# Introduction to Surface Observations

Surface Data

The most basic of atmospheric measurements started at the surface. Before the advent of instruments like the thermometer and barometer (yes; there were times when we didn't have these basic instruments), people recorded whether the weather was warm or cold. Unfortunately, humans can only detect a minimum change in temperature of around 5°F. Since we live on Earth's surface, it is easiest to get our measurements there. But the more important question may be, what variables are important and *why*?

What do you think are the most important surface variables and why?

A goal for every meteorologist is to be able to explain the variations in atmospheric parameters that we observe. Today we will focus on the surface variables and their spatial variation. There are many variables that are important and we have to somehow get all of them plotted on a single map, for multiple stations. Doing so will benefit a meteorologist immensely because there will be a wealth of information literally at their fingertips. The following section describes how we can compactly write the surface data in a concise format on a weather map.

Review of Station Models

SURFACE STATION MODEL
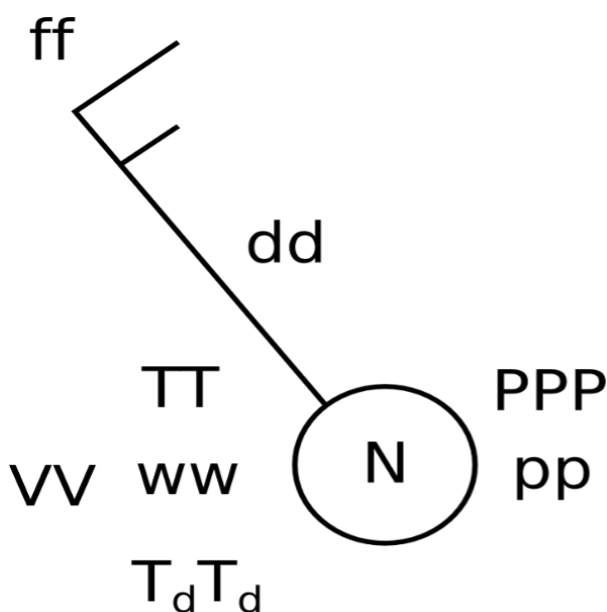
ff is the "flag". It represents the wind speed. A half stick represents 5 kts, a full stick is 10 kts, and a filled in triangle is 50 kts.

dd is the wind direction. It always points in the direction FROM which the wind is blowing

TT is the temperature. In the United States it is typically in °F while in every other part of the world it typically is °C (Assume °F unless otherwise specified for this class.)

VV is the visibility in statute miles.

ww is the present weather condition. This is typically a symbol. Please see later portions of this hand out for what these symbols are.

T~d~T~d~ is the dewpoint temperature. It follows the same unit convention as the temperature.

PPP is the sea-level pressure to the nearest tenth of a unit. The units are typically hectopascals (hPa), which is equivalent to millibars (mb). You need to add either a 10 or a 9 to the front end of this given number (whichever beings the pressure closer to 1000).

pp is the pressure tendency over the previous 3 hours given in tenths of a unit. Typically a "slash" is present as well indicating if the pressure is rising (/) or falling (\).

N is the sky cover in oktas (eighths).

> Clear = A circle with nothing in it.
>
> 1 Okta = A circle with a single vertical line in the middle
>
> 2 Oktas = A circle with the upper right quadrant filled in.
>
> 3 Oktas = A circle with a single vertical line in the middle AND the upper right quadrant filled in.
>
> 4 Oktas = A circle with the right half filled in
>
> 5 Oktas = A circle with a single horizontal line in the middle AND the right half filled in.
>
> 6 Oktas = A circle with the right half and bottom right quadrant filled in.
>
> 7 Oktas = A circle that is filled in EXCEPT a single vertical line in the middle.
>
> 8 Oktas = A circle that is filled in completely.
>
> Obscured Sky = A circle with an X in it.

Please note that this is not all-inclusive. There is additional information that can be displayed on a surface station plot; however, this covers the basics.

Observational Charts -- Surface Chart

Making and reading our surface charts are important, as it is essential to read them quickly to diagnose the constantly changing environment. A surface map can tell you a lot of information about the current environment. Observations near big bodies of water will likely have differing characteristics than stations just a little farther inland. Additionally, there will be differences between observations near cities versus out in the middle of cornfields. These variations in meteorological parameters could be very important to the future evolution of the weather at a given location. Therefore, it is important to completely understand how surface maps are created and be able to explain meteorological differences between different regions.

We have previously described how to read a surface observation, now we will create our own surface maps using the computer.