Uintah Basin Air Quality Research Project

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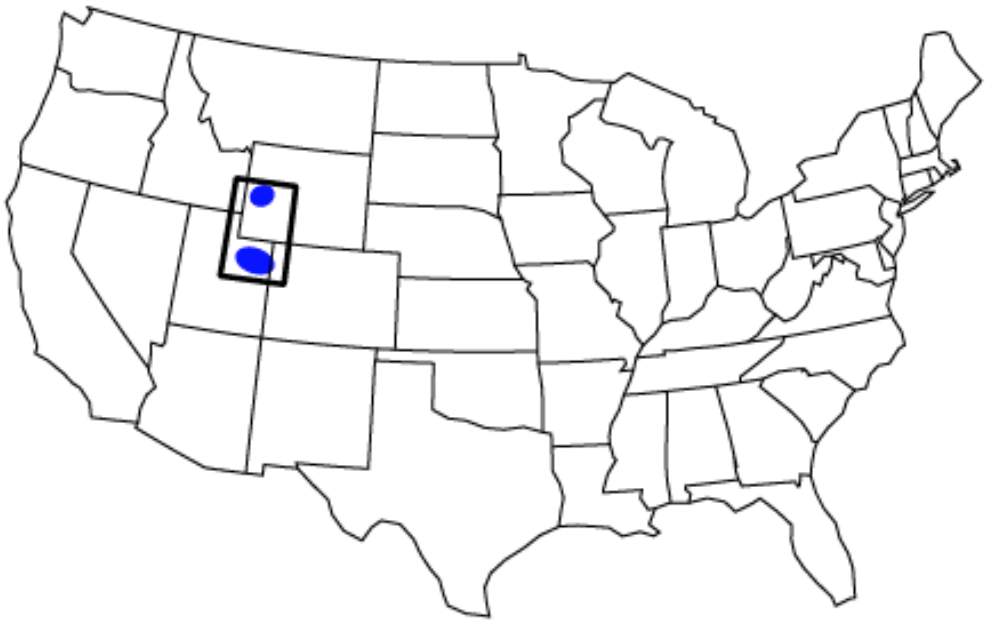
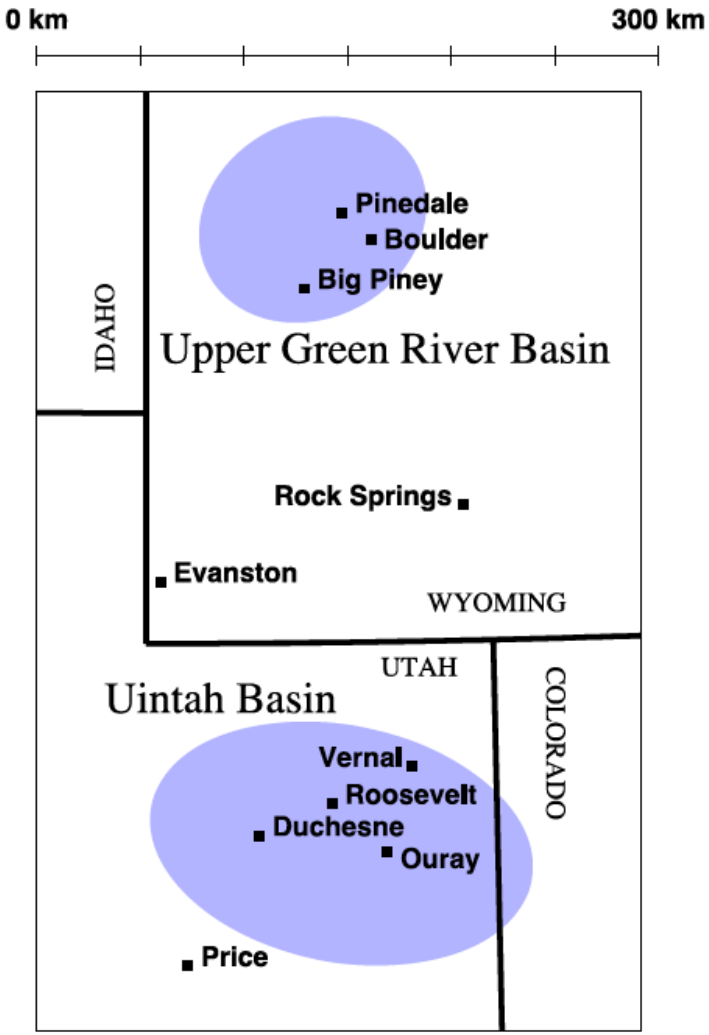
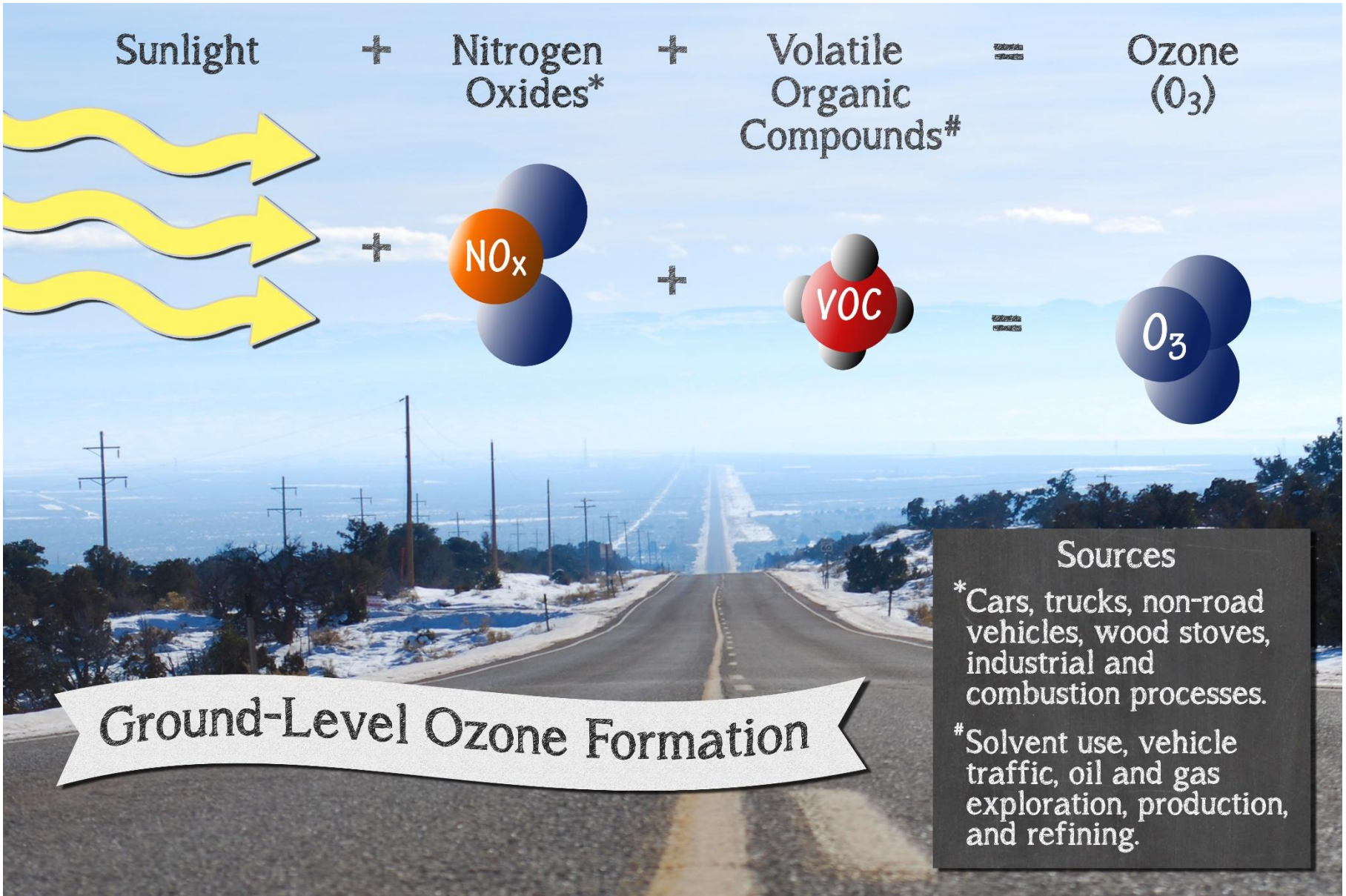
Wintertime Ozone in the Uintah Basin is Unique, Newly Discovered, and Still Poorly Studied

- Ozone pollution is an urban summertime problem
- Only two regions worldwide are known to produce high winter ozone

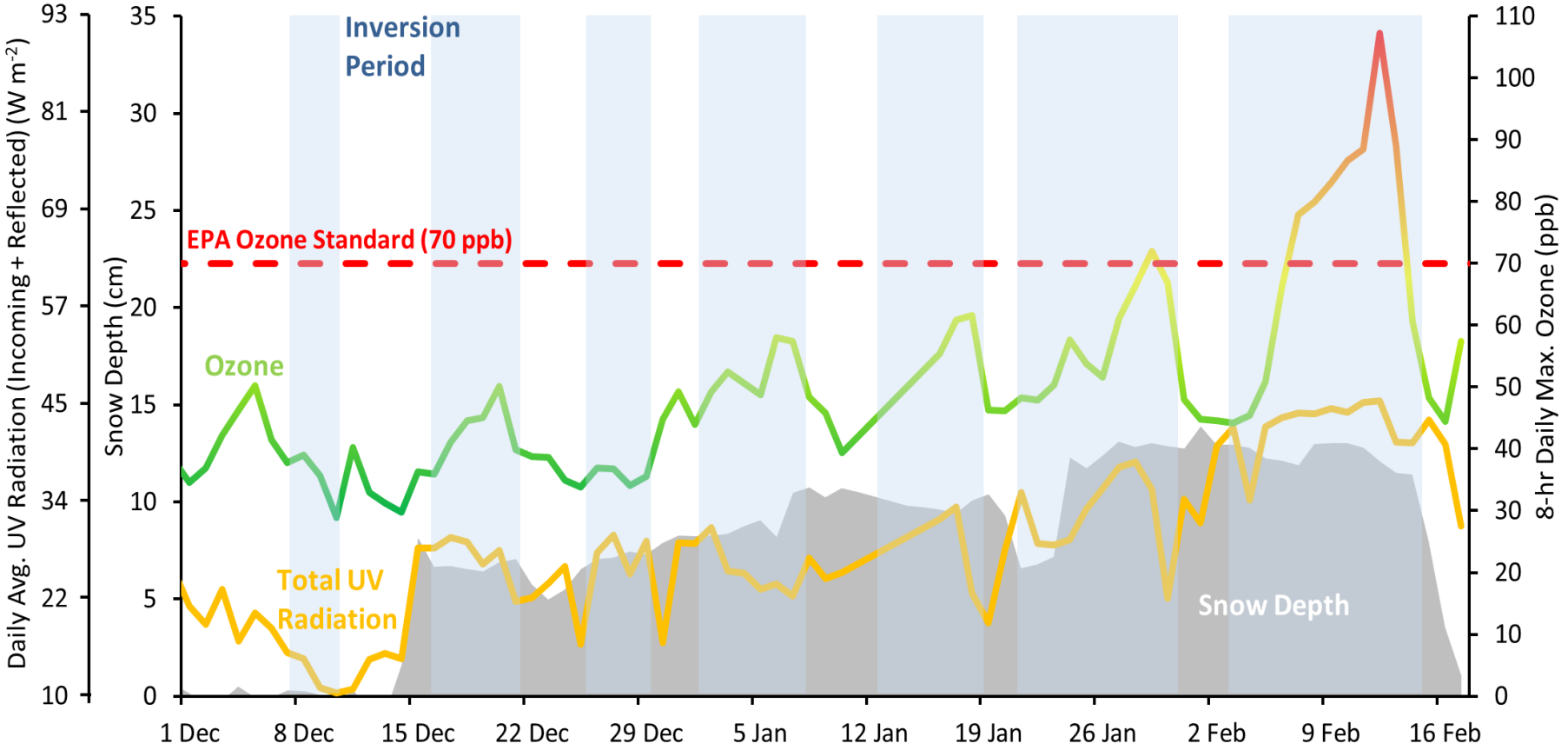




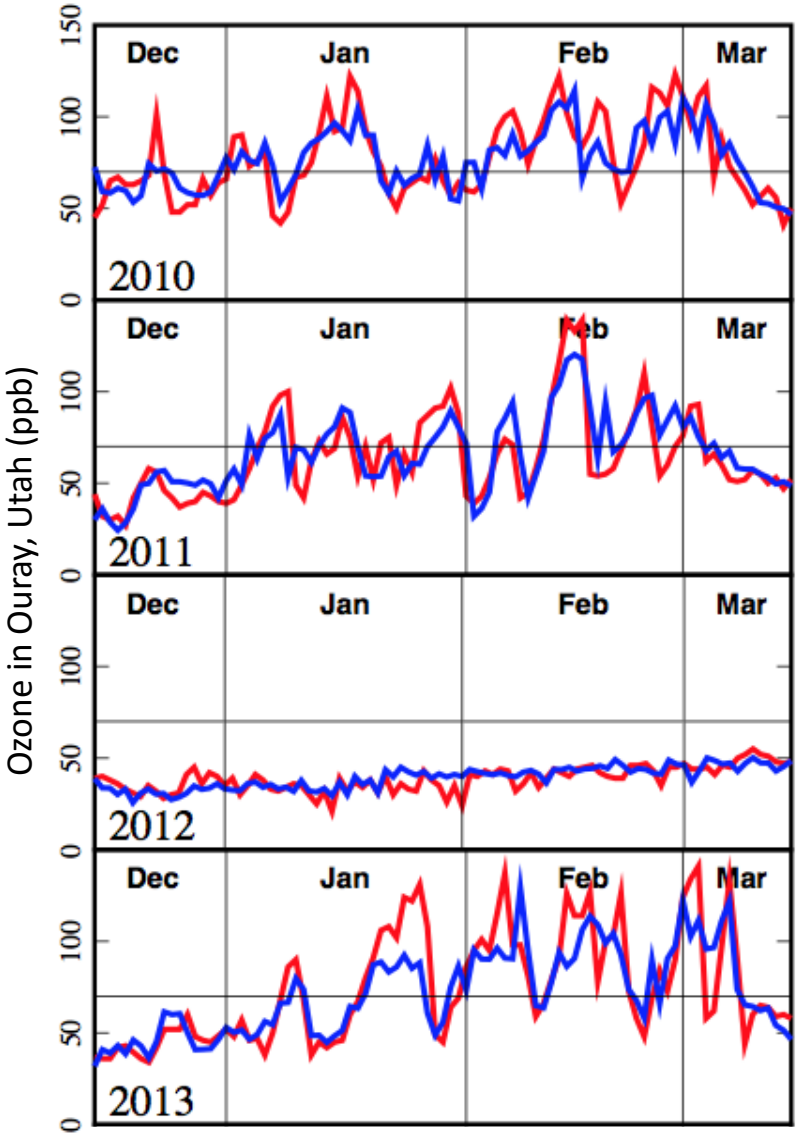
Ozone is Formed from Reactions Involving Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC)

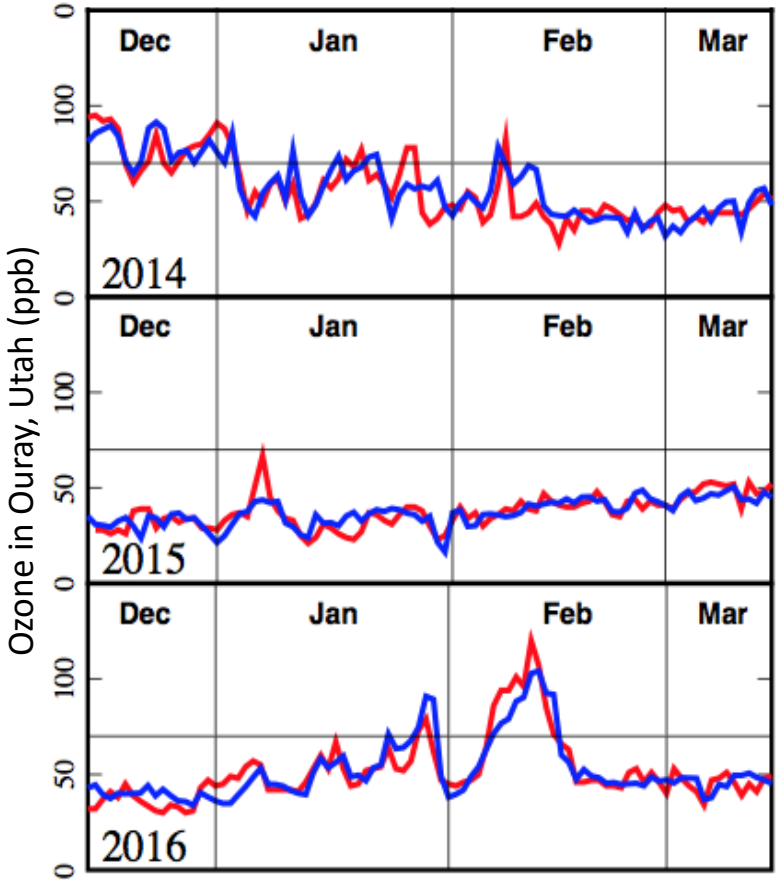


Winter Ozone Only Occurs During Strong, Multi-Day Temperature Inversions



Winter Ozone Episodes are Very Predictable

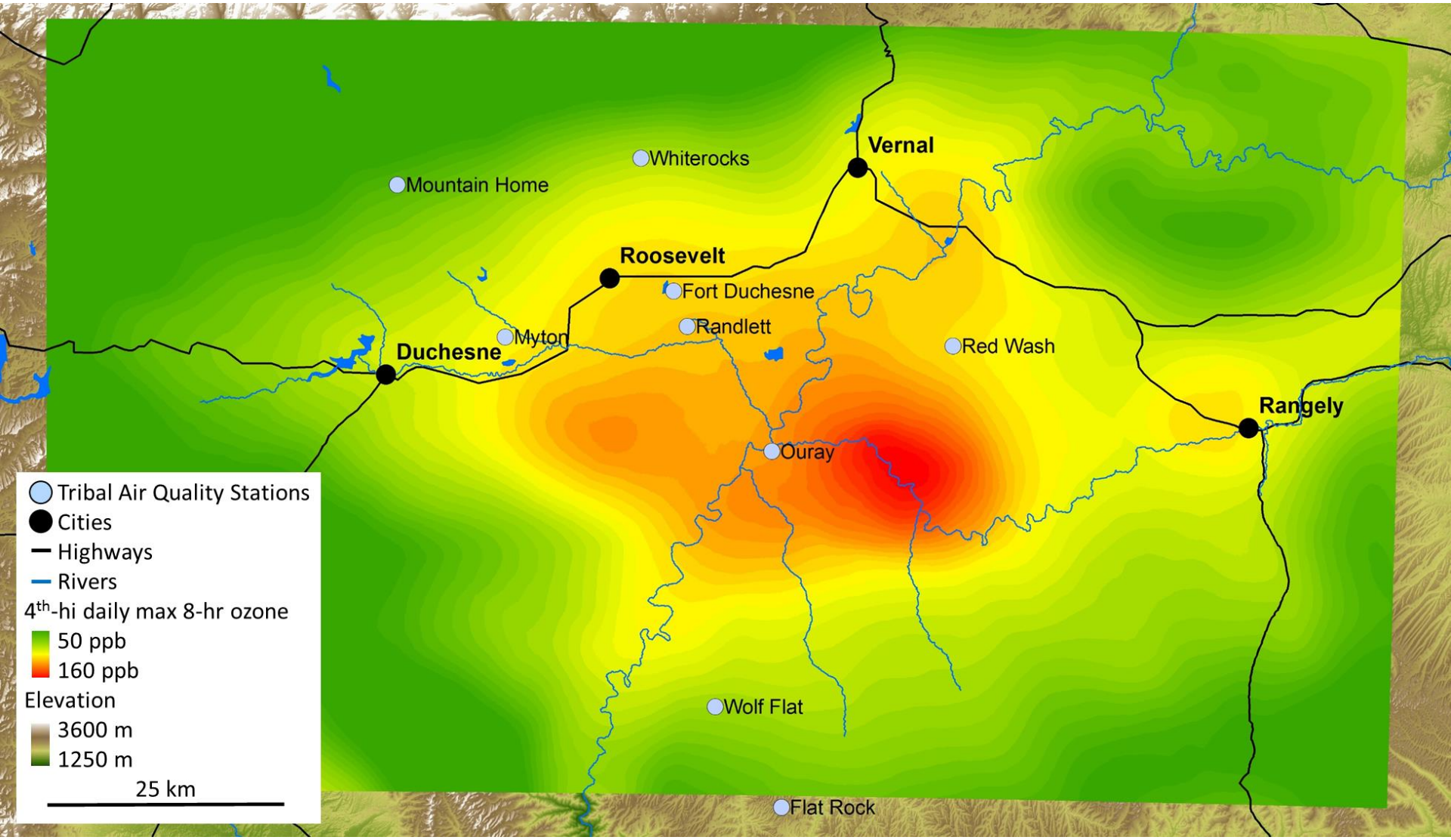




Predicted via statistical model

Measured

Elevation and Proximity to Oil and Gas Activity Determine the Distribution of Winter Ozone



Several Key Uncertainties Limit Our Ability to Understand and Reduce Wintertime Ozone

1. What are the specific sources of ozone precursors?
   - Gaps in understanding of emission rates and speciation

2. How have/will changes to emissions affect ozone production?
   - Measurements and modeling tools needed to track changes

3. How can we improve the ability of models to simulate wintertime ozone?
   - Improvements in models needed to better simulate inversion conditions

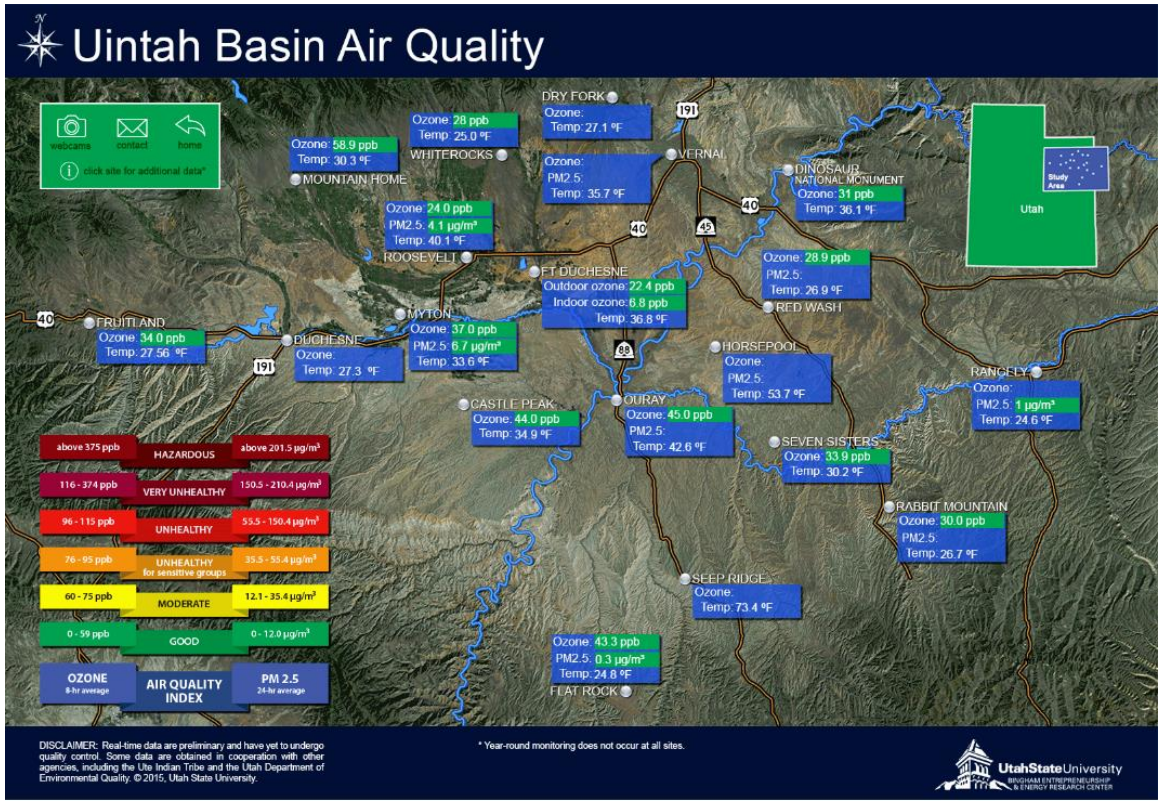
Emissions Measurements Needed To Ensure Effective, Economical Mitigation

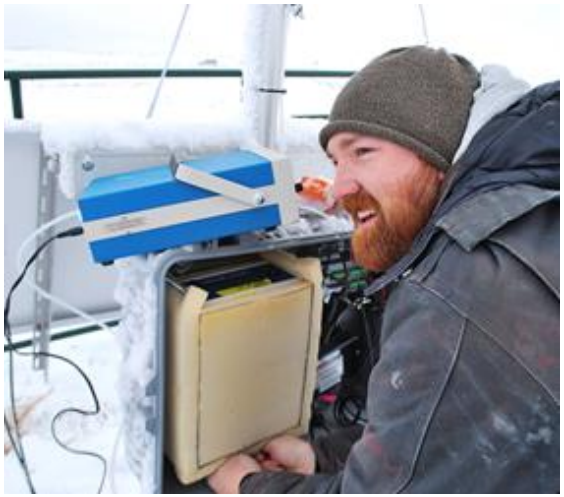
We have shown that produced water, which was previously uncharacterized, is an important VOC source

We are working with Utah DAQ and others to determine highest priorities, carry out additional measurements

Ambient Monitoring Needed To Track Changes Over Time

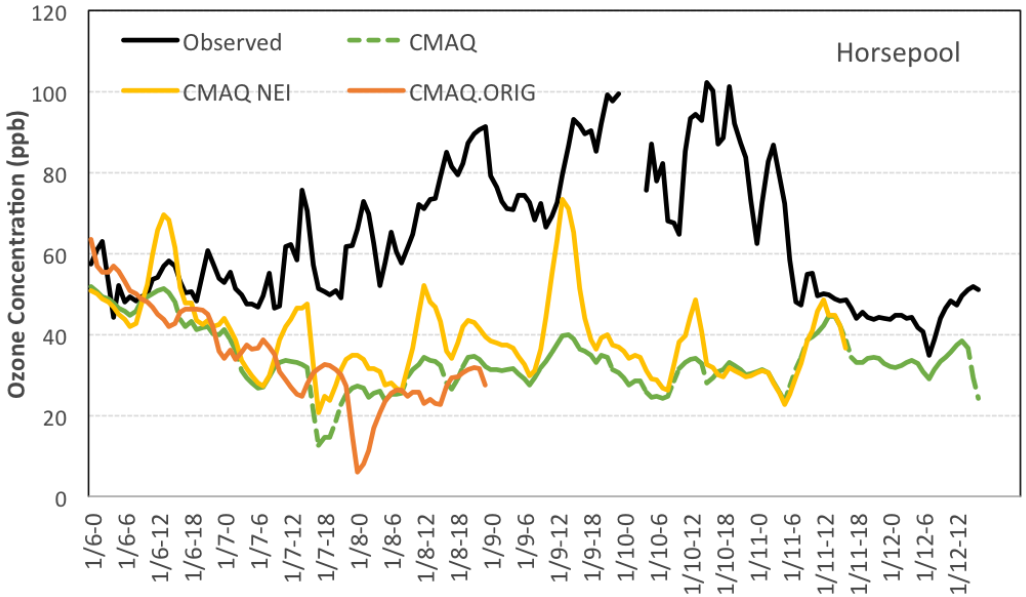
We are collecting a long-term dataset of ozone, key precursors, and meteorological conditions, analyzing for trends related to changes in industrial activity





Improvements to Air Quality Models Needed To Allow for More Accurate Decision-making

We are working to improve simulations of “background” ozone and 3-dimensional structure of winter inversions

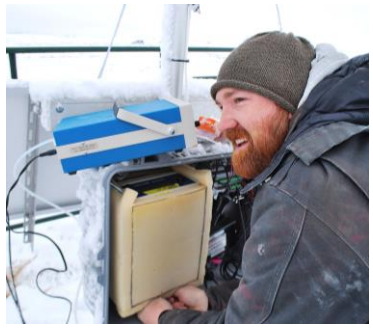


Thank You









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