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Weather Station Installation Guidelines Application Note #3

Overview

The key to accurate meteorological data is proper placement of the weather station and respective instruments. Generally speaking the weather station should be situated in the general area of interest, away from obstructions such as trees and buildings. Ten meter towers are often used to raise measurement heights above low-lying obstructions. This Application Note will provide further information on the specific instruments commonly used in meteorological applications. These guidelines were condensed from the following publications:

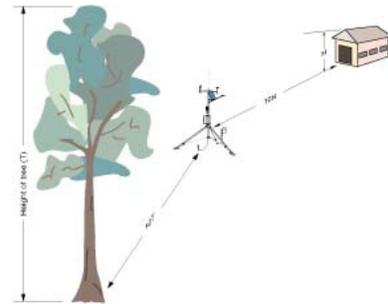
The State Climatologist (1985). Publication of the American Association of State Climatologists (AASC): Heights and Exposure Standards for Sensor on Automated Weather Stations, v. 9, No. 4, October 1985.

EPA (1987). On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013. Office of Air Quality Planning and Standards, Research Triangle Parks, North Carolina 27711.

WMO (1983). Guide to Meteorological Instruments and Methods of Observation. World Meteorological Organization No. 8, 5th edition, Geneva Switzerland.

Wind Speed and Direction

Wind sensors should be located over open level terrain. The EPA recommends the wind sensor be a distance of at least ten times the height of nearby buildings, trees or other obstructions.



Temperature and Relative Humidity

The sensor should be housed in a ventilated radiation shield. The EPA recommends the sensor be no closer than four times an obstruction's height, at least 30 m from large paved areas, and located in an open level area that's at least 9 m in diameter. The open areas should be covered by short grass, or where grass does not grow, the natural earth.

These areas should be avoided to ensure optimal accuracy:

- Large industrial heat sources, i.e. refrigeration units, transformers, etc.
- Rooftops
- Steep slopes
- Sheltered hollows
- High vegetation
- Shaded areas
- Swamps
- Areas where snow drifts occur
- Low places holding standing water after rains

Standard measurement heights:

1.5 m ±1.0 m (AASC)

1.25 to 2.0 m (WMO)

2.0 m temperature (EPA)

2.0 m and 10.0 m for temperature difference (EPA)Precipitation

Precipitation

The AASC and EPA suggest tipping buckets no closer than four times the height of an obstruction. The orifice of the gage must be in a horizontal plane, open to the sky, and above the level of in-splashing and snow accumulation. Typically, tipping buckets are sited on level ground covered with short grass or gravel.

Wind shields, such as those used by the National Weather Service, are recommended for open areas.

Standard measurement heights:

1.0 m ±1.0 cm (AASC)

30.0 cm minimum (WMO, EPA)

Solar Radiation

Pyranometers should be mounted away from shadows, reflective surfaces, and sources of artificial radiation. Mounting the pyranometer on the southernmost (northern hemisphere) part (either crossarm or pyranometer mounting arm) of the weather station should minimize shading from the other weather station structures. The height the sensor is mounted is not critical for the accuracy of the measurement. However, pyranometers mounted at heights of 3 m or less are easier to level and clean.

Soil Temperature

The measurement site for soil temperature should be at least 1 m² and typical of the surface of interest. The ground surface should be level with respect to the immediate area (10 m radius).

Standard measurement depths:

10.0 cm, ± 1.0 cm (AASC)

5.0 cm, 10.0 cm, 50.0 cm, 100.0 cm (WMO)