To understand the degree-day method to estimate snowmelt.

**Snowmelt methods**

- Two approaches can be taken to estimate snowmelt:
  - A detailed energy balance
  - The degree-day method
- I present the degree-day method which is a simple method. Often times, available data and computational restrictions make the degree-day method a valuable approach.

**The Degree-day method**

The equation for the degree-day method is as follows:

\[ M = k(T_a - T_b) \]

where

- \( M \) = total daily snow melt in water depth (cm/day)
- \( k \) = degree-day factor (cm/°C/day)
- \( T_a \) = average daily air temperature (°C)
- \( T_b \) = base temperature at which snow melt occurs (°C), usually taken as 0 °C.
Degree-day factor

- The degree-day factor should be fit to observed data for the region of interest. Typical values are:
  - 0.2 - 0.5 cm/°C/day for clear areas
  - 0.07 cm/°C/day for forested areas

Example

Q: In a clear agricultural area, the average daily air temperature was 3 °C. What is the estimated snow melt that day?

A: assuming a k-value of 0.35 cm/°C/day, and T_b as 0 °C, we find the daily snow melt

\[ M = 0.35 \times (3 - 0) = 1.05 \text{ cm/day} \]