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# Meteorological Observations Available for the State of Utah

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# Meteorological Observations Available for the State of Utah

Written by: Sonia Wharton, LLNL August 31, 2017

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The National Weather Service's Meteorological Assimilation Data Ingest System (MADIS) contains a large number of station networks of surface and upper air meteorological observations for the state of Utah. In addition to MADIS, observations from individual station networks may also be available. It has been confirmed that LLNL has access to the data sources listed below.

**1. MADIS:** MADIS ingests data from NOAA data sources and non-NOAA providers. For the state of Utah the data system can be broken down into three categories: (1) MesoWest, (2) METAR, and (3) other station networks. MADIS data contains both surface meteorological and upper air observations at sampling frequencies ranging from 5-min to hourly. MADIS also contains gridded forecast products, and networks which are not considered part of MesoWest or METAR.

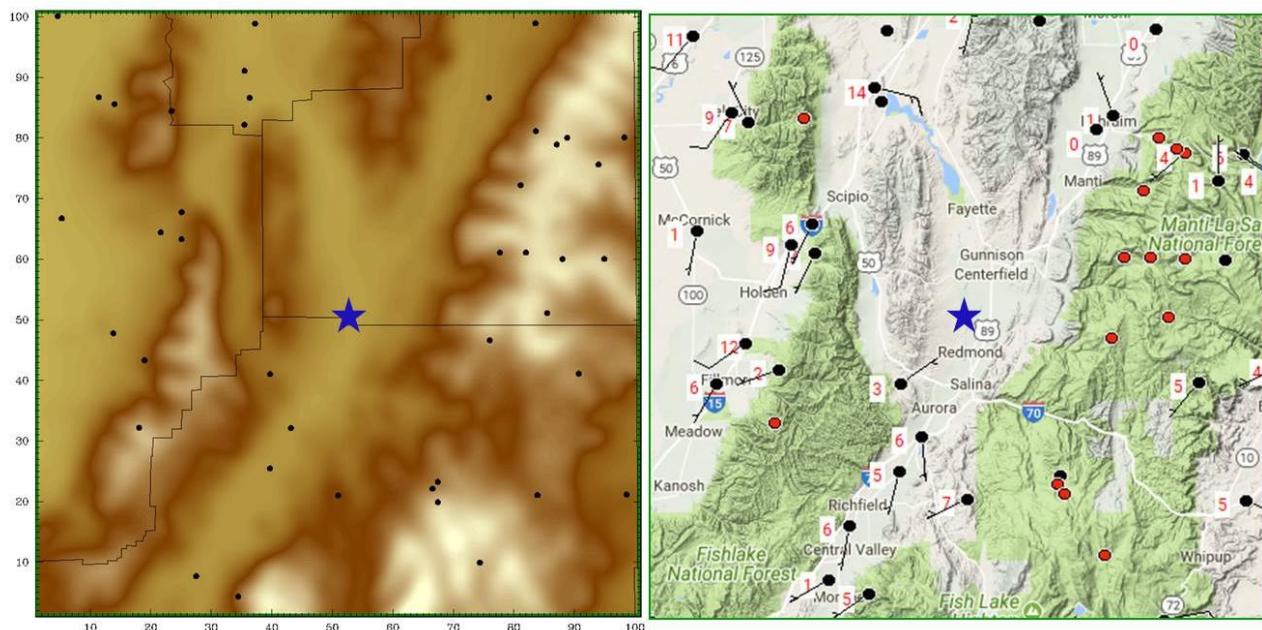


Figure 1: Meteorological stations within 50 miles of Redmond Salt Mine in central Utah. The location of the mine is indicated by the blue star. Map at left: Each dot represents an input source of meteorological data for the NARAC atmospheric modelling system. Map at right: The black dots and wind vectors show real-time data availability of wind speed and wind direction observations near Redmond Mine, queried from the MesoWest network. The red dots indicate stations with suspect data quality.

**A. MesoWest Network (<http://mesowest.utah.edu/>):** Latest observation file (mesowest.dat.gz) is updated every 15-minutes and metadata file (mesowest\_csv.tbl.gz) is updated every 2 hours. The following networks are included in MesoWest:

- National Weather Service Network: surface meteorology
  - Number of Stations = 28 (statewide)

- 5-min observations of air temperature, relative humidity, wind speed, wind direction, air pressure, cloud cover, precipitation
- Remote Automated Weather System (RAWS) Network: surface meteorology
  - Number of Stations = 68 (statewide)
  - Hourly observations of air temperature, relative humidity, wind speed, wind direction, precipitation
- Snowpack Telemetry (SNOWTEL) Network: surface meteorology
  - Number of Stations = 86 (mountainous areas statewide)
  - Hourly observations of air temperature, relative humidity, wind speed, wind direction, solar radiation, snow depth, snow water content
- Citizen Weather Observation Program (CWOP): surface meteorology
  - Number of Stations = 29 (statewide)
  - Observations of air temperature, relative humidity, wind speed, wind direction, barometric pressure, precipitation
- Union Pacific Railroad Weather Station Network: surface meteorology
  - Number of Stations = 24 (statewide)
  - Observation type and frequency not listed
- Utah Department of Transportation (DOT) Road Weather Information System (RWIS) Network: surface meteorology
  - Number of Stations = 38 (statewide)
  - 15-min observations of air temperature, relative humidity, wind speed, wind direction
- Central Utah Water Conservancy District Network: surface meteorology
  - Number of Stations = 9 (north-central Utah)
  - Observations of air temperature, relative humidity, solar radiation
- U.S. Army Dugway Proving Ground Network: surface meteorology
  - Number of Stations = 25 (north-west Utah)
  - 15-min observations of air temperature, relative humidity, wind speed, wind direction, solar radiation, air pressure
- Hydrometeorological Automated Data System (HADS): surface meteorology
  - Number of Stations = 216 (statewide)
  - Variety of meteorological parameters , <https://hads.ncep.noaa.gov/index.shtml>

## B. METAR Network

- Automated Surface Observing System (ASOS): surface meteorology
  - Number of Stations = 8 (statewide)
  - Hourly observations of air temperature, dew point, wind speed, wind direction, cloud cover, visibility, present weather, precipitation
- Automated Weather Observing System (AWOS): surface meteorology
  - Number of Stations = 15 (statewide). 3 stations have archived data. 12 stations have only recent data (~3 weeks) available via a modem connection.

- 20-min observations of air temperature, dew point, wind speed, wind direction, cloud cover, visibility, present weather, precipitation

## C. Other Observational Networks in MADIS

- One Minute Observations (OMO) of the Automated Weather Observing System (AWOS): surface meteorology
  - Number of Stations = 15 (statewide)
  - 1-min observations stored in 5-min time stamped files. Binary data.
- Ground-Based Global Positioning System (GPS) Meteorology Demonstration Network: surface meteorology
  - Number of Stations = 4 (statewide)
  - 30-min observations of air temperature, relative humidity, barometric pressure, wind speed, wind direction, precipitation
- NOAA/NWS Radiosonde Network: upper air meteorology
  - Number of Stations = 1 (near Salt Lake City)
  - radiosondes launched twice daily (0000 and 1200 UTC)
  - Low resolution data include fixed height observations of pressure, altitude, air temperature, dew point, wind speed, wind direction
  - High resolution data include 6-sec observations of pressure, air temperature, altitude, relative humidity, azimuth and elevation angles
- Cooperative Agency Profiler (CAP) Network: upper air meteorology
  - Number of Stations = 2, (southwest of Salt Lake)
  - 915 MHz wind profiler, RASS
  - Hourly observations of wind speed and direction

## D. Gridded Forecast Data

- NAM3, NAM4, NAM12 (3-, 4-, 12-km resolution spacing) – 84 hour forecasts
- GFS (0.5°, 0.25° resolution) – 7 day forecasts
- HRRR (3-km resolution) – 18 hour forecasts

**2. Non-MADIS Meteorological Data in Utah:** These data products are not ingested into MADIS but may provide sources of additional meteorological data in the state. Data can be found at: <https://www.eol.ucar.edu/projects/hydrometnet/utah/>

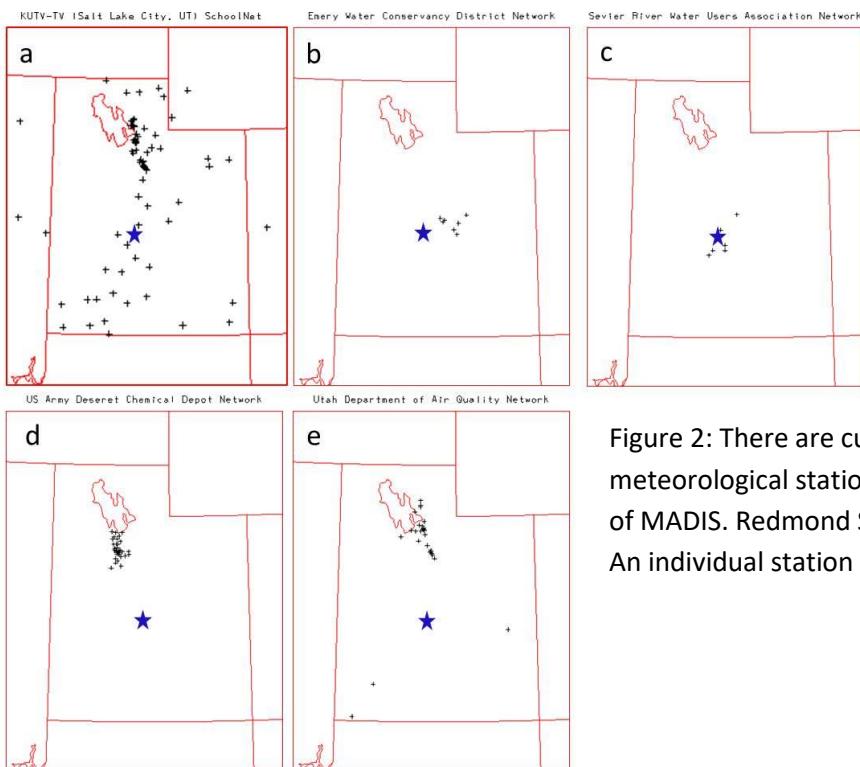


Figure 2: There are currently at least five surface meteorological station networks in Utah which are not part of MADIS. Redmond Salt Mine is indicated by a blue star. An individual station is indicated by a black cross.

(a) KUTV2 WeatherNet – KUTV-TV in Salt Lake City: surface meteorology

- Number of Stations = 67 (statewide)
- Up to 1-min observations of air temperature, relative humidity, wind speed, wind direction, precipitation, barometric pressure

(b) Emery Water Conservancy District Network: surface meteorology

- Number of Stations = 7 (central Utah)
- Hourly observations of air temperature, relative humidity, wind speed, wind direction, solar radiation, soil temperature, precipitation

(c) Sevier River Water Users Association: surface meteorology

- Number of Station = 6 (central Utah)
- Hourly observations of air temperate, relative humidity, wind speed, wind direction, solar radiation, soil temperature, precipitation

(d) U.S. Army Desert Chemical Depot: surface meteorology

- Number of Stations = 26 (near Tooele, Utah)
- 15-min observations of air temperature, relative humidity, wind speed, wind direction, barometric pressure

(e) Utah Division of Air Quality: surface meteorology

- 17 stations (mostly north-central Utah)
- Hourly wind speed, wind direction, air temperature, relative humidity

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