Session 5: Surface Meteorological Measurements

I. Overview
II. Screening Criteria
III. Examples

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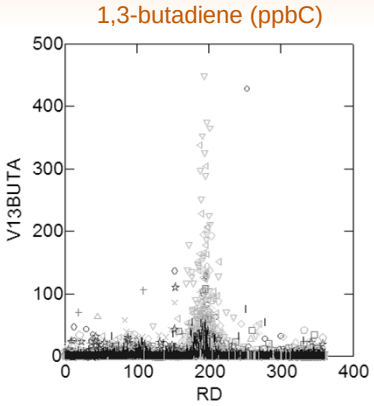
STi Sonoma Technology, Inc.

Using Surface Meteorological Measurements

Data analysts can use surface meteorological measurements

- to understand the diurnal changes in concentration associated with meteorology (temperature, wind speed)
- to investigate emission sources affecting a monitoring site (source apportionment)
- to investigate pollutant transport
- for meteorological adjustments for trend analyses
- To evaluate models



Common Measurements

- Temperature
- Wind speed, wind direction
- Relative humidity
- Solar radiation
- Precipitation
- Barometric pressure

Example Screening Criteria: Surface Meteorological Measurements

Wind Direction

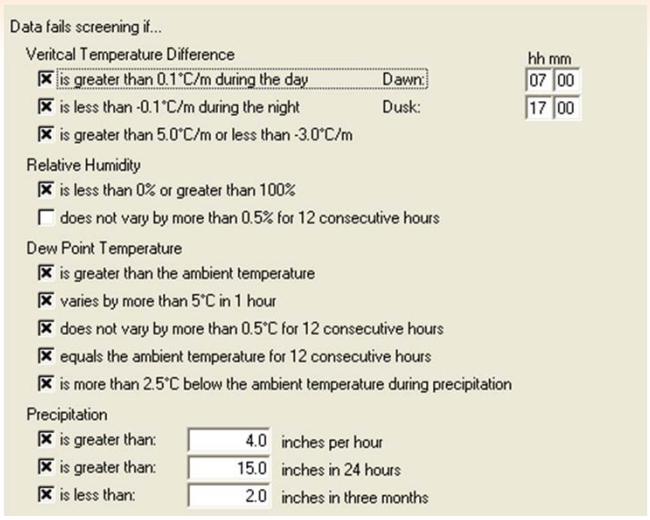
- ☒ is less than 0° or greater than 360°
- ☒ does not vary by more than 1° for 3 consecutive hours
- ☒ does not vary by more than 10° for 18 consecutive hours

Temperature

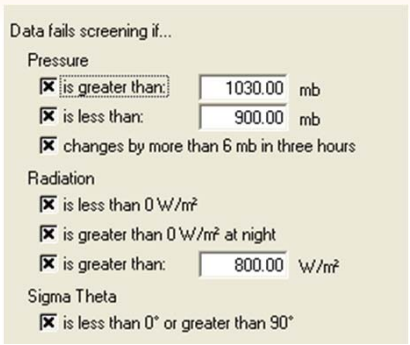
☒ is greater than the local record high:	40.0	°C
☒ is less than the local record low:	-40.0	°C
☒ is more than 5°C above the mean monthly max:	40.0	°C
☒ is more than 5°C below the mean monthly min:	-40.0	°C

- ☒ varies by more than 5°C in 1 hour
- ☒ does not vary by more than 0.5°C for 12 consecutive hours

Example Screening Criteria: Surface Meteorological Measurements



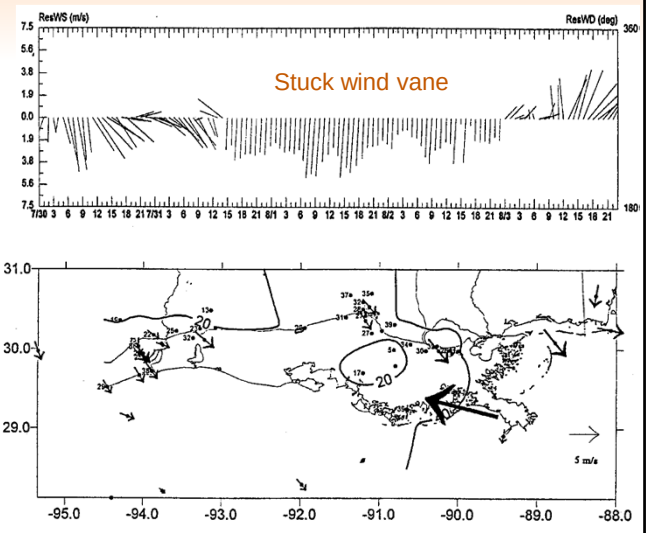
Example Screening Criteria: Surface Meteorological Measurements



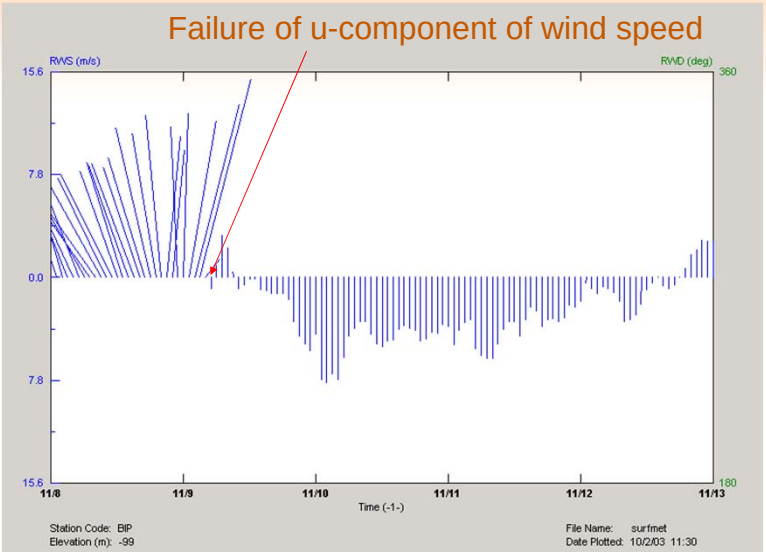
Example Meteorological Data Validation

Examples of questionable meteorological data identified during data validation (SAI et al., 1995)

- **Top:** Constant wind directions were reported at Cocodrie, Louisiana, from July 31–August 2, 1993. The wind direction data were invalidated
- **Bottom:** High surface winds at a surface station in Grand Isle, Louisiana, on August 29, 1993, at 0800 CST appear spatially erroneous

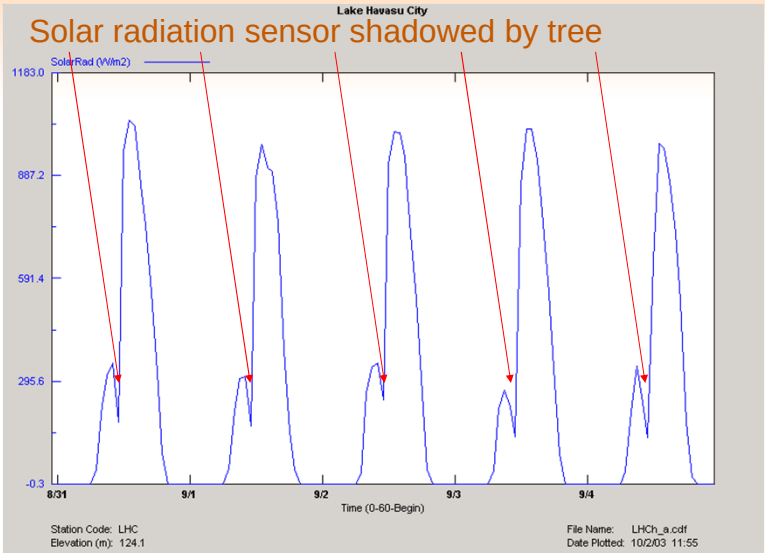


More Surface Meteorological Examples



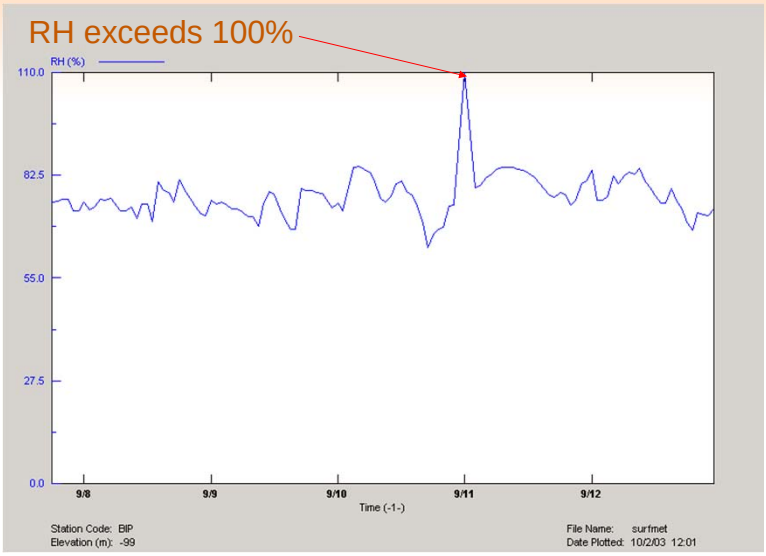
More Surface Meteorological Examples

Solar radiation sensor shadowed by tree



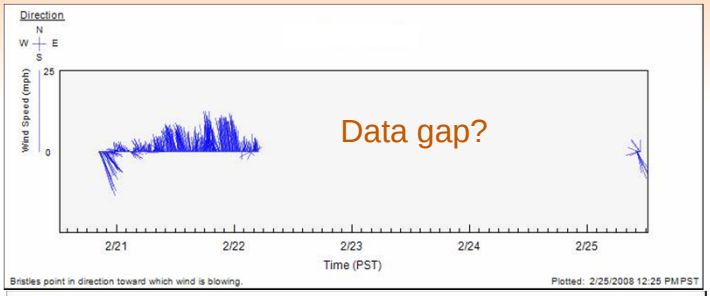
More Surface Meteorological Examples

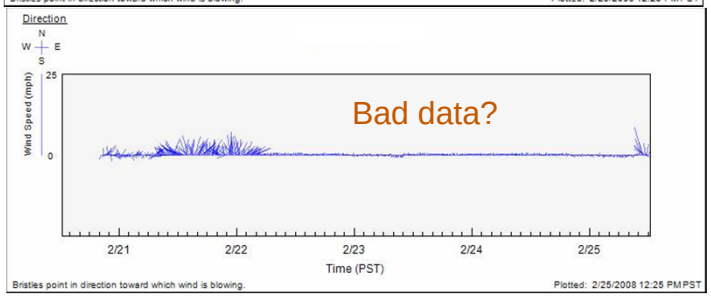
RH exceeds 100%



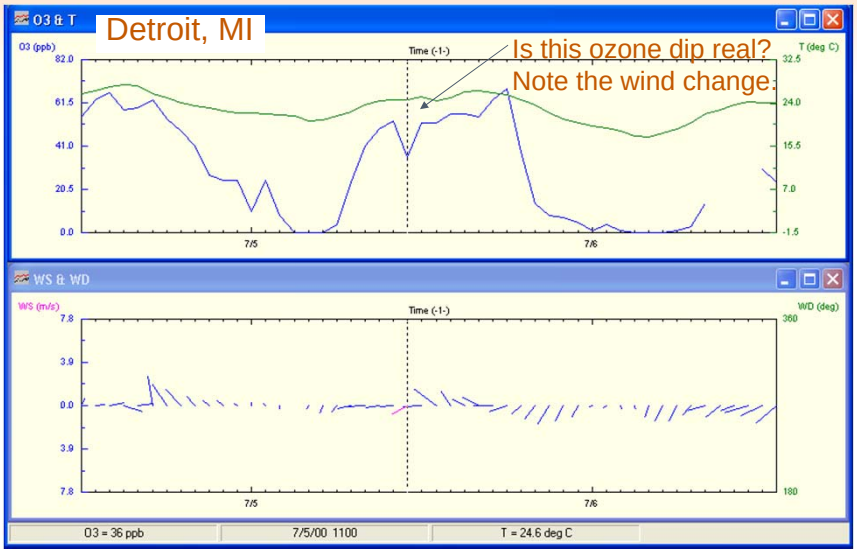
More Surface Meteorological Examples

Two sites located close together had a data collection problem at the same time. A site visit is planned to determine the cause of the problem.





Using Surface Meteorology to Investigate Other Pollutants



Data Sources

Surface meteorological data sources

- National Weather Service (NWS) http://www.nws.noaa.gov
- EPA's AIRS/AQS
- Private meteorological agencies (e.g., forestry service, agricultural monitoring, industrial facilities)
- MesoWest data: http://mesowest.utah.edu/index.html

Summary

For surface meteorological data validation,

- Use established screening criteria
- Visually review data
- Use to assist with validation and analysis of pollutants