CEOP Derived Parameter Equations

- ## Compute U,V Components (GEMPAK):

U = -sin(direction) * wind_speed;
V = -cos(direction) * wind_speed;

- ## Compute Wind Speed and Wind Direction (GEMPAK):

Wind_speed = square_root(U*U + V*V);

if V < 0 then Wind_direction = arctan(U/V) * 180/PI;
Else Wind_direction = arctan(U/V) * 180/PI + 180;

- ## Compute NET radiation (GEMPAK):

NET_radiation = down(in)short + down(in)long - up(out)short - up(out)long;

- ## Compute the Specific Humidity (Bolton 1980):

e = 6.112*exp((17.67*Td)/(Td + 243.5));
q = (0.622 * e)/(p - (0.378 * e));
where:
e = vapor pressure in mb;
Td = dew point in deg C;
p = surface pressure in mb;
q = specific humidity in kg/kg.

*(Note the final specific humidity units are in g/kg = (kg/kg)*1000.0)*

- ## Compute Dew Point Temperature (Bolton 1980):

es = 6.112 * exp((17.67 * T)/(T + 243.5));

e = es * (RH/100.0);
Td = log(e/6.112)*243.5/(17.67-log(e/6.112));
where:
T = temperature in deg C;
es = saturation vapor pressure in mb;
e = vapor pressure in mb;
RH = Relative Humidity in percent;
Td = dew point in deg C

- **Compute Relative Humidity (Bolton 1980):**

es = 6.112*exp((17.67*T)/(T + 243.5));
e = 6.112*exp((17.67*Td)/(Td + 243.5));
RH = 100.0 * (e/es);
where:
es = saturation vapor pressure in mb;
e = vapor pressure in mb;
RH = Relative Humidity in percent