

26 March 2009

### The method to calculate a dew point by OBSJMA

Firstly, OBSJMA calculates a vapor pressure (E) by using the following expressions (1) or (2) and (3).

And then, it substitutes the calculated value to Ew in (1) or (2) and calculates a adequate value of T as the dew point.

In the case of not freezing wet-bulb:

$$\begin{aligned} \log_{10}E_w = & + 10.79574(1 - T_1/T) - 5.02800 \log_{10}(T/T_1) \\ & + 1.50475 \cdot 10^{-4}(1 - 10^{-8.2969(T/T_1-1)}) \\ & + 0.42873 \cdot 10^{-3}(10^{4.76955(1-T_1/T)} - 1) \\ & + 0.78614 \end{aligned} \quad (1)$$

In the case of freezing wet-bulb:

$$\begin{aligned} \log_{10}E_w = & -9.09685(T_1/T - 1) - 3.56654 \log_{10}(T_1/T) \\ & + 0.87682(1 - T/T_1) + 0.78614 \end{aligned} \quad (2)$$

$$E = E_w - A/755 P(T_d - T) \quad (3)$$

Ew = saturated vapor pressure (hPa)

T = wet-bulb temperature (K)

T<sub>1</sub> = 273.16 (K)

E = vapor pressure (hPa)

A = 0.50 (not freezing wet-bulb), 0.44 (freezing wet-bulb)

P = air pressure at the sea level (hPa)

T<sub>d</sub> = dry-bulb temperature (K)