

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

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General comments: This paper provides an overview of the Cold Regions Hydrological Model (CRHM). The model is a valuable contribution to our ability to simulate hydrological processes in cold region landscapes, particularly given that it does not depend on a large amount of model calibration. The model builds on important process-based and modelling work by Pomeroy and his colleagues, and its solid process foundation is a major strength of the model. While CHRM is capable of simulating a suite of hydrological processes, the focus of the current paper is on snow accumulation and snowmelt in coniferous forests. A particularly important aspect of CHRM is its treatment of sublimation of intercepted snow in forests. This process is often neglected in other hydrological models, and is certainly deserving of the attention paid to it by CHRM given the cold

C315

regions landscapes to which it is intended to be applied. The paper describes that validation of the model using snow accumulation and melt data from a number of sites from different countries. Thus, it goes well beyond the standard practice of evaluating a model using data from the site for which it was originally developed. The authors have provided an honest evaluation of the model, as well as reasonable explanations for its relative success across the test sites. I find it to be well-structured and written, with a clear presentation of methods and results, and a sound interpretation of those results. I feel that this is a useful contribution to the field, that it satisfies all of the evaluation criteria specified by HESS, and that it is worthy of publication.

Specific comments: I have no specific comments to make here, since I feel that the paper does a very good job of addressing all of the relevant scientific issues.

Technical corrections page 1036/line 7 phrasing of “account for forest effects” is awkward, and suggests that something is missing from this sentence. page 1039/lines 1,2 “snowland” should be “snowload”. page 1039/eq 7 symbol should be l^* ? page 1046/line 26 MB is 0.94 in Table 3, not 0.92 as given in the text. page 1046/line 27 mean ME is 0.51 in Table 3, not 0.57 as given in the text. page 1050/line 1 “incurred to be random” should be “incurred were random”. page 1051/line 11 “indexes” could be “values”. page 1053 definition of Q_n – “radiationto” should be “radiation to”.

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C316