

***Interactive comment on* “Simulation of permafrost and seasonal thaw depth in the JULES land surface scheme” by R. Dankers et al.**

Anonymous Referee #2

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The paper provides a very constructive assessment of the Land Surface Model JULES by examining active layer thickness and soil temperature. The methodological approach is sound and provides insight on the importance of defining organic content in the soils, which the JULES model does not currently address and which could improve future simulations. The discussion also outlines the importance of a realistic simulation of snow precipitation. The paper is presented in a structured way using clear language and graphics. It is supported by appropriate references and provides information on publically available data sources. I think the paper, which provides a solid analysis, will contribute to the improvement of LSMs and should be published as is. Below are just a few general comments.

- It would be interesting to see what the impacts of re-gridding the NCSCD (to 1-degree)

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are? As mentioned by the authors, it would be interesting to use a sub-grid scheme (as for the vegetation) to input those parameters and see what would be the change in permafrost distribution, as a fair amount of permafrost found in the sporadic and some of the discontinuous zones occurs in peatlands.

- Concerning the validation exercise at CALM sites, I wonder if the use of C3-grass as a surrogate for tundra vegetation (as mentioned in the paper) is appropriate, that is, unless grassland was the dominant vegetation type at those sites. Could it be one of the factors as to why the ALT is consistently deeper than the observed data at these sites?

- Finally, as rightly stated by the authors, when simulating active layer thicknesses and soil temperature, one would think that using a spatial resolution of 1-degree for soil type would be a major impediment and contribute greatly to the uncertainty. As mentioned, sub-grid variability, hydrology, phase change and averaging around water bodies (including coastal zones) are probably all factors which impact the simulated permafrost distribution.

Interactive comment on The Cryosphere Discuss., 5, 1263, 2011.

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