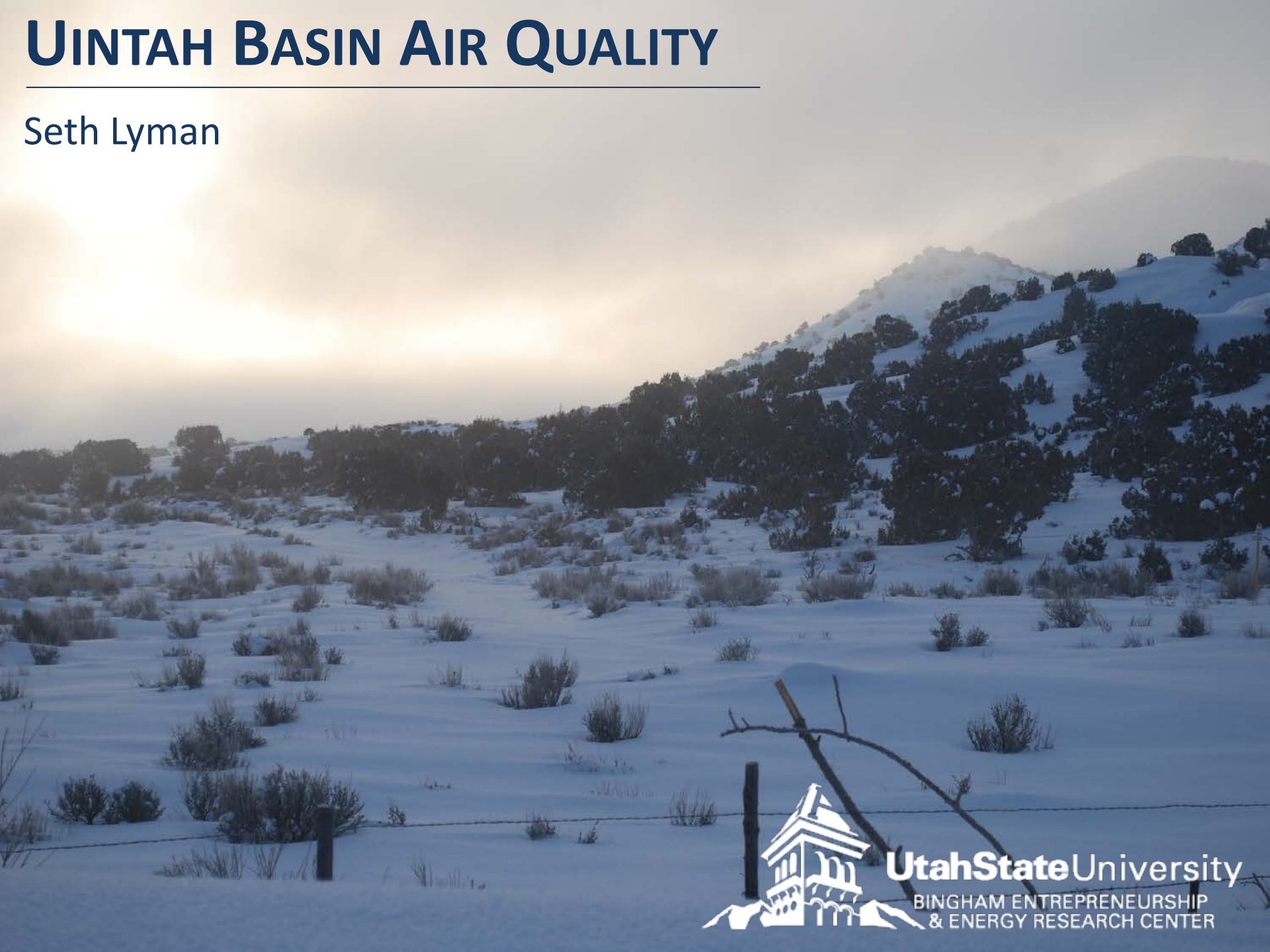
Uintah Basin Air Quality

Seth Lyman



UtahStateUniversity
BINGHAM ENTREPRENEURSHIP
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Bingham Center Air Quality Team

Marc Mansfield
Huy Tran
Trang Tran
Colleen Jones
Randy Anderson
Trevor O'Neil
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Jerimiah Lamb

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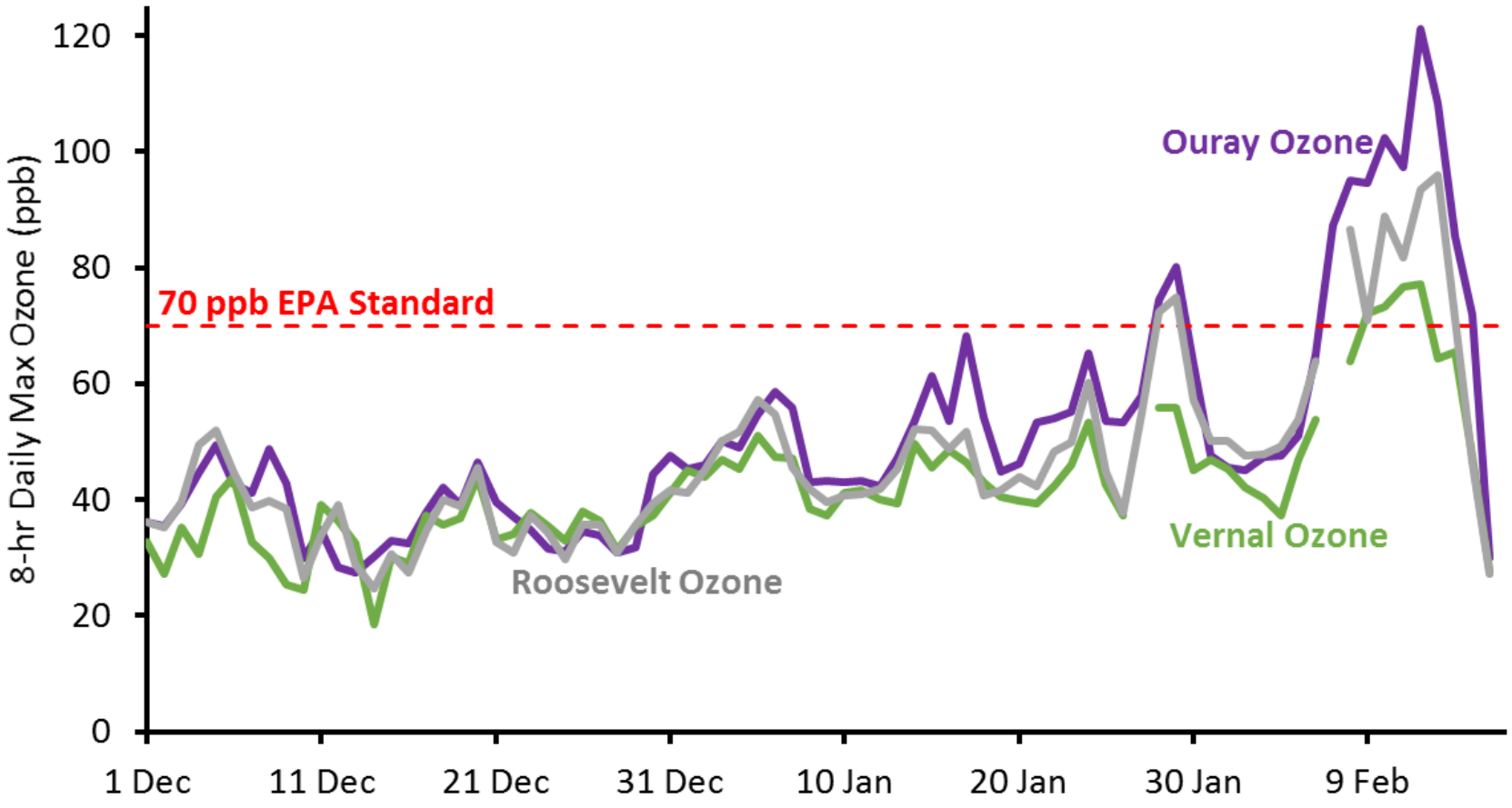
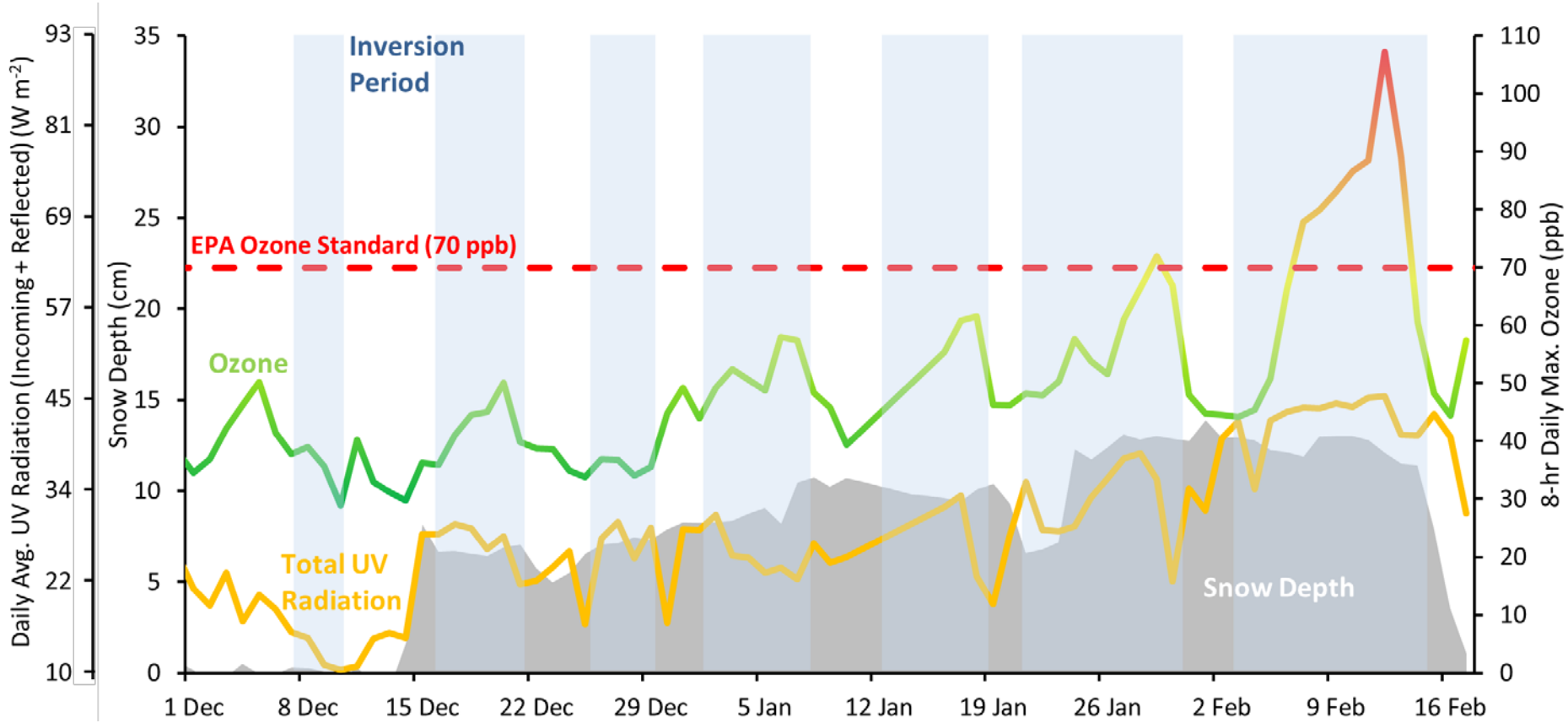
Several generous energy companies

Uintah Basin Ozone During Winter 2015-16



Sustained Inversion and Abundant Solar Energy Led to Ozone Exceedances



Uintah Basin Ozone 2010-2016

Annual 4th highest 8-hour average ozone

	Ouray	Fruitland	Vernal	Rangely	Days w/ snow >5cm
2010	**117**				94
2011	**120**	65	**85**	**104**	81
2012	68	70	65	67	0
2013	**132**	70	**102**	**104**	78
2014	**79**	64	62	63	44
2015	68	70	64	64	0
2016	**96**		**72**		62

Three Year Average Ozone Will Exceed EPA Standard, Leading to Nonattainment Designation

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2016	**96**		**72**		62
3-Year Avg.	**81**		66		

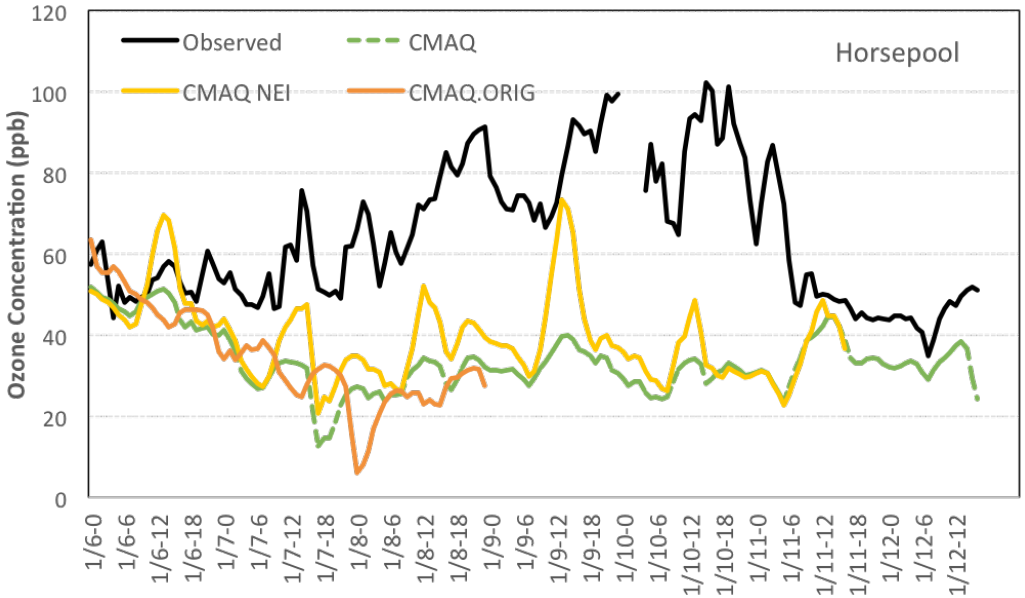
- Data are preliminary and subject to change
- Ouray is not the only monitoring station with a 3-yr avg. > 70 ppb

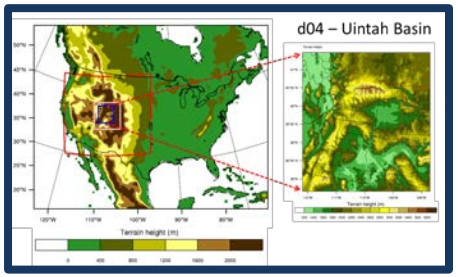
Senate Bill 118

S.B. 118 directs USU to:

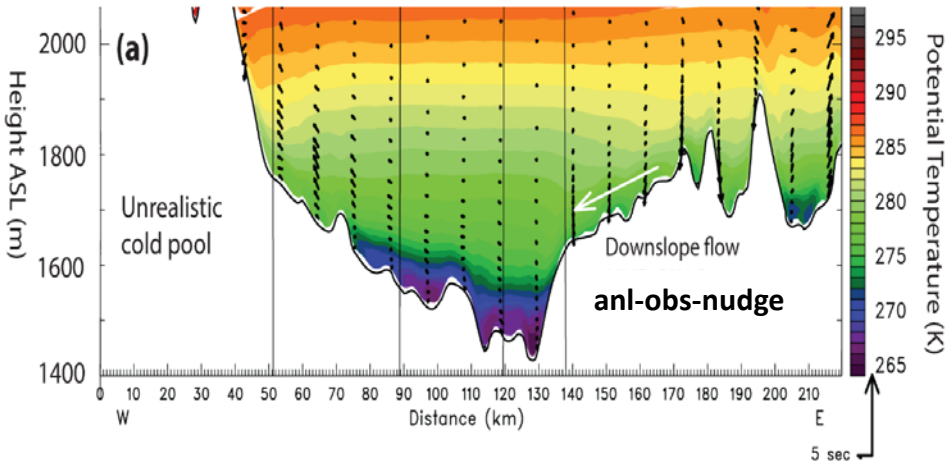
1. Develop and improve computer models used to simulate ozone formation
2. Measure pollutants in ambient air
3. Characterize pollutant emissions

Model Development

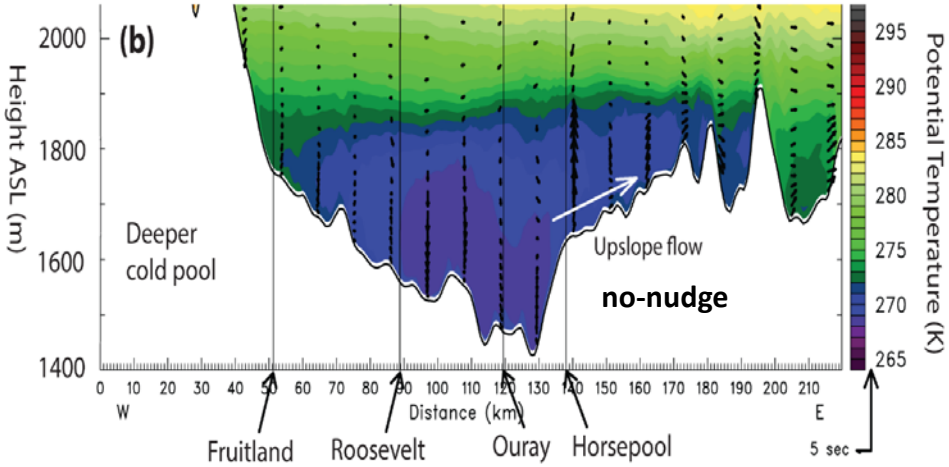




Incorporation of Measurement Data can Improve Meteorological Simulations



Inversion level is too low if observational data and data from NOAA NAM model are incorporated

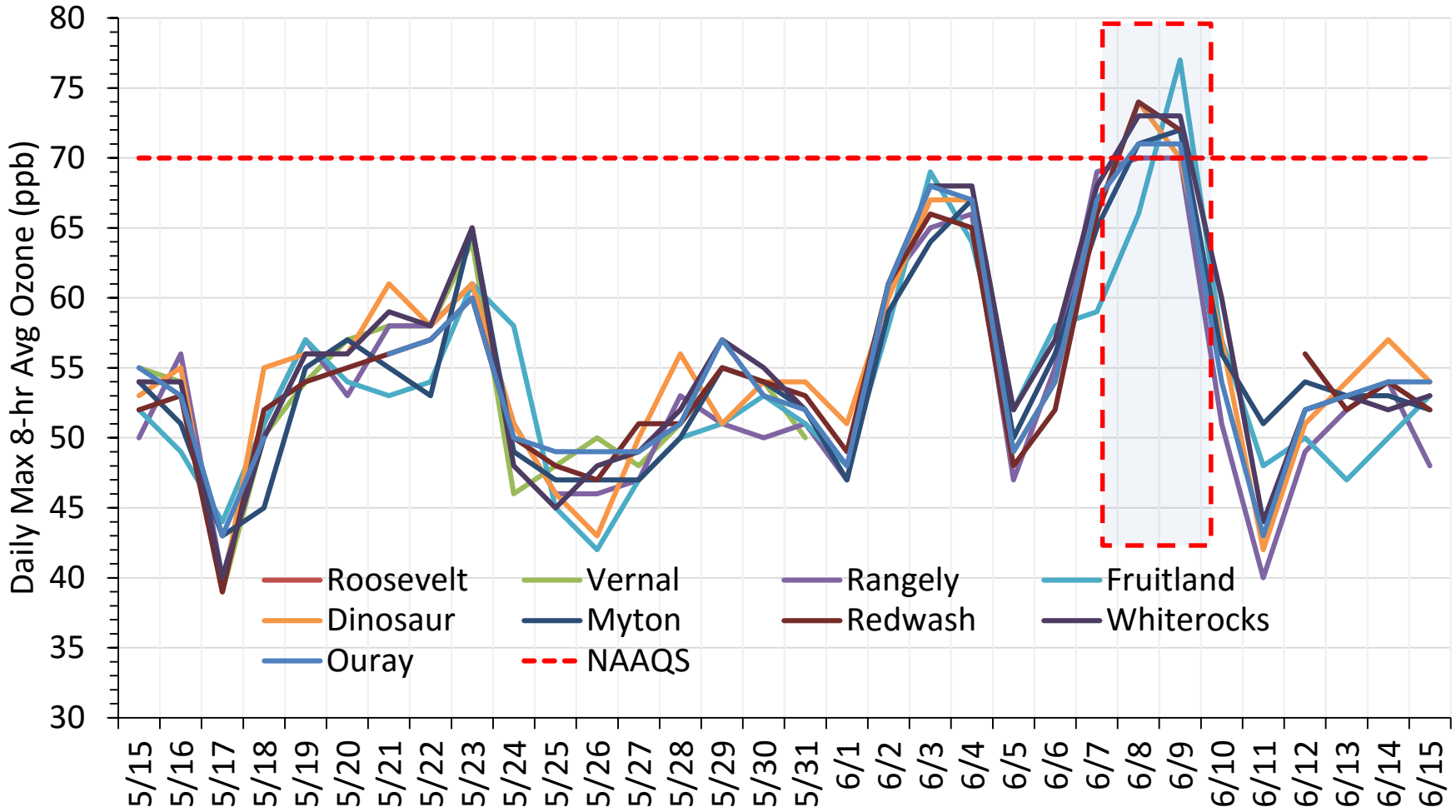


Inversion level is too high if observational data not incorporated

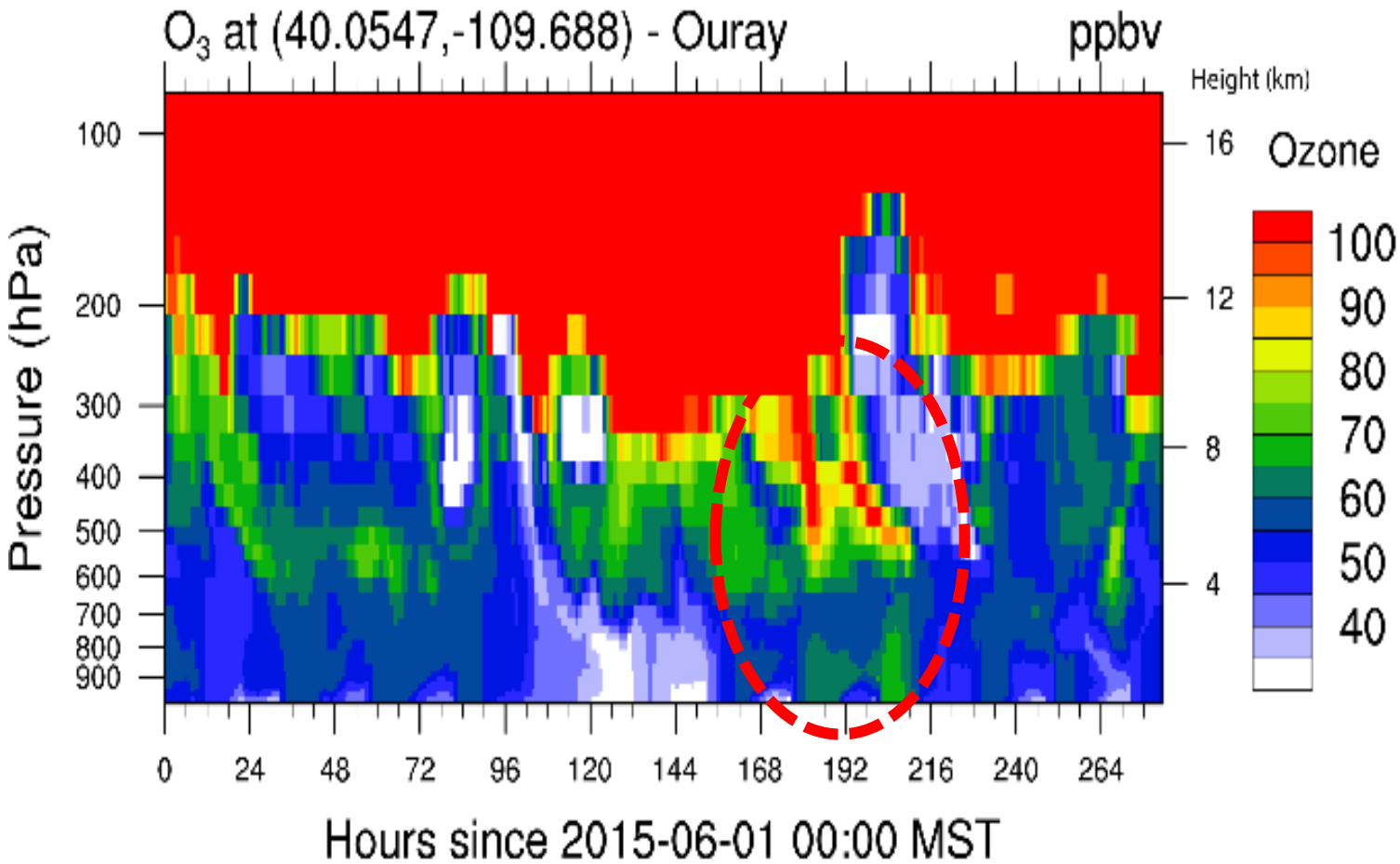
Proper Characterization of Background Ozone Is Critical for Air Quality Management

- Lowered ozone standard pushes us closer to background—higher elevations have higher background
- Background creates a floor for air quality improvement

Ozone Exceedance Days During 2015 Were During Summer, not Winter



Simulations Show that Intrusions of Stratospheric Air Led to Summertime Ozone Exceedances



Summertime Exceedances May Make the Difference Between Marginal and Moderate Nonattainment

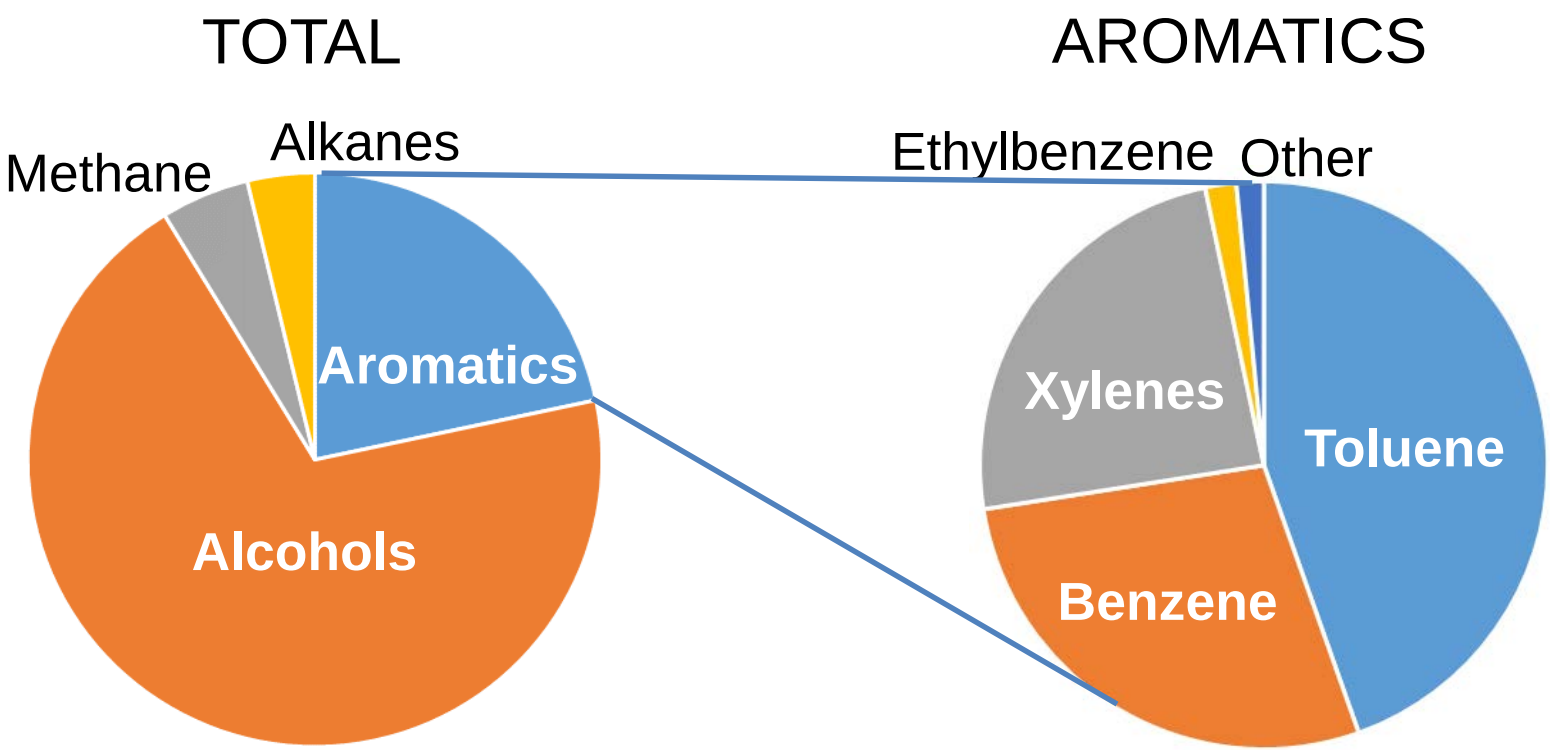
	4th highest daily max 8hr-avg ozone (ppb)			3-year-average
	2014	2015	2016	2014-2016
Ouray (current)	79	**68**	96*	Moderate 81*
Ouray (w/out EE)	79	**67***	96*	Marginal 80*

** Note: data presented here are preliminary, unverified and are not officially recognized*

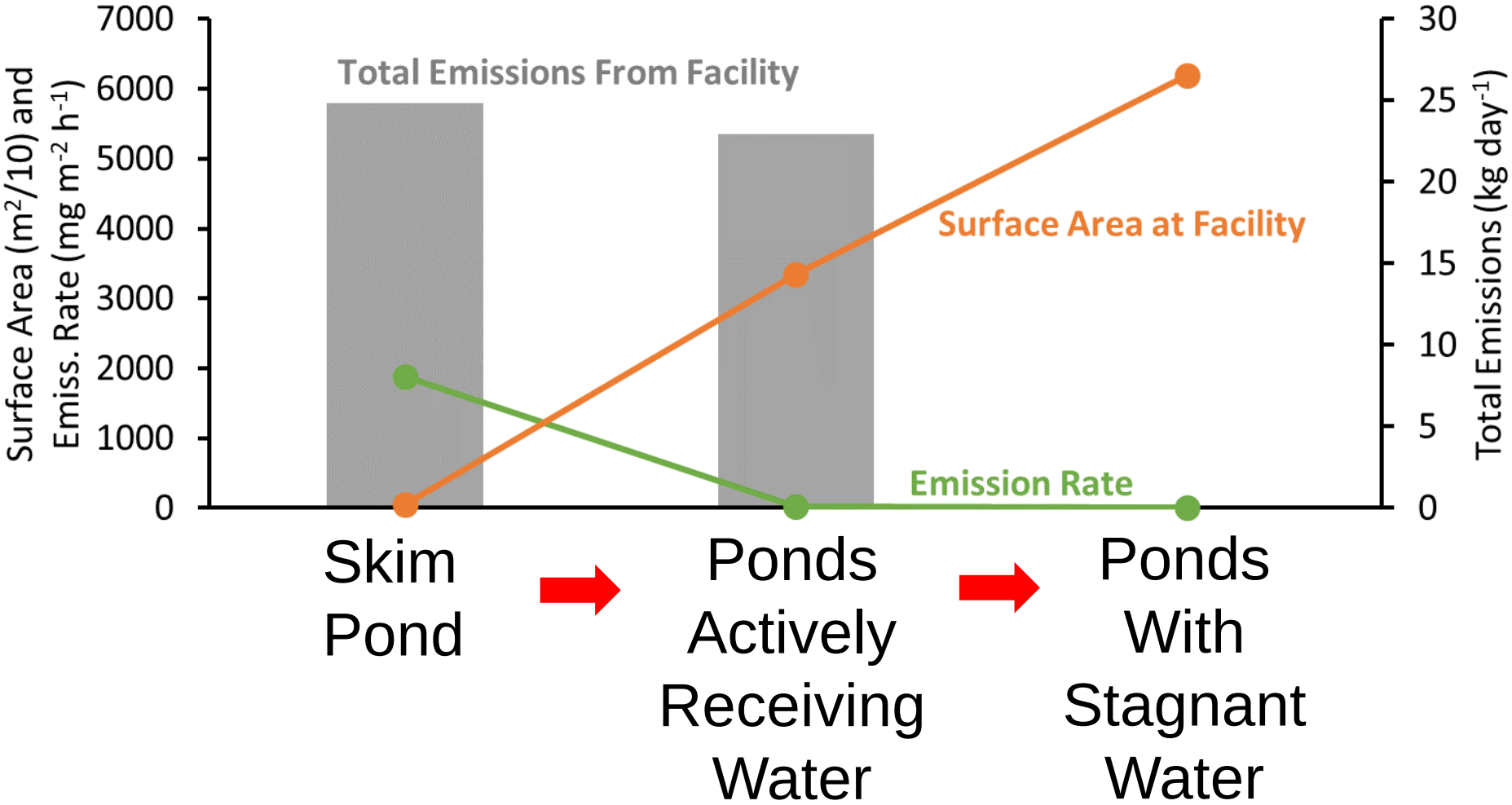
Characterization of Emission Sources

Produced Water is Enriched in Soluble Organics

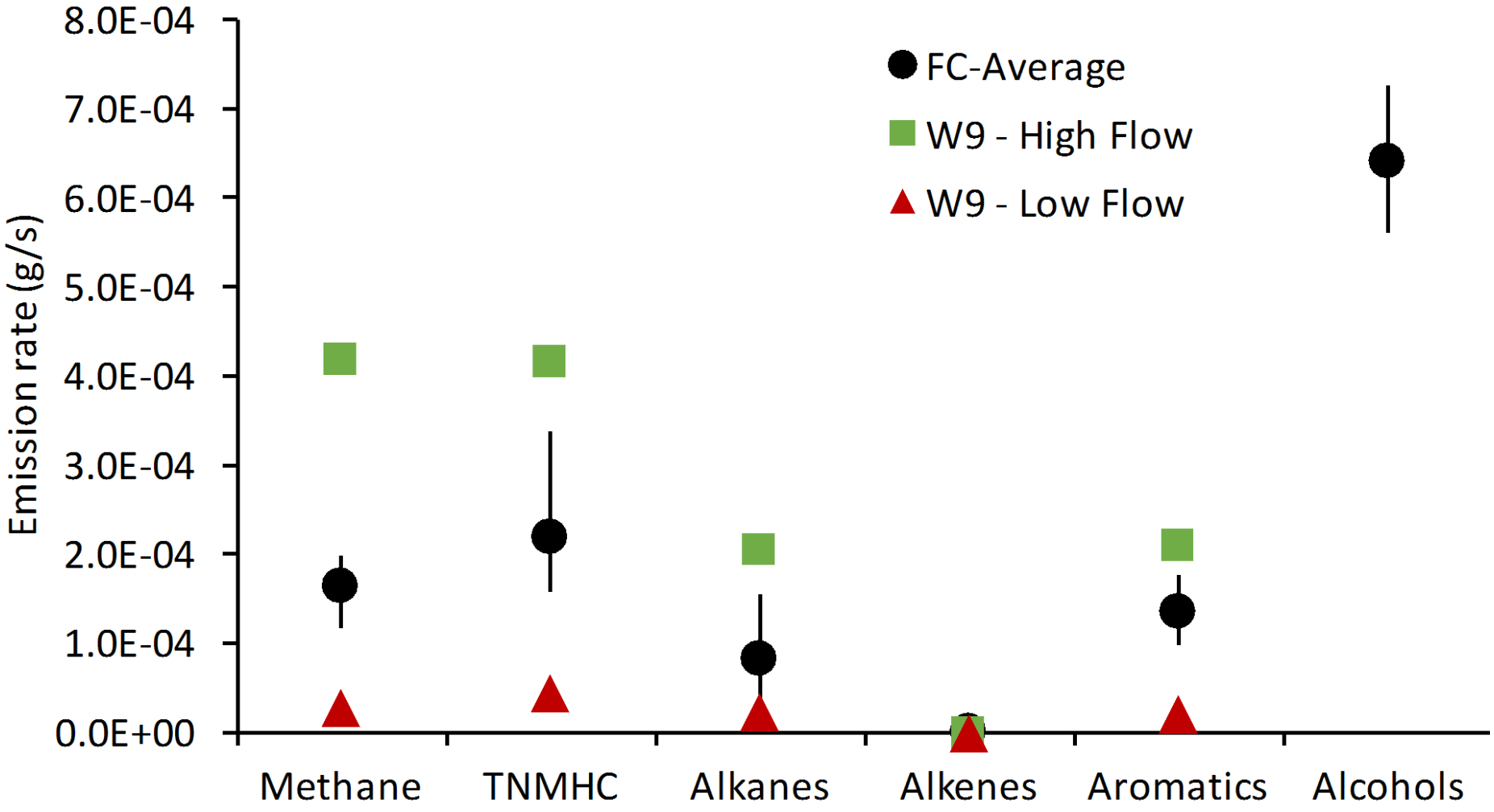
Typical composition of organics in produced water



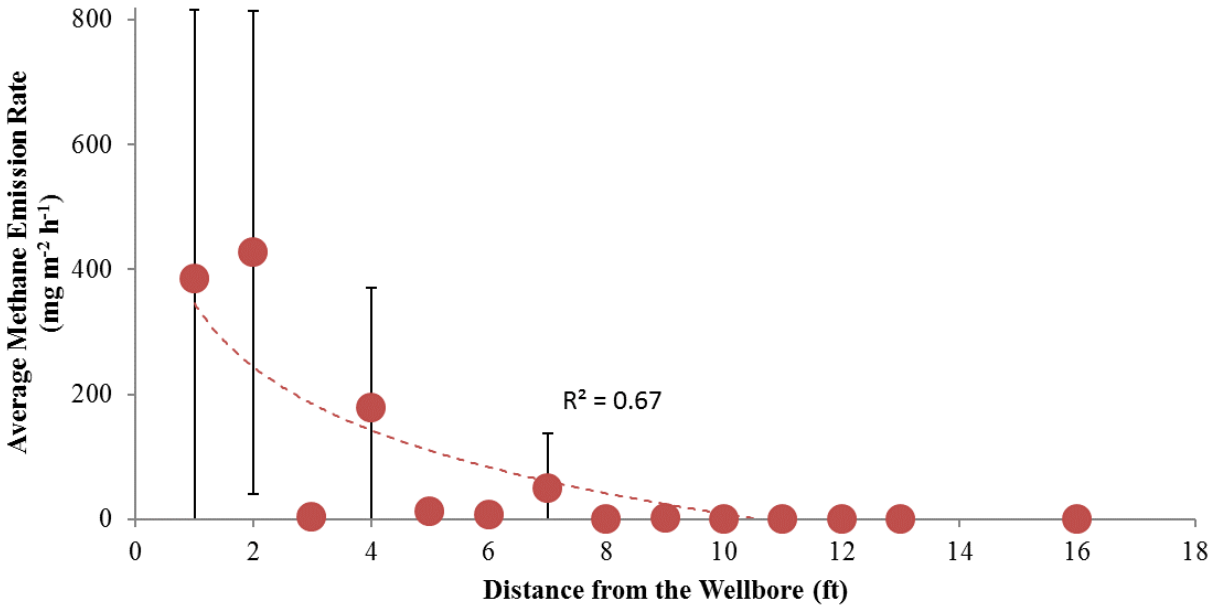
Most Emissions Occur Soon After Exposure of Produced Water to Ambient Air



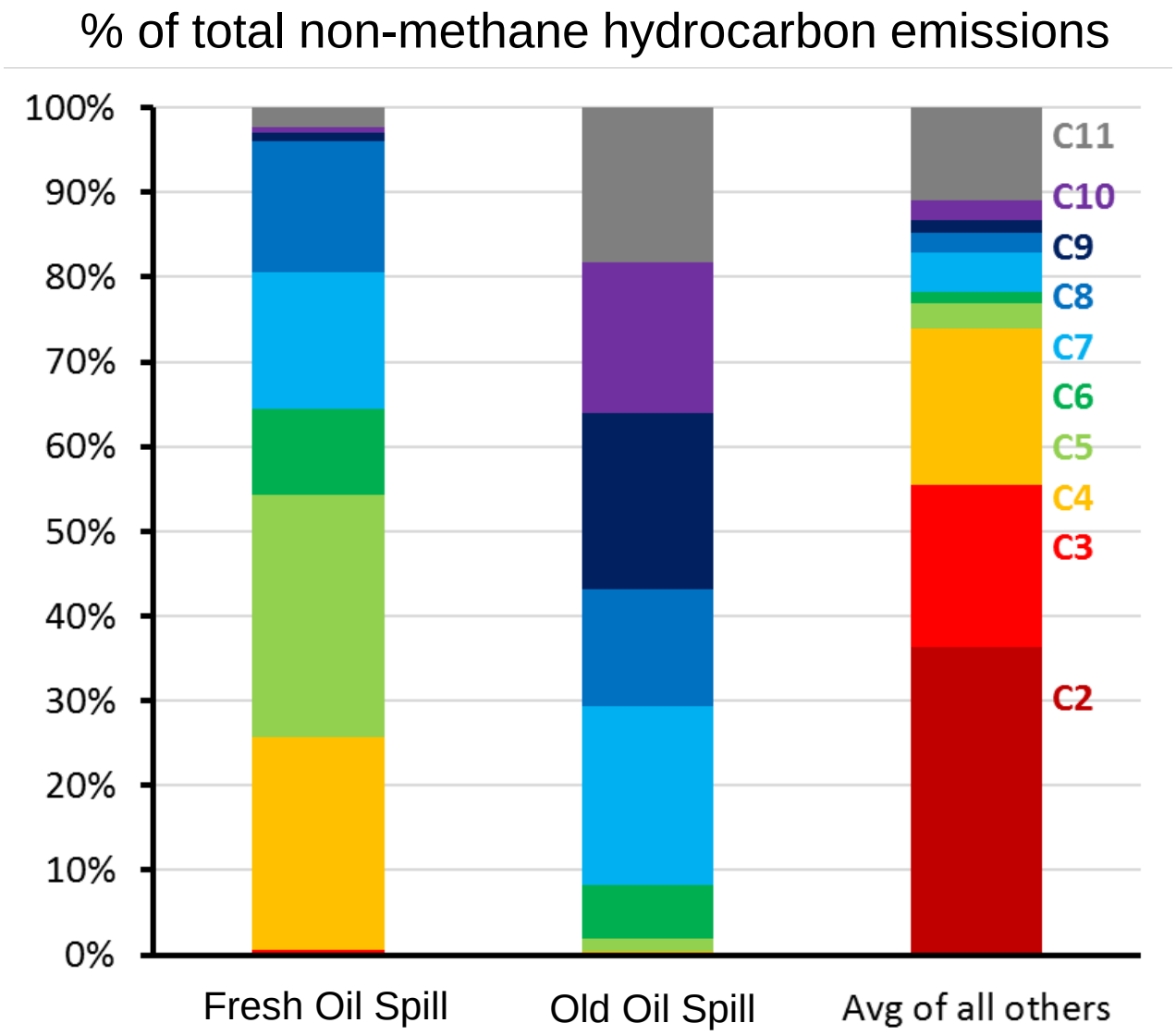
Existing Regulatory Models Can Be Configured to Simulate Emissions From Produced Water Ponds



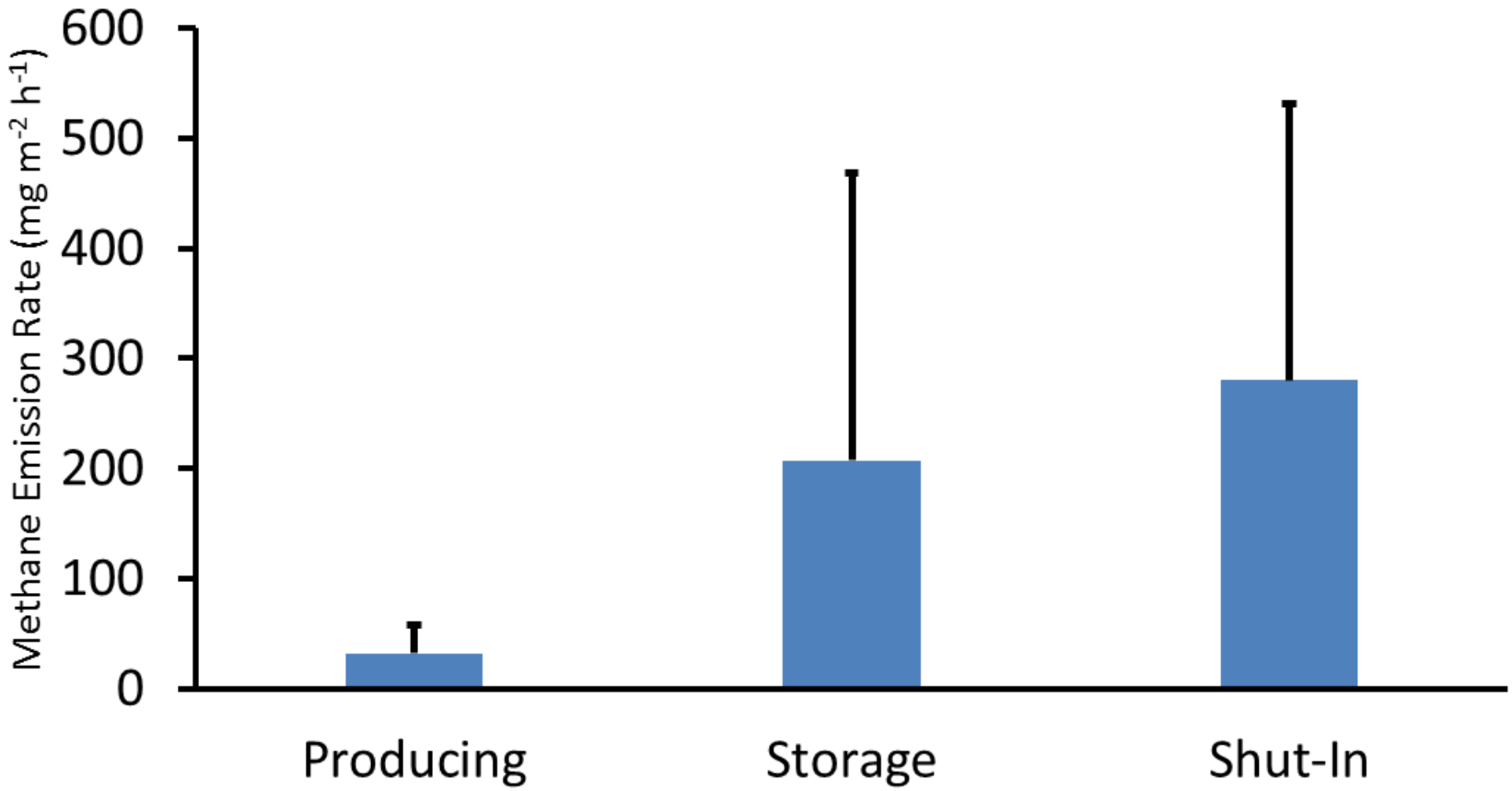
Subsurface Leaks at Well Pads Occur Close to the Wellhead



Emissions Due to Oil Spills are Occasionally Detected



Producing Wells Have Lower Emissions



Higher pressure appears to be leading to increased emissions

Real-time Air Quality Data:
ubair.usu.edu

Bingham Center Air Quality Team Website:
rd.usu.edu