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Holocene carbon accumulation in the Hudson Bay Lowland, Canada

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Northern peatlands represent an important terrestrial sink of atmospheric carbon (C) and have contributed to a net global cooling during the Holocene. As general circulation models predict enhanced hydroclimate variability at northern latitudes, great uncertainty exists regarding the fate of northern peatland C pools, especially in response to changing climate and increasing anthropogenic pressure. The Hudson Bay Lowland (HBL), located in central Canada, is one of the largest continuous peatlands globally and includes the southernmost region of permafrost in North America. This research project uses the HBL patterned peatlands as model systems to investigate the effects of past hydroclimatic variability on peatland ecosystem structure-function and to elucidate the role of peatland succession dynamics in climate system feedbacks and C-sink magnitude and vulnerability. In a study of C accumulation rates, complete peat profiles were collected from spatially extensive sites across a hydroclimatic gradient. Peat sampling proceeded to mineral contact, which occurred at a mean peat depth of 2.2 ± 1 meters. Extruded cores were subject to radiometric dating and analyses of bulk density, dry ash content, and C and nitrogen concentration. Basal radiocarbon dating revealed that peat initiation occurred between 4674 to 6670 calibrated years before present, in response to rapid isostatic uplift. Mean bulk density ranged from 88 ± 7 g dm^{-3} for bogs to 128 ± 34 g dm^{-3} for fens. Herein, modeled C accumulation rates, C pool estimates, and timing of peatland initiation and expansion are presented.