

## Appendix E Metric (SI) Versions of Generalized Snowmelt Equations

### E-1. General

Reference should be made to Chapter 5 of the main text for an explanation of the coefficients and for the background on the equation derivations.

### E-2. Snowmelt During Rain

a. *Partly forested areas.*

$$M = (1.33 + 0.239 kv + 0.0126P_r)T_a + 2.3$$

b. *Forested areas.*

$$M = (3.38 + 0.0126P_r)T_a + 1.3$$

where

$M$  = snowmelt, mm/day

$k$  = basin wind coefficient

$v$  = wind velocity at the 15-m height, km/hour

$P_r$  = daily rainfall, mm

$T_a$  = mean temperature of the saturated air, °C

### E-3. Rain-Free Snowmelt

a. *Open areas.*

$$M = k'(1-F)(3.08 I_i)(1-a) + (1-N)(0.969T'_a - 21.34) + N(1.33T'_d) + k(0.239v)(0.22T'_a + 0.78T'_d)$$

b. *Partly forested areas.*

$$M = k'(1-F)(2.43 I_i)(1-a) + k(0.239v)(0.22T'_a + 0.78T'_d) + F(1.33T'_d)$$

c. *Forested areas.*

$$M = k(0.239v)(0.22T'_a + 0.78T'_d) + F(1.33T'_d)$$

d. *Heavily forested areas.*

$$M = 3.38(0.53T'_a + 0.47T'_d)$$

In the above equations

$M$  = snowmelt, mm/day

$k'$  = basin shortwave radiation melt factor

$F$  = average basin forest canopy cover, effective in shading the area from solar radiation, expressed as a decimal fraction

$I_i$  = insolation (solar radiation on horizontal surface), MJ/m<sup>2</sup>

$a$  = average snow surface albedo

$N$  = estimated cloud cover expressed as a decimal fraction

$T'_a$  = difference between the air temperature measured at 3 m and the snow surface temperature, °C

$T'_c$  = difference between the cloud base temperature and snow surface temperature, °C

$k$  = basin convection-condensation melt factor

$T'_d$  = difference between the dew-point temperature measured at 3 m and the snow surface temperature, °C

$v$  = wind velocity at the 15-m height, km/hour