



Canadian RCM simulated surface/sub-surface climate for the pan-Arctic region and its sensitivity to soil model configuration and representation of organic matter

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Many climate modelling groups have realized the importance of deeper soil configuration and representation of soil organic matter for realistic simulation of surface and sub-surface climate in the high latitudes. This study, performed with the fifth generation of the Canadian Regional Climate Model (CRCM5) using deep and shallow configurations of the land surface scheme CLASS3.5 (Canadian LAnd Surface Scheme), evaluates the sensitivity of land-atmosphere fluxes, surface and sub-surface thermal and moisture regimes, to the presence of soil organic matter and to the depth of the soil model over a pan-Arctic domain. A simple parameterization was adopted to represent the organic matter in CRCM5, through explicit accounting of the organic soil thermal and hydrologic properties, by 'filling' the soil layers with organic carbon from the surface down until soil carbon is depleted. The net effect is a 10 cm organic layer over most of the high latitude regions. Comparison of CRCM5 simulations, with and without organic soil, demonstrates clearly the need to include organic matter for more realistic simulation of permafrost. This paper will also present permafrost/snow linkages, particularly snow-duration/depth/thermal conductivity, for current and future climates.