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Spatial variability in biomass burning in the northern extratropics since the Last Glacial Maximum

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Fire is an important environmental and ecological process in northern high latitude environments. It is currently unclear how fire regimes will change in response to current environmental change in this region and the implications this may have for ecosystem processes and human societies. We reconstruct changes in biomass burning since the Last Glacial Maximum in the northern extratropics (>45°N), using data from the Global Charcoal Database complemented by new records from Canada, Beringia and Russia. A clustering machine-learning algorithm (K-means) is used to delimit regions that show similar burning histories. Comparison of the regional trajectories of change in biomass burning provides insights into the environmental drivers of fire. Generalised linear modelling is then used to explore the independent roles of climate, vegetation changes and human activities on changes in fire regimes for each region and for the northern extratropics as a whole. This study provides quantitative information about the differential importance of the drivers of changes in fire regimes in different regions and at different timescales since the Last Glacial Maximum, and provides insights about how these may influence future fire regimes across this region.