The dependence of evaporative efficiency of vegetated surfaces on ground cover weight fractions in mesic ecosystems

Yi Wang, Richard. M. Petrone, Brandon Van Huizen
Hydrometeorology Research Group, University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1

So difficult to model actual evaporation. Modelling evaporative efficiency (SEE) instead?

But SEE models were developed for bare, mineral soil conditions. Maybe not for me...

You can consider us as hypothetical soils. In fact, SEE models can work for peat-bryophyte-litter soil columns!

Peat-bryophyte-litter ground vegetation column

But I may affect the modelling results.

Litters and bryophytes

We can use bryophytes and litters weight fractions to model SEE of vegetated surfaces!

That also works for below-canopy conditions!

Soil moisture content ($θ$)

Critical soil moisture content ($θ_c$)

Saturated soil moisture ($θ_{sat}$)

Overview of the modelling approach

See (Actual Evaporation ($E_a$))

Potential Evaporation ($E_o$)

(Eq. 1)

$θ_{1/2} = 15.82f_0 + 3.45f_1 + 0.40$ (Eq. 2)

$B = -6.58 + 1.36A$ (Eq. 4)

$r_a = \exp[A - (B \theta / \theta_{sat})]$ (Eq. 3)

$SEE = \frac{r_a}{r_a + r_s}$ (Eq. 5)

$SEE_{BC\_corrected} = \frac{r_a}{r_a + r_s}$ (Eq. 6)

Background and methods

Meteorological observations

Soil moisture

Ground cover weight fractions

Saturated soil moisture

References

Experimental Design

Peat columns

Soil texture weight fraction

Acknowledgements

Contact: yi.wang1@uwaterloo.ca

Modelling results

No canopy (NC)

Below canopy (BC)