



Utah Winter Fine Particulate Study (UWFPS)

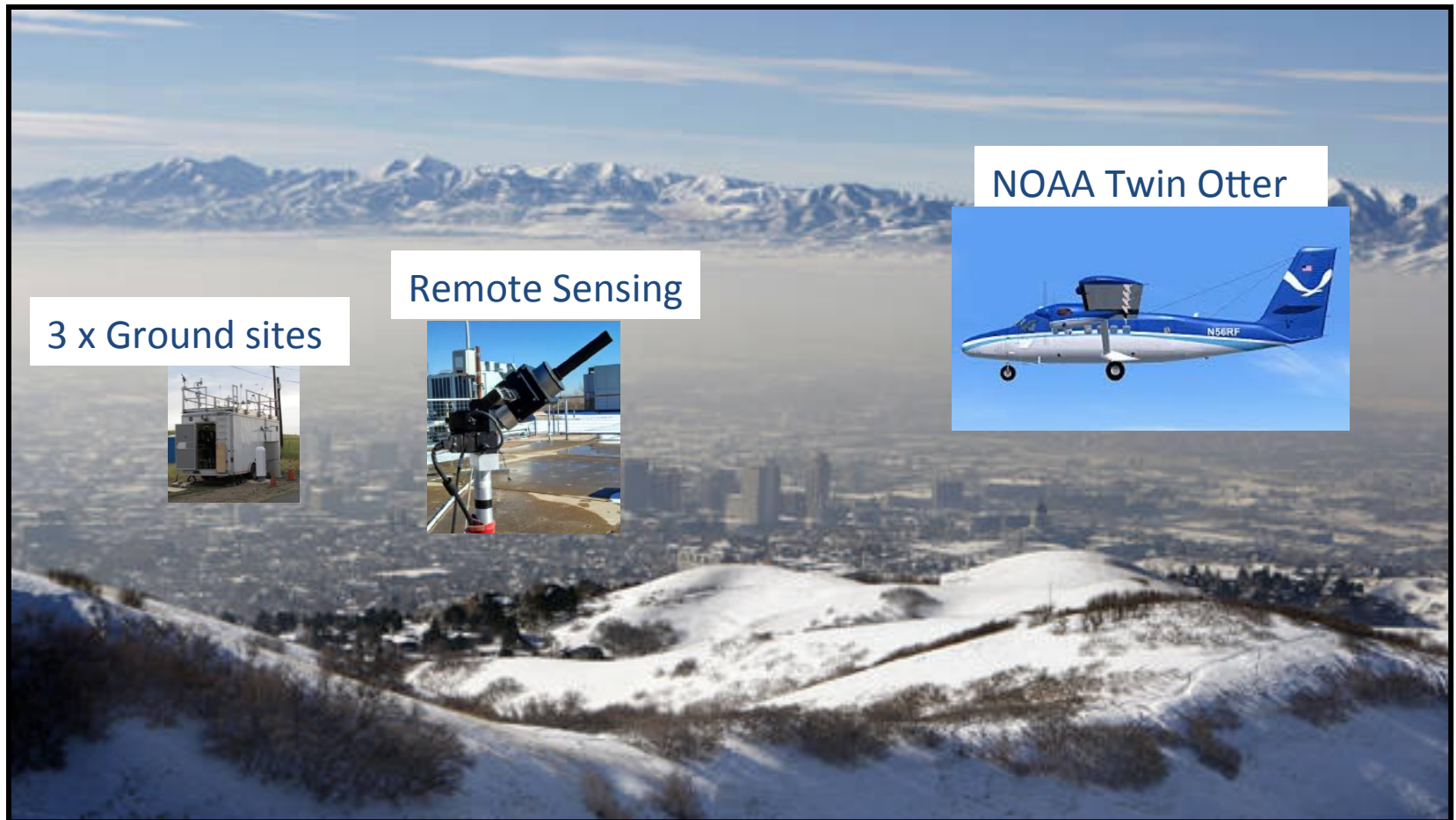
January 15 – February 15, 2017

Salt Lake City and Adjacent Basins

Visit <http://www.esrl.noaa.gov/csd/groups/csd7/measurements/2017uwfps/>

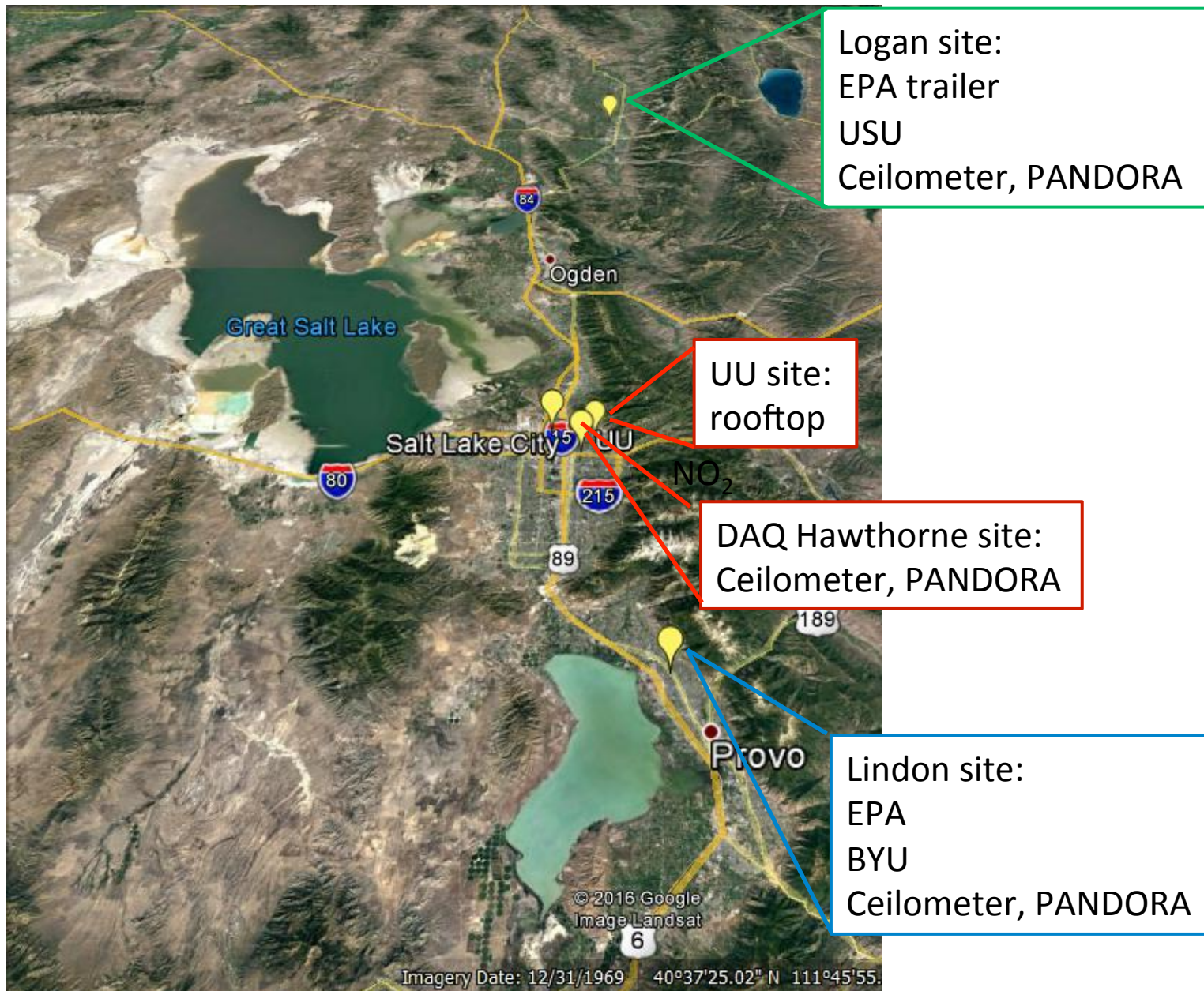
Components of UWFPS

A twin otter aircraft and ground based observations to investigate the factors governing high $PM_{2.5}$ events in mountain basins of northern Utah



Ground-based Observations

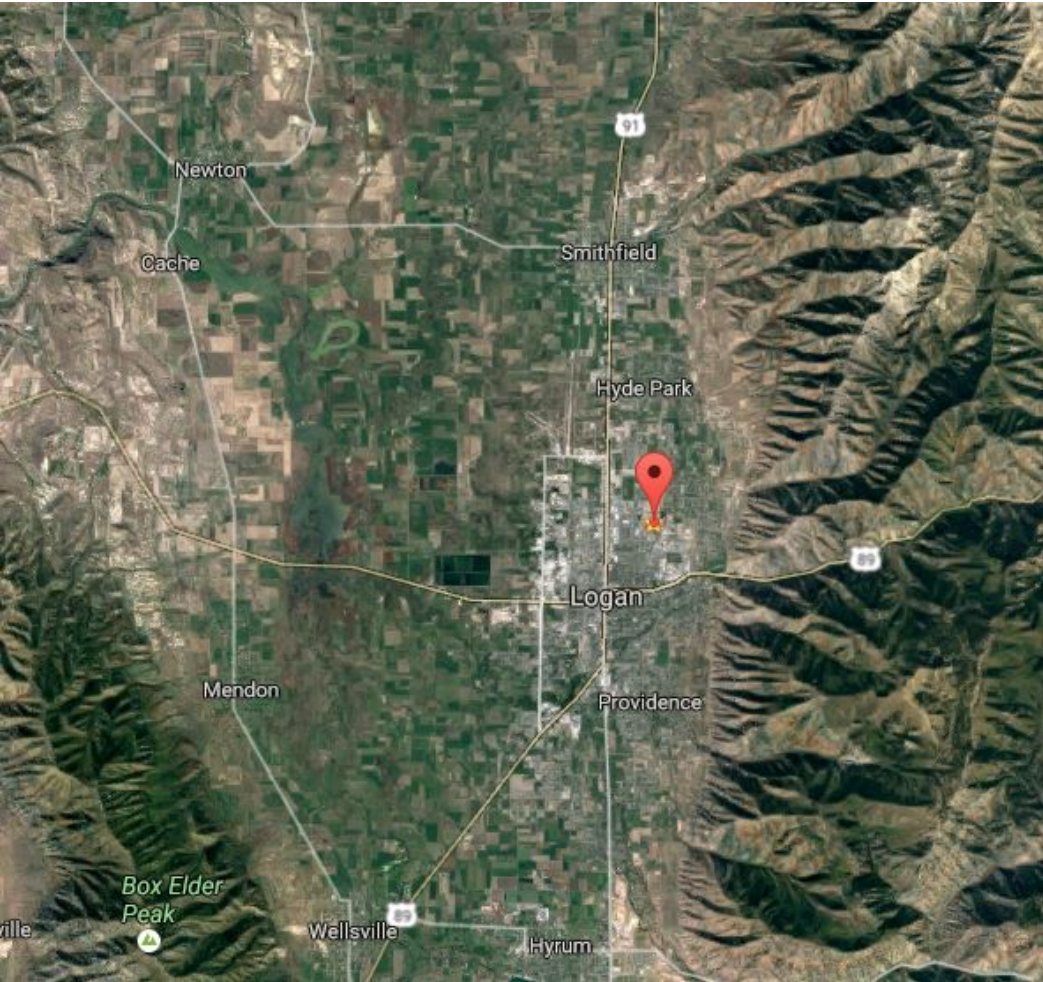
Sites for Ground-based Observations



Cache Valley : USU Logan, Utah



- Population: ~ 125, 000
- Strong agricultural economy



Cache Valley : USU Logan, Utah

EPA trailer
USU

Instrument	Species Measured	PI
<u>Trace gas analyzers</u>		Dr. Russell Long EPA ORD
T-API T200U	NO _y , NO, NO _y -NO,	
T-API T500U CAPS	NO ₂ only	
2B	O ₃	
~ 60 x canister sampling; 2 per day	VOC speciation	
Aerodyne Iodide CIMS	HNO ₃ , N ₂ O ₅ , ClNO ₂ , HONO	
TSI SMPS and UPC OPC	Size distribution from ultrafines through coarse	
2 x Tisch Hi-Vol samplers	PM composition: OA speciation, EC/OC, inorganic ions, C14, etc	
Aerodyne ToF AMS	Real-time PM ₁ composition, size	
Ceilmeter	time evolution of aerosol layer	
PANDORA	-Total column measurements of HCHO, NO ₂ , and O ₃ , -Altitude profiles	
Vaisala weather transmitter	Met parameters (T, RH, ws, wd etc.)	
??	NH ₃	Dr. Randy Martin USU
R & P	OC/EC	

EPA Trailer



Trailer 1. UDAQ

Utah Valley: DAQ's Lindon Station

- Population: ~575, 000

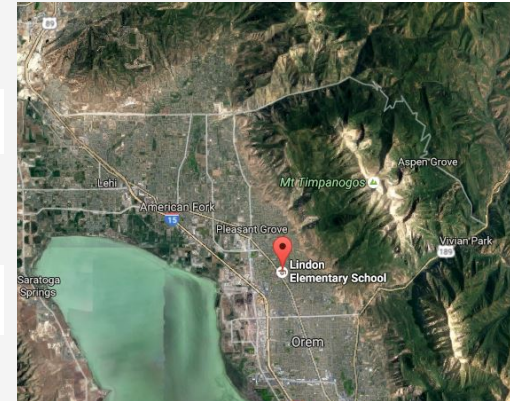


Trailer 2. BYU



Trailer 1. UDAQ

Instrument	Species Measured	PI
<u>Trace gas analyzers</u>		Dr. Russell Long EPA ORD
Thermo 42iY	NO _y , NO, NO _y -NO,	
Aerodyne CAPS	NO ₂ only	
2B	O ₃	
TSI APS	Size distribution from ultrafines through coarse	
2 x PM _{2.5} samplers	PM composition: OA speciation, EC/OC, inorganic ions, C14, etc	
Ceilometer	time evolution of aerosol layer	
PANDORA	-Total column measurements of HCHO, NO ₂ , and O ₃ , -Altitude profiles	
Organic Aerosol Monitor	Hourly speciated organic aerosol	Dr. Jaron Hansen/ Dr. Delbert Eatough BYU
Sunset	OC/EC	
AIM-IC	PM inorganic composition	UDAQ
	Visibility	
	PM _{2.5} , PM ₁₀ , CO, met parameters (T, RH, ws, wd etc.)	



Salt Lake Valley: Rooftop Measurements at University of Utah

Atmospheric Sciences Building



Instrument	Species Measured	PI
AIM-IC	PM inorganics, HNO ₃ , NH ₃ , HONO	Dr. Jen Murphy, University of Toronto
Passive sampler	PM OA speciation	Dr. Brent Williams, Washington University in St. Louis
SMPS; SMPS nano; APS	Size distribution from ultrafine through coarse	Dr. Gannet Hallar (University of Utah)
TEOM	PM _{2.5} mass concentration	UDAQ
Trace gas analyzers	CO, NO _x	
Trace gas analyzers	O ₃ , CO ₂ , CH ₄	Dr. John Lin group/ Munkh (University of Utah)
VOCs	PTR-MS	Dr. Munkh/ Dr. Dylan Millet (University of Minnesota)
Aerodyne QCL	HCHO	
Aerodyne CAPs	NO ₂	Dr. Russell Long, EPA ORD
Pandora	Column HCHO, NO ₂ , O ₃	
	Met observations, forecasting	Dr. Sebastian Hoch and E. Crossman (University of Utah)

Salt Lake Valley: DAQ's Hawthorn Site

Instrument	Species Measured	PI
SMPS; APS	Size distribution from ultrafine through coarse	Dr. Kerry Kelly (University of Utah)
Wind profile	LiDAR	Dr. Sebastian Hoch (University of Utah)
Ceilometer	Aerosol back scattering	Dr. Russell Long, EPA ORD
Pandora	Column HCHO, NO ₂ , O ₃ PM _{2.5} , PM ₁₀ , PM _{2.5} speciation, CO, NO _x , O ₃ , met parameters (T, RH, ws, wd etc.)	UDAQ

UU-LiDAR DAQSTUD - HAWTHORNE/SLC 10 Feb 2016

Backscatter and VAD winds

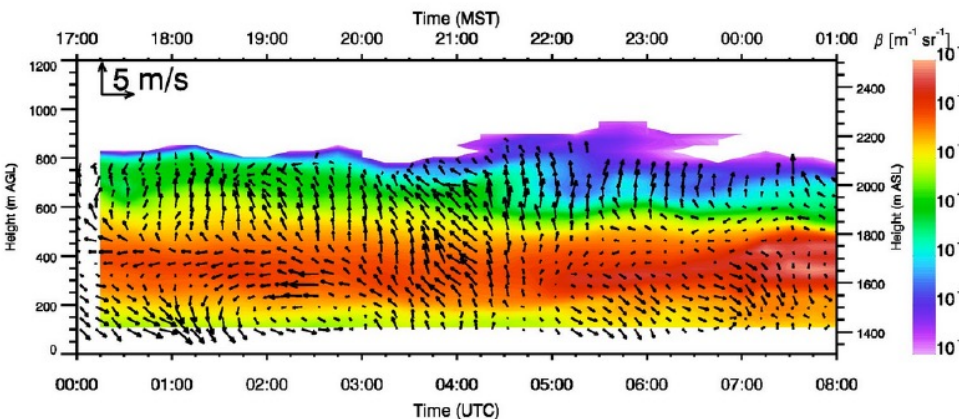
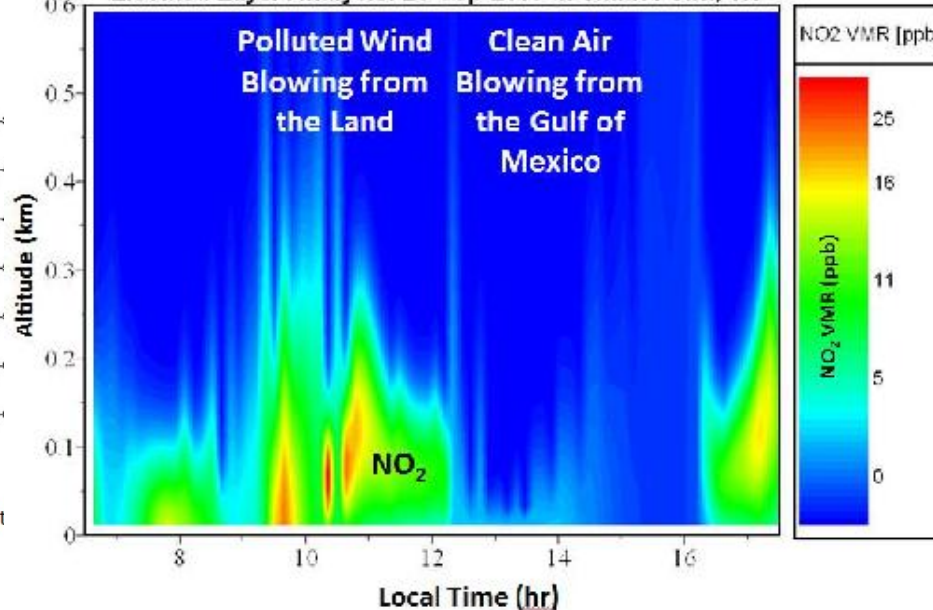
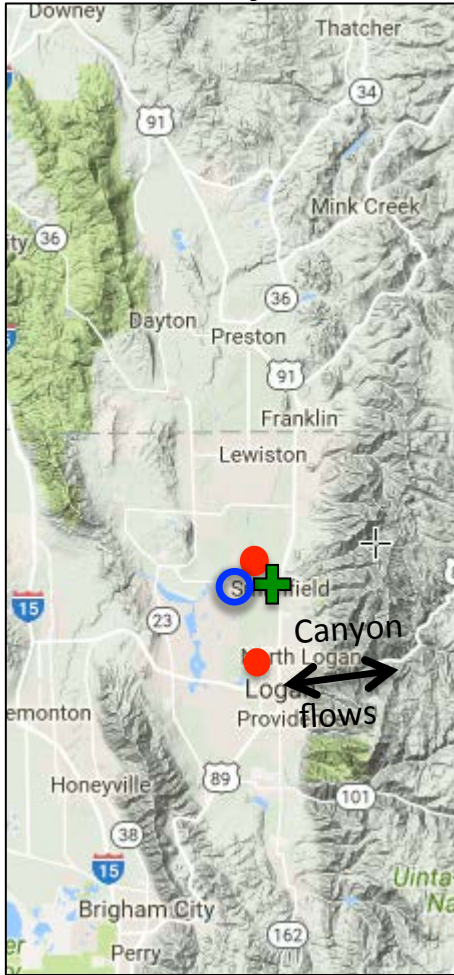


Figure 4: Example quicklook product (subset) showing the Doppler wind lidar retrieved vertical profile of the wind field above the Hawthorne (HW) site.

Elevated Layer Analysis: 25-Sep-2013 at Smith Point, TX



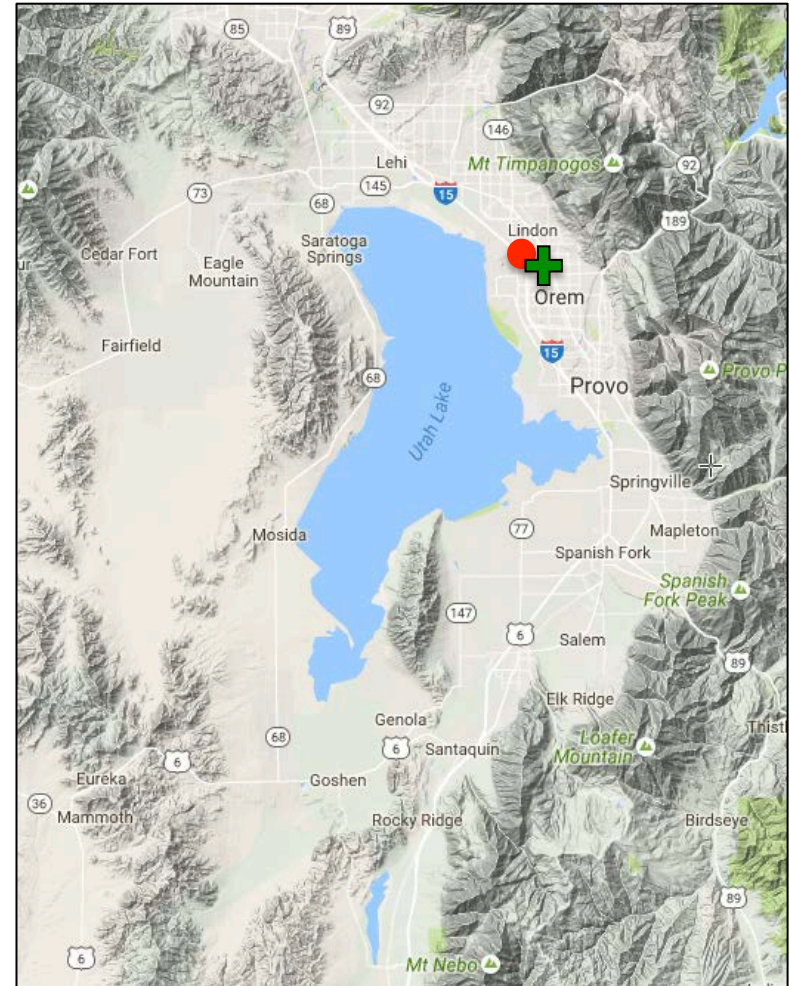
Cache Valley



- Ceilometer
- LiDAR / SoDAR
- ✚ Pandora

Co-location of instrumentation is planned to evaluate meteorological processes affecting the surface observations.

Utah Basin



Deployment University of Utah and EPA ORD resources for the UWFPS Project to study transport patterns

Salt Lake Basin

Hawthorne: UU LiDAR, ORD ceilometer-1, Pandora-1
Red Butte: UU ceilometer-fixed
UU: UU basic met observations, ORD Pandora-1

Aerosol Backscatter
Wind Profile
Pandora / Chemistry Profile

Cache Valley

Smithfield: ORD ceilometer-2, Pandora-2
Campbell: CS ceilometer-fixed

Utah Valley

Lindon: ORD ceilometer-3, Pandora-3

Tentative Schedule for Arrival & Installation

Start Date	Instrument	Who
December 15, 2016	Filter based samplers, AIM, CO analyzers, NOx, TEOM	UDAQ; locals
January 2, 2017	AIM-IC PTR-MS others	U. Toronto UMN
January 8-9	EPA trailer, remote sensing devices, analyzers	EPA ORD
	Ground sites : UU, Lindon, Cache	Ground team, BYU, UU met
January 15, 2017	Twin Otter Arrives	Twin Otter Team
February 15, 2017	End of Study	
