

The new model is now given by

$$HI = T - 1.0799e^{0.03755T}[1 - e^{0.0801(D-14)}], \quad (4a)$$

where HI, T , and D are all in degrees Celsius.

For T_a we ignore the

effects of wind and radiation and employ Steadman's (1984) regression equation

$$T_a = -1.3 + 0.92T + 2.2e,$$

where T is in Celsius and e is in kPa.

$$HI = -42.379 + 2.04901523T + 10.14333127R - 0.22475541TR - 6.83783 \times 10^{-3}T^2 \\ - 5.481717 \times 10^{-2}R^2 + 1.22874 \times 10^{-3}T^2R + 8.5282 \times 10^{-4}TR^2 - 1.99 \times 10^{-6}T^2R^2$$

where T is an air temperature ($^{\circ}\text{F}$) and R is a relative humidity (%).

An

equation (available as a FORTRAN program from NCDC) was also provided:

$$H_i = 16.923 + 0.185212T + 5.37941R \\ - 0.100254TR + 9.4169 \times 10^{-3}T^2 \\ + 7.28898 \times 10^{-3}R^2 + 3.45372 \times 10^{-4}T^2R \\ - 8.14971 \times 10^{-4}TR^2 + 1.02102 \times 10^{-5}T^2R^2 \\ - 3.8646 \times 10^{-5}T^3 + 2.91583 \times 10^{-5}R^3 \\ + 1.42721 \times 10^{-6}T^3R + 1.97483 \times 10^{-7}TR^3 \\ - 2.18429 \times 10^{-8}T^3R^2 + 8.43296 \times 10^{-10}T^2R^3 \\ - 4.81975 \times 10^{-11}T^3R^3 + 0.5,$$

where T is air temperature ($^{\circ}\text{F}$) and R is relative humidity (%).

Minimum apparent temperature is a discomfort index based on air and dew point temperatures (14). It is defined as the minimum daily value of the 3-hour apparent temperature values, calculated by using the following formula: $AT = -2.653 + 0.994 \times T + 0.0153 \times (DT)^2$, where AT is apparent temperature, T is air temperature in $^{\circ}\text{C}$, and DT is dew point temperature in $^{\circ}\text{C}$.

The Weather Stress Index [51] is a summer season algorithm and is a derived form of apparent temperature (AT):

$$AT = -2.653 + (0.994T_a) + 0.368(T_d)^2, \quad (3)$$

where T_a = air temperature ($^{\circ}\text{C}$); T_d = dewpoint temperature ($^{\circ}\text{C}$).