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The co-evolution of continental ice cover and 3D ground temperature over the last glacial cycle

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Glacial ice cover imposes a significant challenge to the inversion of past climate from deep borehole temperature records. In this context, I will examine the impact of evolving ice cover over the last glacial cycle on the associated continental scale 3D ground temperature field using the MUN/UofT glacial systems model(GSM). This will includes results from a recently completed calibration for North America along with initial results from an ongoing calibration for Eurasia. The GSM incorporates a 3D thermo-mechanically coupled ice-sheet model, a detailed bed-thermal model, and numerous components associated with surface mass-balance, surface drainage, glacio-isostatic adjustment, and climate forcing. The model is calibrated with a large ensemble Bayesian methodology against a large set of relative sea-level, geodetic, and strandline observations along with independent deglacial ice margin chronologies inferred on the basis of glacial geology and geomorphology. I will validate calibrated ensemble results against temperature records from deep boreholes. The signature of glacial ice will be shown to be especially evident in the extent of present-day disequilibrium in permafrost depth.