
7000-year human legacy of European fire regimes

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Abstract

Variability in fire regime at the continental scale has primarily been attributed to climate change, often overshadowing the widely potential impact of human activities. However, human ignition modifies the rhythm of fire episodes occurrence (fire frequency), whereas land use alters vegetation composition and fuel load, and thus the amount of biomass burned. It is unclear, however, whether and how humans have exercised a significant influence over fire regimes at continental and millennial scales. Based on sedimentary charcoal records, we use new alternative estimate of fire frequency and biomass burned for the last 16000 years (here after 16 ky) that we evaluate with outputs from climate, vegetation, land use and population models. We find that pronounced regional-scale land use changes in southern Europe at the beginning of the Neolithic (8-6 ky), during the Bronze Age (5-4 ky) and the medieval period (1 ky) caused a doubling of fire frequency compared to the Holocene average (the last 11.5 ky). Despite anthropogenic influences, southern European biomass burned decreased from 7 ky, which is in line both with changes in orbital parameters leading climate cooling and also reductions in biomass availability because of land use. Our study underscores the role of elevation-dependent parameters, and particularly biomass and land management, as major drivers of fire regime variability. Results attest a determinant anthropogenic driving-force on fire regime and a decrease in fire-carbon emissions since 7 ky in Southern Europe.

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