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Northern hemispheric biome changes synthesized from taxonomically harmonized and temporally standardized fossil pollen record since the Last Glacial Maximum in comparison to MPI-ESM simulations

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Fossil pollen datasets can help to understand the temporal and spatial distribution patterns and driving forces of the past terrestrial biomes in high northern latitudes. Here we present a global pollen dataset since the Last Glacial Maximum, synthesized from 2821 palynological records from the Neotoma Paleocology Database and additional literature. All terrestrial pollen taxa were taxonomically harmonized on genus (woody taxa) or family level (herb taxa) and temporally standardized by using a defined parameter setting for Bayesian age-depth modeling based on 14C dating. The age-depth models were statistically compared with existing models for each record. With a biomization approach, we reconstructed biomes for several time-slices throughout the last 22000 years with a temporal resolution of roughly 500 years. The reconstructed biome distributions are compared to simulated biome distributions inferred from a transient simulation for the last 25000 years, performed in the comprehensive Earth System Model of the Max Planck Institute (MPI-ESM). The overall biome trend agrees well, but the simulation shows lower forest cover in the high northern latitudes and reaches the maximum forest cover in the Holocene much earlier than the reconstructions indicate.