Initial spread index

Description

The Initial spread index (ISI) is one of the two intermediate indices required for calculating the Canadian fire weather index (FWI). The ISI represents the rate of fire spread without the influence of variable quantities of fuel. It is a combination of the effects of wind speed and fine fuel moisture content on fire spread, and thus requires wind speed and the $FFMC$ as input variables (Van Wagner 1987).

The name of this index refers to the basic rate at which a fire would spread when the fine fuel is dry but drying in depth not advanced (Van Wagner 1987).

As the ISI combines the influences of wind and fine fuel moisture, it is well appropriated for predicting burnt area (Van Wagner 1987).

Formula

The ISI is the product of a wind and a fine fuel moisture functions.

The wind function is obtained as follows (Van Wagner and Pickett 1985):

$$f(U) = e^{0.05039 \cdot U_{12}}$$

where U_{12} is wind speed [km/h] at noon.

And the fine fuel moisture function as follows (Van Wagner 1985):

$$f(F) = \left(91.9 \cdot e^{-01386 \cdot m}\right) \cdot \left(1 + \frac{m^{5.31}}{4.93 \cdot 10^7}\right)$$

where m is the fuel moisture content [%] and dermined as follows (Van Wagner 1985):

$$m = 147.2 \cdot \frac{101 - FFMC}{59.5 + FFMC}$$

where $FFMC$ is the Fine fuel moisture code.

The ISI is finally obtained with the following equation (Van Wagner 1985):

$$ISI = 0.208 \cdot f(U) \cdot f(F)$$

References

Original publications:
Van Wagner and Pickett (1985)
Van Wagner (1987)

The original document is available at http://wiki.fire.wsl.ch//tiki-index.php?page=Initial+spread+index