

Interactive comment on “Evaluation of North Eurasian snow-off dates in the ECHAM5.4 atmospheric GCM” by P. Räisänen et al.

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Received and published: 16 June 2014

Räisänen et al. investigate the ability of a specific atmospheric climate model (ECHAM5) to reproduce the annual duration of snow cover for Northern Eurasia, and assess the possibility of improving the simulations by constraining model fields to be closer to reality or changing model parameter values. Although by no means the first such investigation, this is an interesting and worthwhile study. For the benefit of readers who are not familiar with the details of current practice in modelling snow processes, it should be pointed out that there are climate models that address all of the limitations of ECHAM5 identified by the authors: unrealistic temperature dependence of snow albedo, combined energy balance for subgrid snow and snow-free land fractions, and lack of snow shading by forest canopies. A

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good exemplar of the state of the art in snow parametrizations for climate modelling is given by the CLM land-surface model used in the CESM climate model; see http://www.cesm.ucar.edu/models/cesm1.0/clm/CLM4_Tech_Note.pdf.

Comments relating to specific page and line numbers in the discussion paper are given below.

page 3672, lines 21-22 (also 3673, 28 and 3681, 20-21). Please consider doi:10.1029/2010EO450004

3673, 23. Derksen and Brown (doi:10.1029/2012GL053387) is another important recent work evaluating CMIP5 snow cover simulations

3679, 25. Brackets required around LAI + SAI

3684, 18. “locally exceeds 20 days” or “exceeds 20 days locally” would be better.

3685, 14. Snow does not necessarily persist longer in forests than on open ground – the recent review of observations by Lundquist et al. (doi:10.1002/wrcr.20504) shows shorter duration for forests in warmer regions.

3686, 27. Again, less snow is often observed to accumulate in forests due to canopy interception than on nearby open ground that is not affected by wind scour; see, for example, Figure 4 in Lundquist et al. or Essery et al. (doi:10.1175/2009BAMS2629.1).

3687, 14. “makes snow-off occur”

3693, 25. For future work with CMIP5 model outputs, it would be interesting to see if the CLASS land surface scheme (which is an unusual example of a model with separate energy budgets for snow and snow-free land) in the CanCM4 climate model behaves differently from ECHAM5.

Interactive comment on Geosci. Model Dev. Discuss., 7, 3671, 2014.

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