The drivers of changing fire regimes: an assessment of anthropogenic influence on fire history in the Iberian Peninsula during the Holocene

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Climate changes have been invoked to explain recent changes in wildfire regimes in Mediterranean regions, and climate projections suggest that there will be an increase in fire weather during the 21st century. However, humans influence natural fire regimes today directly by suppressing or igniting fires, and indirectly by changing fuel types and fuel structure through land use changes. Recent observations provide only a limited basis for determining the relative importance of climate and human activities for fire. The diachronous introduction of agriculture during the Neolithic provides an opportunity to examine the potential impact of human activities on fire regimes. We reconstruct fire history using sedimentary charcoal records and population change based on summed probability distributions of radiocarbon dates on archaeological material, focusing on the interval between 10,000 and 3,500 cal. BP. The archaeological radiocarbon dates are also used to map the onset of agriculture through time across the region. For Iberia as a whole, we identify two periods of rapid population growth, centred on ca. 7,400 and ca. 5,400 cal. BP. However, these periods of rapid population growth are not synchronous with changes in charcoal accumulation. Changes in charcoal accumulation are not aligned with the time-transgressive dates for the introduction of agriculture across the region; charcoal accumulation was already increasing ca. 400 years prior to the onset of agriculture and continues to increase for ca. 200 years afterwards. There is also no consistent correlative relationship between population and fire across the period of analysis. Our analyses show that there are no direct links between the introduction of agriculture or subsequent increases in population and changes to fire regimes in Iberia in the early to mid-Holocene, suggesting that changes in fire regimes were largely driven by climate changes.