Delta T

Delta T, ΔT, is used in agriculture to indicate acceptable conditions for spraying pesticides and fertilizers. It is simply the difference between the air temperature (aka "dry bulb temperature") and the wet bulb temperature:

$$\Delta T = T - T_{wb}$$

Dew Point Temperature

Source: RSMAS

$$T_d = \frac{243.04[\ln(\frac{RH}{100}) + \frac{17.625 \times T}{243.04 + T}]}{17.625 - \ln(\frac{RH}{100}) - \frac{17.625 \times T}{243.04 + T}}$$

T_d = dew point in degrees Celsius (°C)

T = temperature in degrees Celsius (°C)

RH = relative humidity (%)

Feels Like Temperature

If the temperature is at or above 80°F the Feels Like temperature equals the Heat Index. If temperature is below 50°F, Feels Like temperature equals the Wind Chill.

Heat Index Temperature

Source: Weather.gov

Heat Index is calculated for temperatures at or above 80°F and a relative hummidity at or above 40%.

$$
\begin{aligned}
T_{hi} = {} & -42.379 + (2.04901523 \times T) \\
& + (10.1433127 \times RH) - (0.22475541 \times T \times RH) \\
& - (6.83783 \times 10^{-3} \times T^2) - (5.481717 \times 10^{-2} \times RH^2) \\
& + (1.22874 \times 10^{-3} \times T^2 \times RH) + (8.5282 \times 10^{-4} \times T \times RH^2) \\
& - (1.99 \times 10^{-6} \times T^2 \times RH^2)
\end{aligned}
$$

T = temperature in degrees Fahrenheit (°F)

RH = relative humidity (%)

Pressure Trend

The Pressure Trend description is determined by the rate of change over the past 3 hours.

$$\Delta P = P_{0h} - P_{3h}$$

P_{0h} = the latest pressure reading in millibars (mb)

P_{3h} = pressure reading 3 hours ago in millibars (mb)

Description	Rate
Steady	$-1\text{mb} < \Delta P < 1\text{mb}$
Falling	$\Delta P \leq -1\text{mb}$
Rising	$\Delta P \geq 1\text{mb}$

Rain Rate

The Rain Rate description is set according to the latest one minute accumulation, extrapolated to an hourly rate.

$$\Delta R = \frac{V_r \times 60\text{min}}{1\text{h}}$$

V_r = rain accumulation in millimeters over one minute (mm/min)

Description	Rate
None	$\Delta R = 0\text{mm/h}$

Very Light	$0\text{mm/h} < \Delta R < 0.25\text{mm/h}$
Light	$0.25\text{mm/h} \leq \Delta R < 1.0\text{mm/h}$
Moderate	$1.0\text{mm/h} \leq \Delta R < 4.0\text{mm/h}$
Heavy	$4.0\text{mm/h} \leq \Delta R < 16.0\text{mm/h}$
Very Heavy	$16.0\text{mm/h} \leq \Delta R < 50.0\text{mm/h}$
Extreme	$\Delta R \geq 50.0\text{mm/h}$

Sea Level Pressure

Source: AMS

$$P_{sl} = P_{sta}[1 + \frac{P_0}{P_{sta}}^{\frac{R_d\gamma_s}{g}} \frac{\gamma_s(h_{el} + h_{ag})}{T_0}]^{\frac{g}{R_d\gamma_s}}$$

P_{sta} = station pressure in millibars (mb)

P_0 = standard sea level pressure (1013.25mb)

R_d = gas constant for dry air $(287.05\frac{J}{kg\cdot K})$

γ_s = standard atmosphere lapse rate $(0.0065\frac{K}{m})$

g = gravity $(9.80665\frac{m}{s^2})$

h_{el} = ground elevation in meters (m)

h_{ag} = station height above ground in meters (m)

T_0 = standard sea level temperature $(288.15K)$

Vapor Pressure

Source: Weather.gov

Vapor pressure, P_v can be estimated in units of millibar (mb) as follows:

$$P_v = \frac{RH}{100} \times 6.112 \times e^{\left(\frac{17.67 \times T}{T + 243.5}\right)}$$

T = temperature in degrees Celsius (°C)

RH = relative humidity (%)

Wet Bulb Temperature

Source: Weather.gov

Wet Bulb Temperature (T_{wb}), is determined using the following formulas for actual vapor pressure (P_v) and the vapor pressure related to wet bulb temperature ($P_{v,wb}$) in millibar (mb):

$$P_v = P_{v,wb} - P_{stn} \times (T - T_{wb}) \times 0.00066 \times (1 + (0.00115 \times T_{wb}))$$

$$P_{v,wb} = 6.112 \times e^{\left(\frac{17.67 \times T_{wb}}{T_{wb} + 243.5}\right)}$$

T = temperature in degrees Celsius (°C)

RH = relative humidity (%)

P_{stn} = station pressure in millibar (mb)

Note, the above equations can't be solved for T_{wb} directly, but several iterative methods may be used to determine T_{wb}.

Wind Chill Temperature

Source: Weather.gov

Wind Chill is calculated for temperatures at or below 50°F and wind speeds above 5mph.

$$\begin{aligned} T_{wc} = 35.74 + (0.6215 \times T) \\ - (35.75 \times V^{0.16}) \\ + (0.4275 \times T \times V^{0.16}) \end{aligned}$$

T = temperature in degrees Fahrenheit (°F)

V = wind speed in mph