

Interactive comment on “Simulation of snow accumulation and melt in needleleaf forest environments” by C. R. Ellis et al.

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Response to Interactive comment by Anonymous referee:

1. Equation 18: Did you consider the slope of the topology in case of terrain land?

No, as Eq. 18 describes the estimation of snow surface temperature there is no account for topology other than the corrections of longwave irradiance (L_{λ}) for emissions from surrounding terrain. However, CRHM does make corrections for shortwave irradiance (K_{λ}) with varying topography following the procedures of Garnier and Ohmura (1970) as noted in the description of the CRHM platform by Pomeroy et al. (2007).

2. Page 1046 line 10: Why does the MB is so high: According to Equation 21, pre-
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diction efficiency of CRHM is poor for MB close to 1 and prediction efficiency of CRHM is best for MB close to 0. Figure 3 does not show that prediction efficiency of CRHM is quite satisfactory. Did you deduct values from 1.0?

I believe the confusion here lies in the incorrect expression of the MB index by Eq. 21 (please see the attached “supplement” pdf document showing the required correction of Eq. 21). Thus, with the corrected MB formulation, MB values will be less than unity when the sum of simulated values is less than the sum of observed values. Similarly, MB values will be greater than unity when the sum of simulated values is greater than the sum of observed values.

3. Yes, discrepancies do exist in the MB values in Table 3 to the simulated and observed values in Figure 3. To correct this, the following changes should be made in Table 3:

BERMS 2002-03 (clearing) MB should be “1.14” not “1.10”; BERMS 2002-03 (forest) MB should be “1.12” not “1.20”; Fraser 2004-05 (clearing) MB should be “0.95” not “1.10”; Fraser 2004-05 (forest) MB should be “1.05” not “0.7”; Marmot 2007-08 (pine forest) MB should be “0.95” not “1.09”.

As a result, the mean MB values also require the following changes in Table 3:

Clearing sites (mean) MB should be “0.99” not “1.0” ; All sites (mean) MB should be “0.97” not “0.96”.

With the above change in Eq. 21 and the correction of values in Table 3, MB values should correspond to the results shown in Figure 3.

In addition, the following corrections should also be made in Table 3:

Forest sites (mean) ME should be “0.55” not “0.47” ; Clearing sites (mean) ME should be “0.55” not “0.54”; All sites (mean) ME should be “0.55” not “0.51”; Clearing sites (mean) RMSE should be “30.8” not “29.7”

With the above changes in Table 3, the following changes in the text are suggested:

1. Page 1034/ line 12:

The statement:

“achieving a model efficiency of 0.57, with the lowest efficiencies at the forest sites.”

should be changed to:

“achieving a model efficiency of 0.55 for the prediction of snow accumulation at individual sites.”

2. Page 1046/ starting line 25:

The statement:

“Here, a slight systematic underestimation of forest SWE is realised (MB=0.92), with no bias for the simulation of SWE at the clearing sites (MB=1.0).”

should be changed to:

“Here, only small systematic underestimations of SWE are realized at both forest and clearing sites, having corresponding MB values of 0.94 and 0.99.”

3. Page 1046/ starting line 27:

“The mean ME for SWE simulations at individual sites was 0.57, with slightly higher efficiencies at the clearing sites.”

should be changed to:

“The mean ME for SWE simulations at individual sites was 0.55, with similar efficiencies for clearing and forest sites.”

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/7/C354/2010/hessd-7-C354-2010->

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supplement.pdf

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