Hamon Potential Evapotranspiration

\[ PET = k * 0.165 * 216.7 * N * \left( \frac{e_s}{T + 273.3} \right) \]

where,
- \( PET \) = potential evapotranspiration [mm day\(^{-1}\)]
- \( k \) = proportionality coefficient = 1 \([\text{unitless}]\)
- \( N \) = daytime length \([x/12 \text{ hours}]\)
- \( e_s \) = saturation vapor pressure [mb]
- \( T \) = average monthly temperature \([\ ^\circ\text{C}]\)

\( e_s \) - saturation vapor pressure

\[ e_s = 6.108e^{\frac{17.27T}{T+237.3}} \]

Source: Lu et al. (2005)

script: calcPEThamon.r

Primary Sources


\(^1\) Lu et al. (2005) uses a \( k \) value of 1.2 for the southeastern United States.
The number of daylight hours in units of 12 hours is calculated as:

\[ N = \left( \frac{24}{\pi} \right) \times \omega \]

where:
- \( \omega \) is the sunset hour angle [radians]
- \( w \) - sunset hour angle
  \[ \omega = \cos^{-1}[-\tan(\delta) \tan(\phi)] \]

where:
- \( \phi \) is latitude [radians]
- \( \delta \) is the declination [radians]

\( \delta \) - declination
\[ d = 1 + 0.033 \cos \left( \frac{2\pi}{365} J \right) \]

where:
- \( J \) is the Julian Day of the year.

NB: when the sun does not rise \( \omega \) is set equal to 0, when the sun does not set \( \omega \) is set equal to \( \pi \). This is accomplished by taking only the real portion of the result of the equation calculating \( \omega \).

In order to calculate \( N \) at a monthly time step, we calculate average daily radiation for each day within the month and then average across the month.

Source: Allen et al. (1998)