

Virtual Temperature

From the user, an air temperature (T), a dewpoint temperature (T_d), and a station pressure (p_{sta}) are given. To calculate the virtual temperature, the temperatures must be converted to units of degrees Celsius ($^{\circ}C$) and the station pressure must be converted to units of millibars (mb). To see how to convert these values, see the links below:

<http://www.wrh.noaa.gov/slc/projects/wxcalc/formulas/tempConvert.pdf>

<http://www.wrh.noaa.gov/slc/projects/wxcalc/formulas/pressureConversion.pdf>

Then, the virtual temperature (T_v) can be calculated using the formula below:

$$T_v = \frac{T + 273.15}{1 - 0.379 \times \left(\frac{6.11 \times 10^{\frac{7.5 \times T_d}{237.7 + T_d}}}{p_{sta}} \right)}$$

The virtual temperature answer will be in units of Kelvin (K), but virtual temperature can be converted to other units using the link above.