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ORCHIDEE-PEAT v2.0: a dynamic model of peatland extent, peat accumulation and decomposition

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Peatlands are one of the most effective ecosystems at sequestering CO_2 from the atmosphere and one of the largest natural sources of methane (CH4), playing a pivotal role in the global greenhouse effect. In this study, we present a parameterization of a polytelmic peatland carbon decomposition and accumulation model, as well as an implementation of a TOPMODEL based dynamic peatland extent module in the ORCHIDEE-MICT land surface model. This study focuses on the dynamics of northern peatlands since the Holocene. The model is applied to zones above 30° N following the pattern and timing of deglaciation that was derived from paleogoegraphic maps. The model is first evaluated across a range of northern peatland sites where peat ages, depths and carbon content have been recorded. Then we use multiple datasets to validate modeled northern (>30°N) peatland areas, carbon stocks and peat depths.