Supporting the Operations and Maintenance of the UUNET Weather and MEOP Air Quality Platforms in Northern Utah

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WHAT IS UUNET?

- UUNET is a network of mesonet stations operated by the MesoWest team at the University of Utah. In addition to weather stations, the network includes SODAR, Ceilometers, Eddy Covariance and radio networks located throughout Utah and Steamboat Springs, Colorado.
- Utilizing Campbell Scientific dataloggers, real-time data are reported to MesoWest as well as to partners that utilize the data such as the NWS to assist in real time threat assessment (severe weather approaching Salt Lake City).

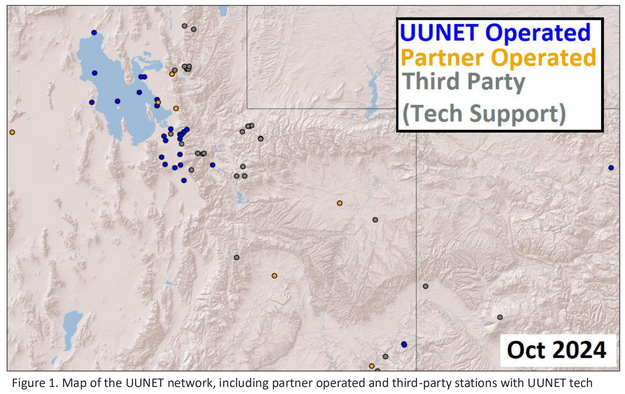


Figure 1. Map of the UUNET network, including partner operated and third-party stations with UUNET tech support.

WHAT IS MEOP?

- The Mobile Environmental Observing Platform (MEOP) is an air quality monitoring project with the goal of mapping air pollution (PM & Ozone) throughout the Salt Lake Valley.
- Utilizing a partnership with the Utah Transit Authority (UTA), air monitors are deployed on 3 TRAX Light Rail vehicles and 15 Electric Buses to monitor air quality as the vehicles travel along their routes. Data can then be used to shape public health policy and emission regulations.

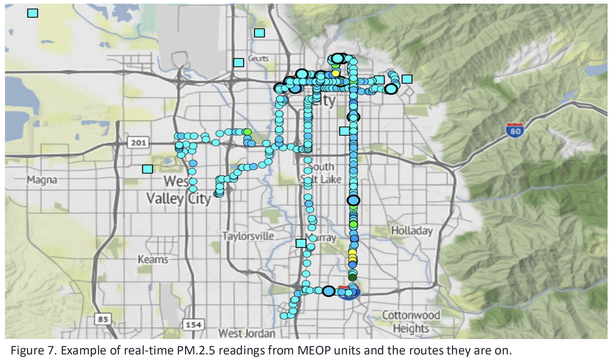


Figure 7. Example of real-time PM.2.5 readings from MEOP units and the routes they are on.

MAINTENANCE OF STATIONS

Routine Maintenance visits are made at least once a year to ensure instrument functionality and accurate data.

Station inspection procedures include:

- Changing anemometer bearing to ensure smooth propeller rotation.
- Clearing debris from tipping bucket precipitation gauges.
- Inspecting temperature & relative humidity filter caps.
- Cleaning solar radiation sensors and solar panels of dirt and dust.
- Ensuring battery reservoirs are at appropriate levels.
- Change filters and SD cards at eddy covalence deployments.
- Assess sensor response to current environmental conditions.



Figure 2. Above Red Butte (UABRB) weather station



Figure 3. UUCMF Eddy covariance station

MAINTENANCE OF PANELS

Wooden panels are installed in enclosures to provide access to monitoring equipment, including:

- PM Monitor
- Ozone monitor
- Temperature & RH Sensor
- Cellular Modem
- GPS Device
- Datalogger

Maintenance of air quality panels include coordinating with UTA, as well as

- Changing PM & Ozone filters
- Checking flow rate
- Exchange Temperature & RH filter cap
- Cleaning inlets and vents

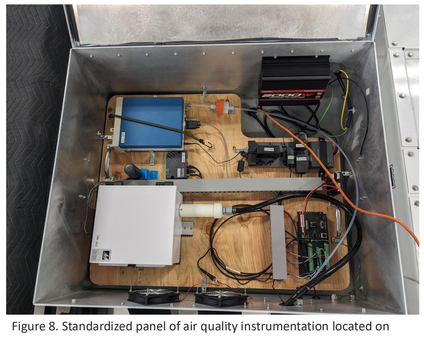


Figure 8. Standardized panel of air quality instrumentation located on electric buses.

QUALITY CONTROL

- Instrument maintenance & quality control (QA/QC) are crucial for ensuring accurate data for historical records, research, and real-time threat assessments.
- Prior to site visits, recent data (1-2 weeks) are reviewed relative to nearby stations to assist in identifying issues.

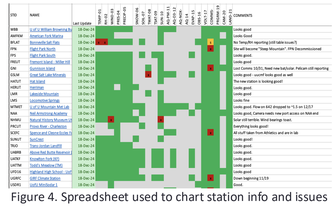


Figure 4. Spreadsheet used to chart station info and issues

- Spreadsheets as shown in Figure 4 can easily display known issues and aid in the planning of maintenance visits.
- Graphs as shown in Figure 5 and Figure 6 are examples of variables displaying suspect readings that warrant further investigation.

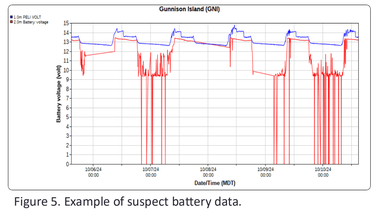


Figure 5. Example of suspect battery data.

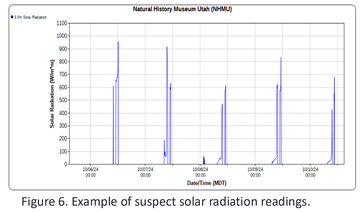


Figure 6. Example of suspect solar radiation readings.

QUALITY CONTROL

- Mobile vs. Fixed stations: both need QC procedures, but mobile platforms require special attention.
- It is critical to ensure filtered measurements from units located inside maintenance depots are flagged in post processing to not affect outside air values.
- As shown in Figure 10, utilizing GPS latitude and temperature are effective ways to determine location of units inside or outside.
- Displays as in Figure 9 are easy ways to showcase what units are in operation, if a particular sensor is non-reporting, and if attention needs to be brought to certain units.

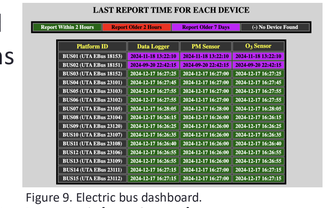


Figure 9. Electric bus dashboard.

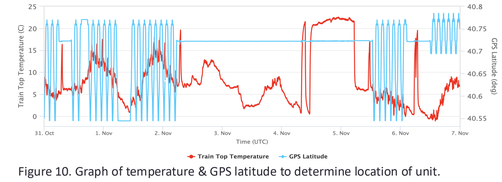


Figure 10. Graph of temperature & GPS latitude to determine location of unit.