

Introduction

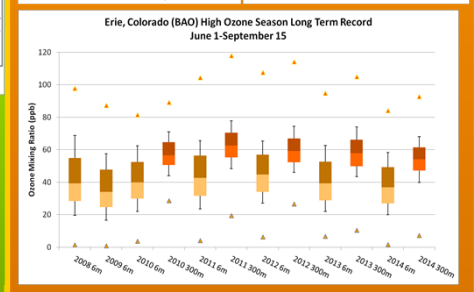
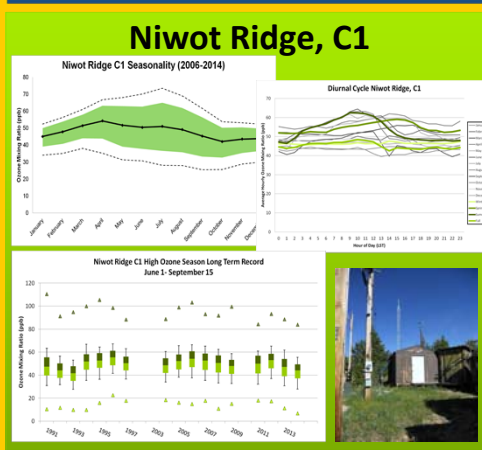
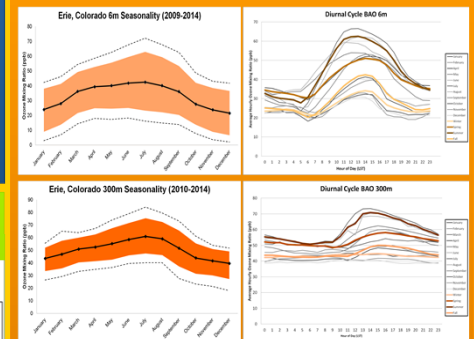
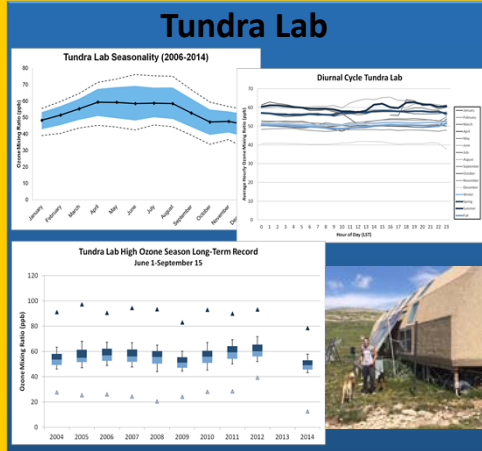


Surface Ozone is a harmful pollutant that has direct and indirect effects on human health, ecosystem functioning, and atmospheric processes. As a secondary pollutant, surface level ozone is formed in the atmosphere as a product of the reaction between precursor pollutants in the presence of sunlight. The Colorado Front Range is a region that is subject to frequent high ozone episodes and is an area of non-attainment to the National Ambient Air Quality Standard (NAAQS). It is imperative to understand seasonal, diurnal, and long-term trends of ozone; as well as the role of meteorology and precursor pollutant sources on ozone formation and accumulation in the region.



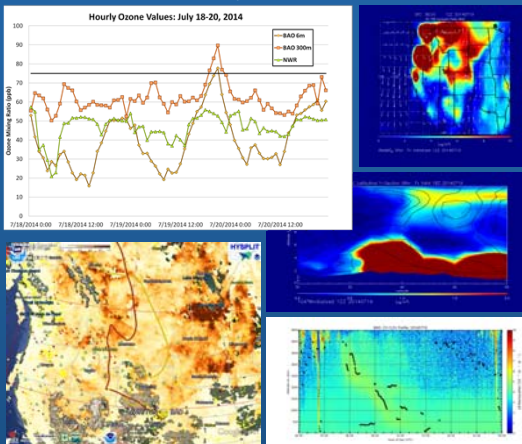
	Erie, Colorado 2009-current	Niwot Ridge, C1 1991-current	Tundra Lab 2004-current
Latitude, Longitude	40.05 N, 105.004 W	40.0362 N, 105.544 W	40.0542 N, 105.5889W
Elevation (masl)	1584 masl	3035 masl	3538 masl
Site Information	Urban	Tree-Rural	Above Treeline-Rural
Inlet Height	6m and 300m	6 m	6 m
Collaboration	NOAA Boulder Atmospheric Observatory	CU Mountain Research Station	CU mountain Research Station

Station Seasonal and Diurnal Variability



High Ozone Event: Wildfire Influence

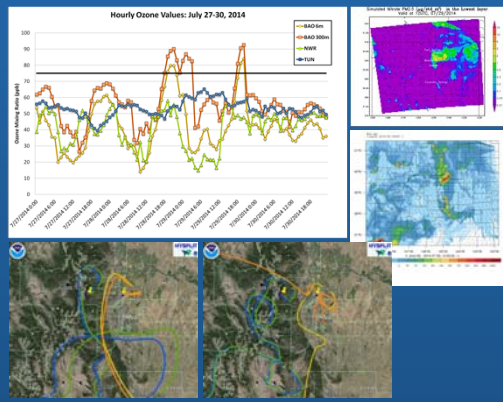
July 19, 2014



Ozone values above the NAAQS were measured from Erie, Colorado on July 19, 2014. NOAA Hysplit back trajectory reveals the air mass moving into the measurement station was impacted by wildfires in the Northern US and Canada. NOAA RAQMS model output and co-located ceilometer image confirm the influence of black carbon and aerosols at the Erie station. Niwot Ridge remained above the boundary layer, sampling a different air mass.

High Ozone Event: Urban Pollution

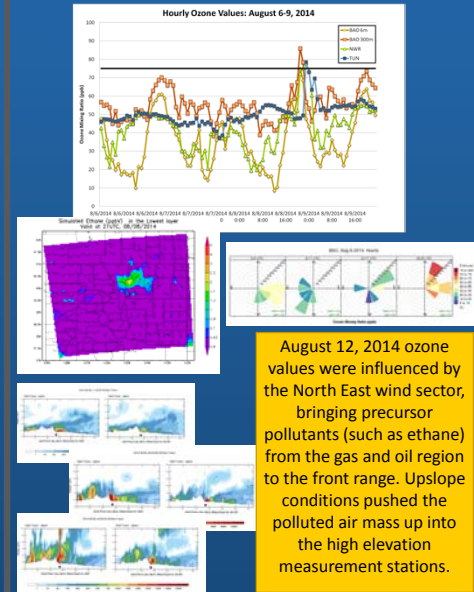
July 28-29, 2014



High ozone values were observed at the Erie measurement location, while Niwot Ridge and Tundra lab measured air masses with less ozone. The dominant source of ozone precursors can be related to urban pollution from the local area. The Niwot Ridge and Tundra air masses followed a trajectory which avoided the impact of local pollution.

High Ozone Event: Gas and Oil

August 12, 2014



August 12, 2014 ozone values were influenced by the North East wind sector, bringing precursor pollutants (such as ethane) from the gas and oil region to the front range. Upslope conditions pushed the polluted air mass up into the high elevation measurement stations.

Data Use Acknowledgements:

NCAR WRF ARW
NOAA RAQMS
NASA Earth Observatory
ESRL RAPChem
Mozart4 Chemical Forecast
NASA GEOS-5

Thank you:

University of Colorado-Mountain research station— Hillary Buchanan, Mark Williams, Hope Humphries, Jennifer Morse and the INSTAAR/LTER program
Boulder Atmospheric Observatory—Dan Wolfe, Jon Kofler, and Bruce Bartram
Students: Mark Leonard and Helen Cothrel
Continued support and expertise – Detlev Helmig and John Sullivan