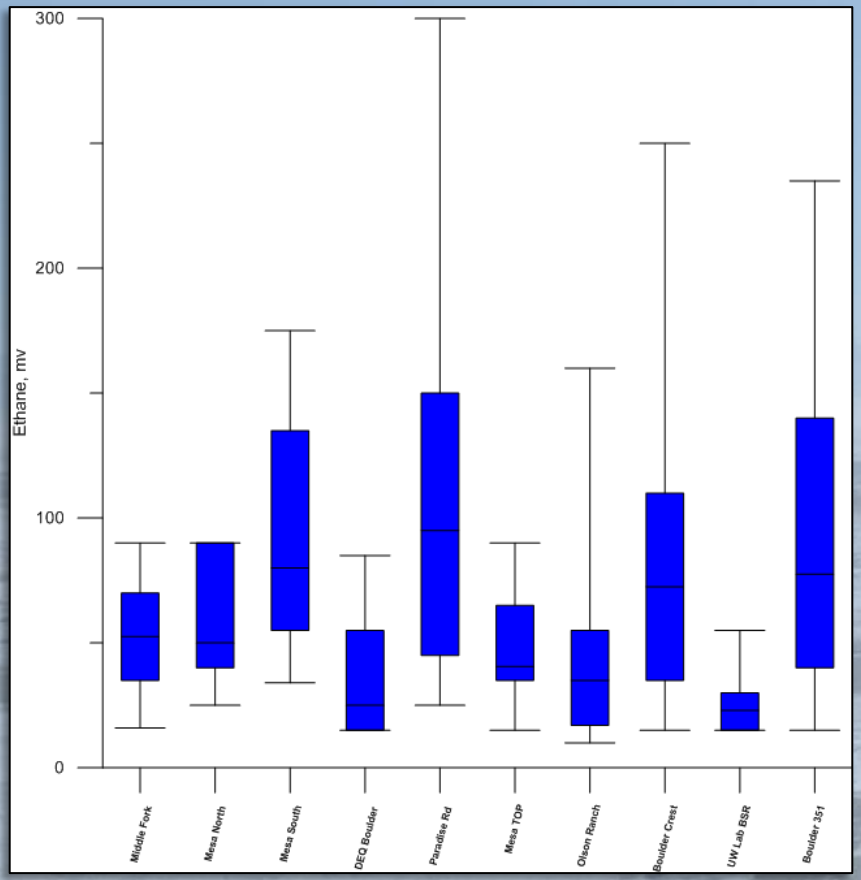
PASQUA Year Two

Mobile Laboratory



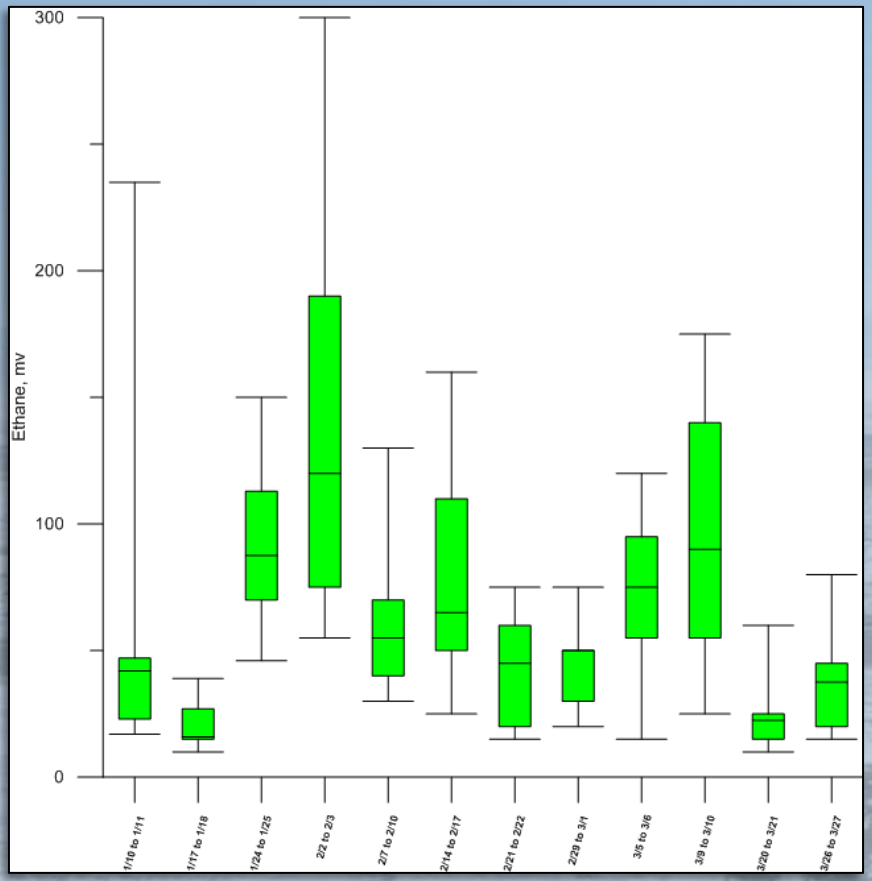
PASQUA Year Two

Spatial VOC



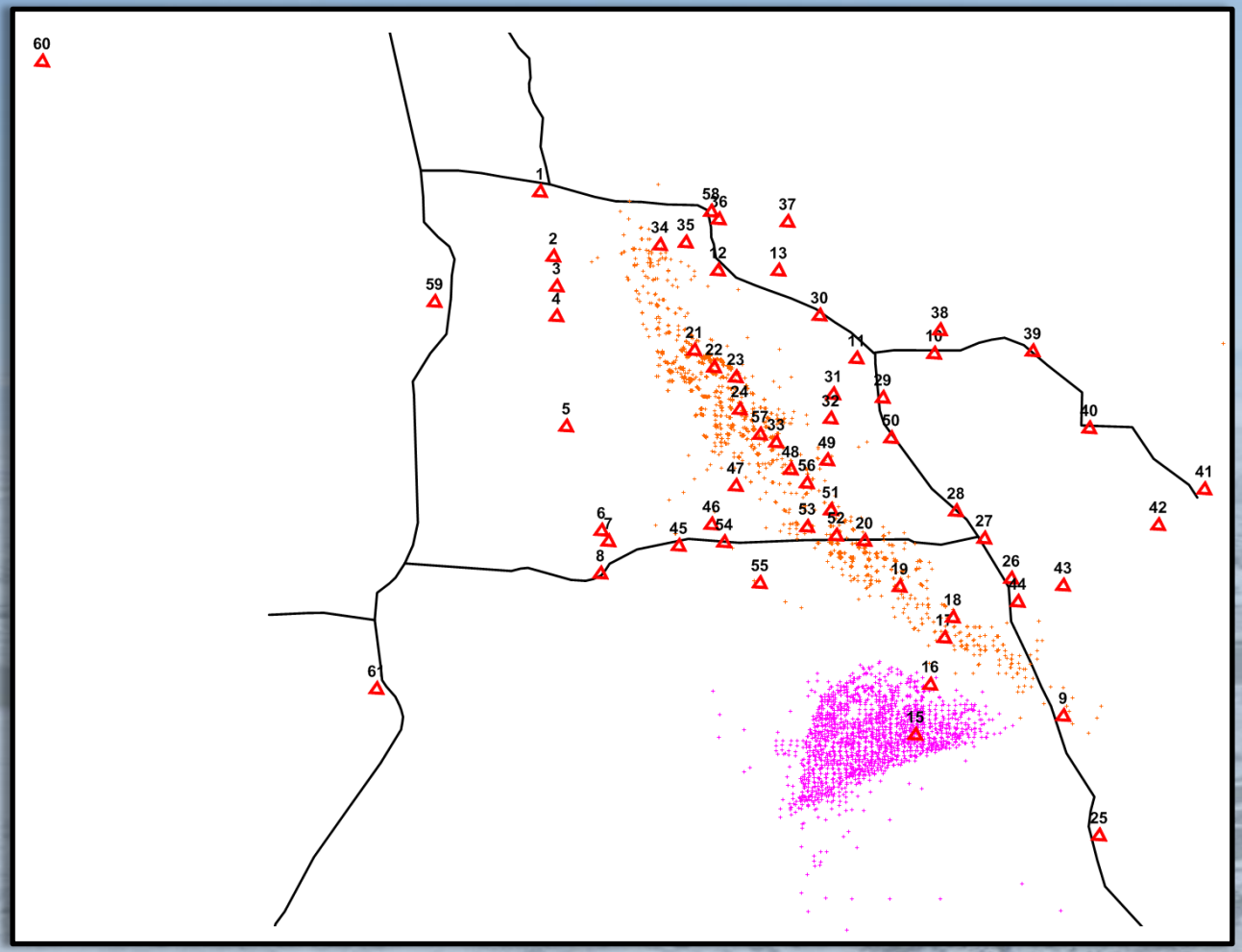
PASQUA Year Two

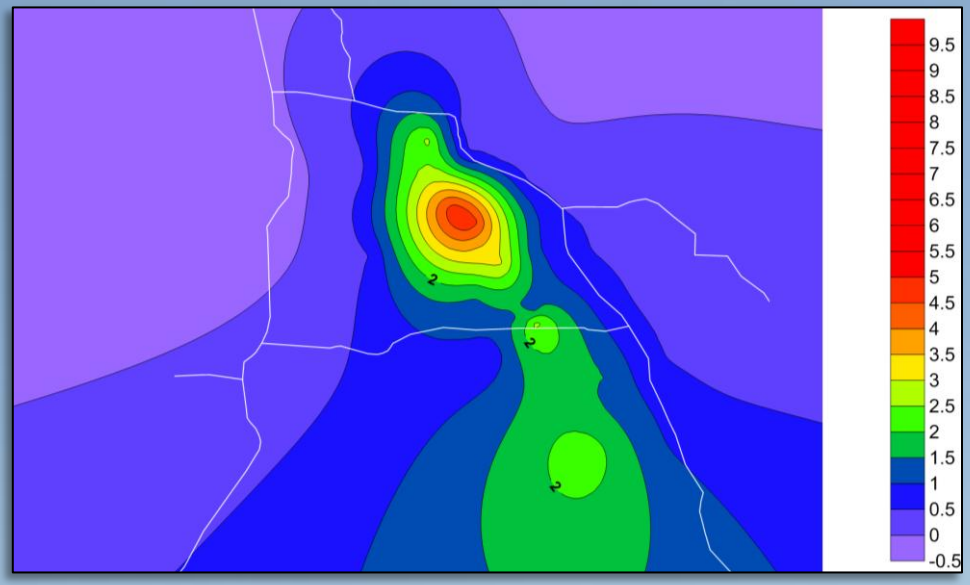
Spatial VOC



PASQUA Year Two

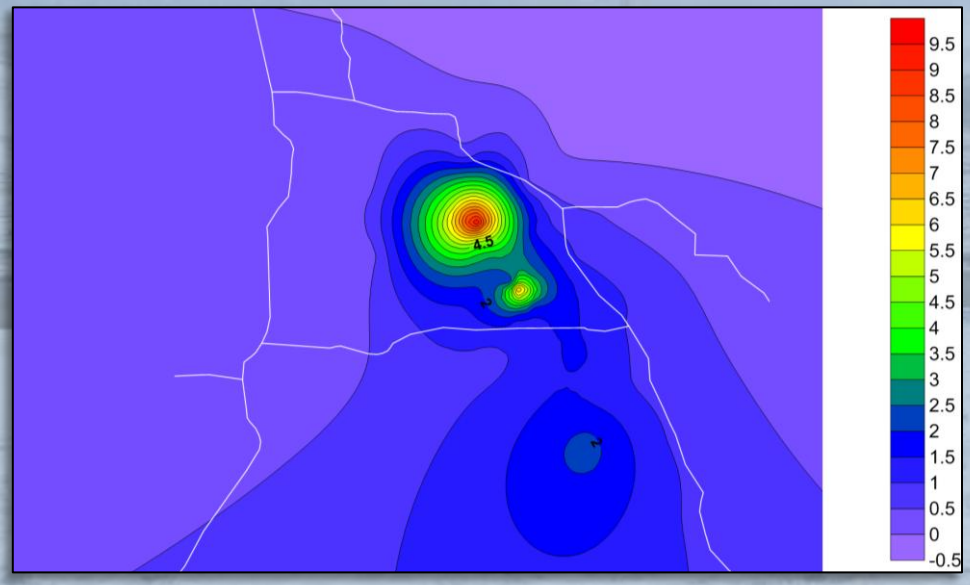
Spatial BTEX & NO_x





November 2011

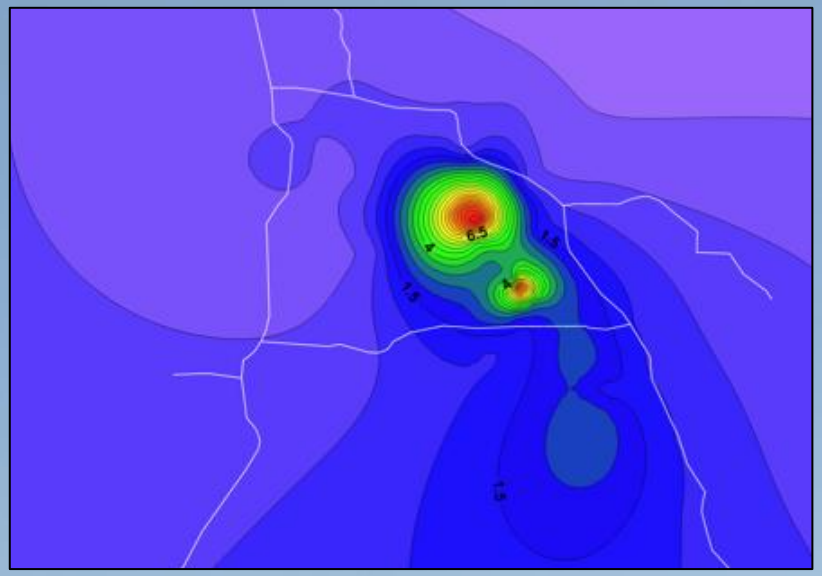
Benzene ppb



February 2012

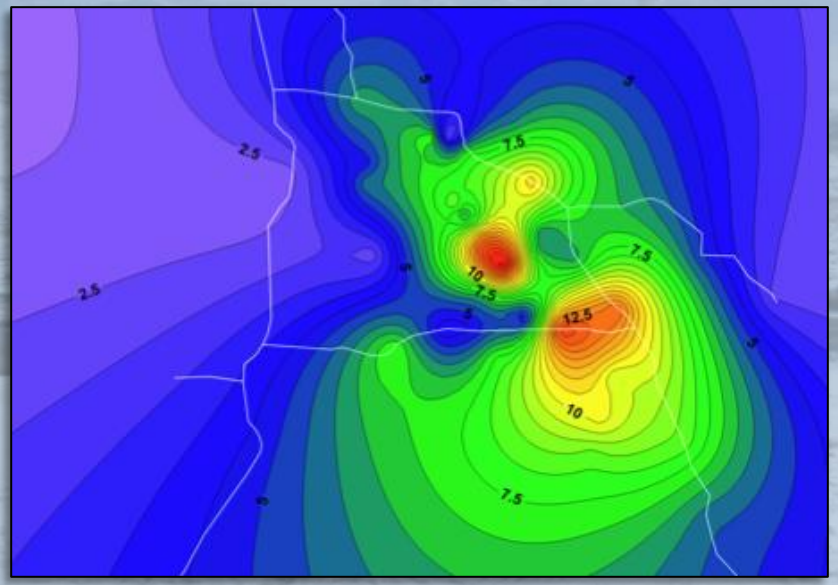
Benzene ppb

Production and Handling



February 2012

Toluene ppb

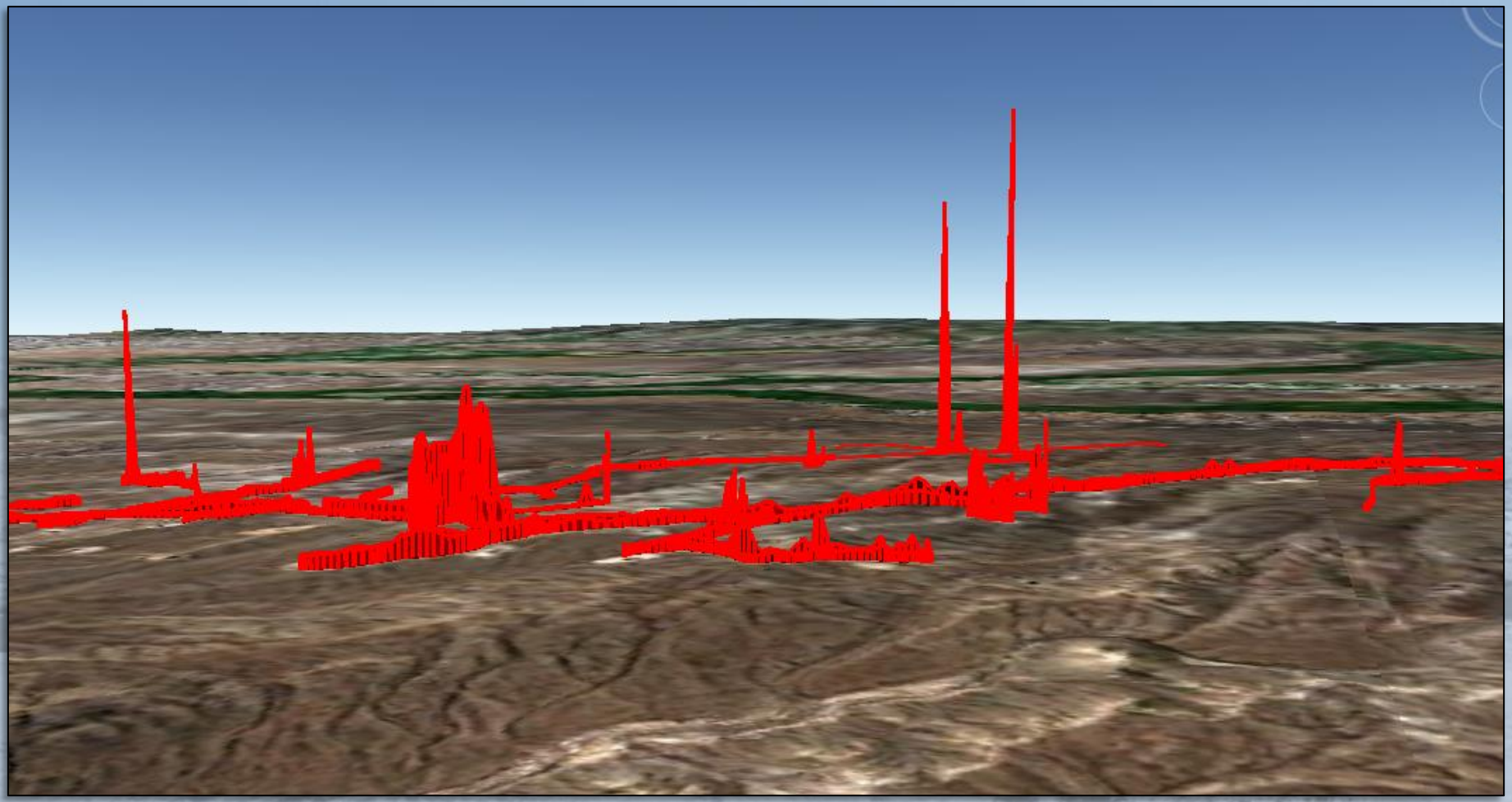


February 2012

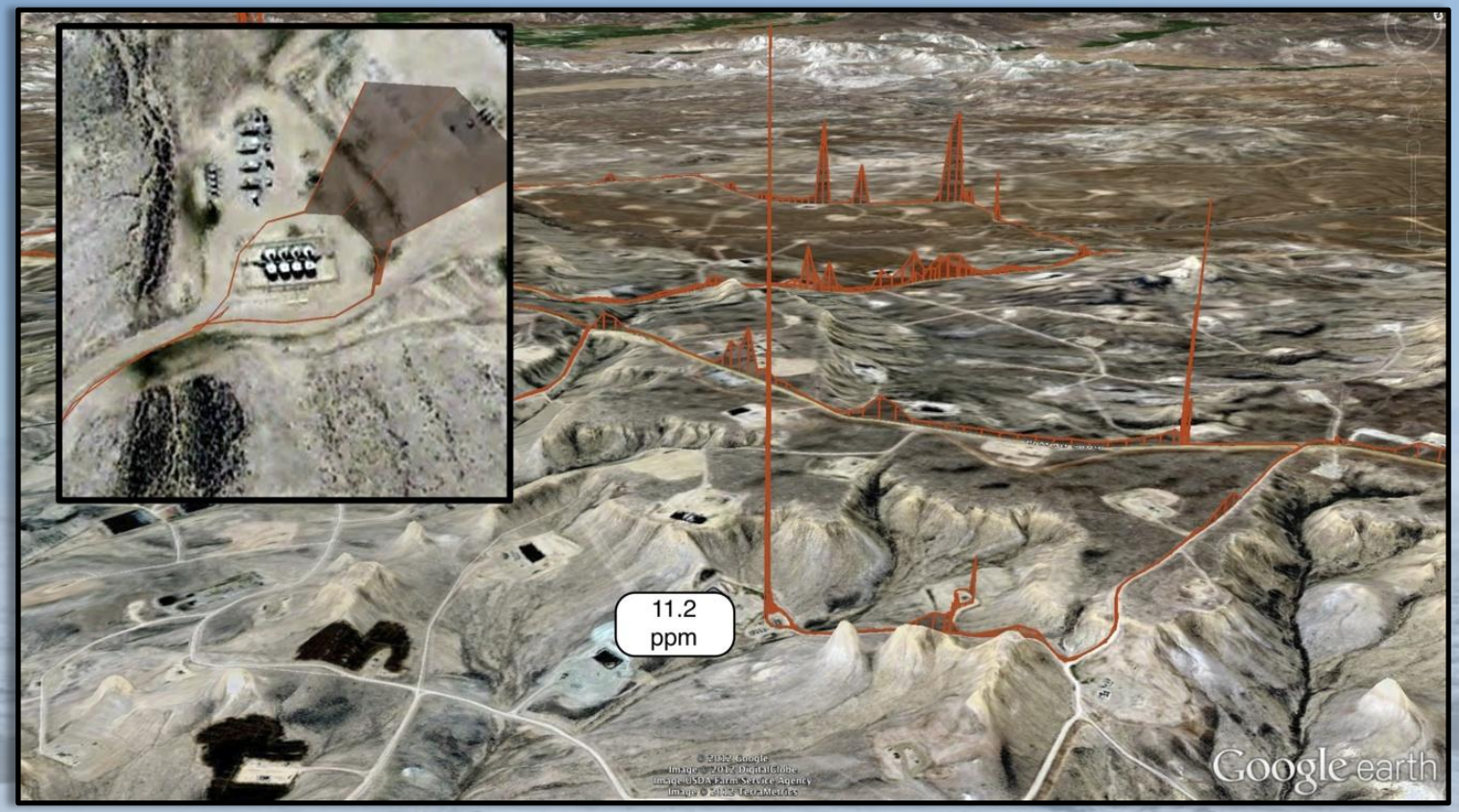
NO_x ppb

Ozone production zone

Instrument Testing 2011-2012

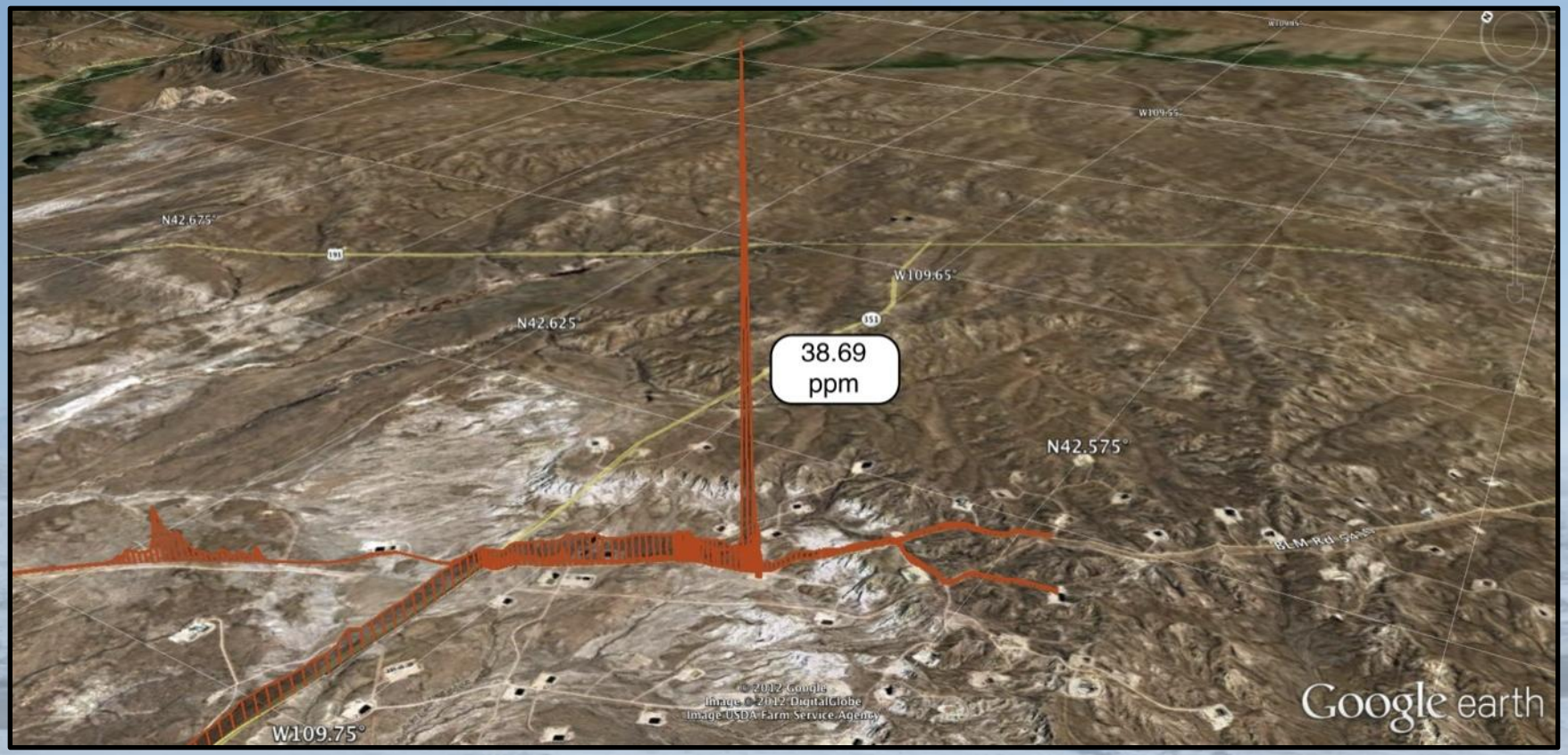


Methane Concentrations
Steady Source



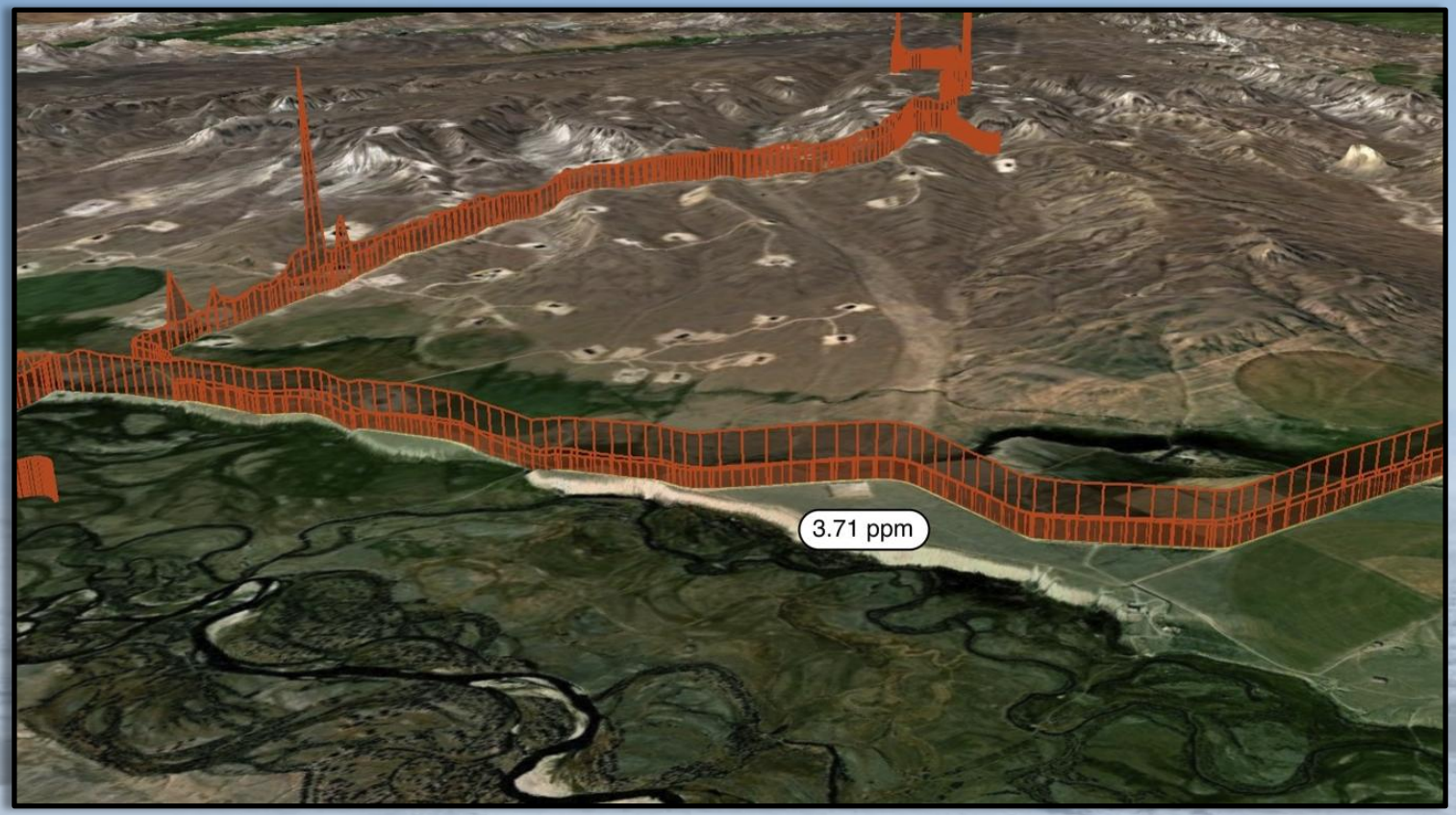
Methane Concentrations
Steady Source During O_3 Season

Methane Concentrations
Maintenance Source



Methane Concentrations
Windy Conditions

Methane Concentrations
Ozone Conditions



Looking Forward

- New Equipment
  - Picarro
    - $100K
  - PTR-TOF-MS
    - $500K
- New People
  - Dr. Shane Murphy
  - PhD Student

Looking Forward

- Non-attainment area informational needs
  - Source identification and characterization
  - Bottom-up VOC & NOx inventory
  - Produced water contributions
- Pre-development monitoring in Moneta Divide
- NPL Air Quality Study

Why?

- Natural extension to PASQUA
- Directly relevant to wintertime ozone
- Adds to non-attainment weight of evidence considerations
- Strong support from all stakeholders
- Allow State to lead by example

Funding Request

- Approximately $80K for 2012-13 project

Funding Acknowledgements

- Wyoming DEQ-AQD
- Pinedale Anticline Project Office
- UW School of Energy Resources

Volunteer Acknowledgements

Sublette County Conservation District (Meghann Durbrow, Delsa Allen, Loren Racich) • BLM (Tim Zebulske, Shelly and Jed Gregory, Mark Thonoff, Kelly O'Kell, Cindi Etcheverry, Kyle Schmacher, Brian Roberts) • USFS (Ted Porwoll, Ed Sherman) • Citizens United for Responsible Energy Development (Bev and Sam Sharp, Perry Walker, Tina Rock, Susan Cramer, Mary Lynn Worl) • WDEQ-AQD (Jennifer Frazier, Brandi O'Brien) • Town of Pinedale (Mayor Steve Smith, Mary Hogarty, Patty and Dave Racich, Kate Grimes)•Shell (Jim Sewell, David Osborn, Nancy Feck, Charles Travis, Bill Cook, Levi Ackland) • BP (Don Brooks, Todd Morgan) • Questar (Kevin Williams) • Big Piney High School Students and Employees (Steven Nelson) • Pinedale High School Students and Employees (Elizabeth David) • The Log Cabin Motel (Forest and Sofia Wakefield) • Rock Rabbit Cafe

Thank You

http://www-das.uwyo.edu/ozone/index.html