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Fire and climatic variability during the last 140,000 years in South Western Iberia

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Fires play an important role in terrestrial ecosystem dynamics, in particular in vegetation destruction, and in greenhouse gas release. Microcharcoal particles preserved in a core off Lisbon were analysed to reconstruct fire history during the last 140,000 years, in order to understand vegetation changes in this region and to explore the possible role of these fires in natural greenhouse gas variations in the past. For this, we have applied an automatic counting based on the traditional identification of black, opaque, abrupt shape particles. However, these black particles can originate from the erosion of rich organic geological layers from the hydrological basin. To discriminate fires from diagenetic processes, we have compared traditional microcharcoal particles counting with petrographic analysis. This study has shown a strong correlation between climatic changes (Dansgaard-Oeschger cycle, Heinrich events) and microcharcoal accumulation in the marine domain that suggest a close relationship between millennial scale climatic cyclicity and fire activity. The comparison between the two methods suggests that the increase in microcharcoal accumulation and, therefore, the development of fires coincides with Dansgaard-Oeschger interstadials and, inversely, low fire activity is contemporaneous with Dansgaard-Oeschger stadials. This correlation is certainly due to the different plant biomass availability during Dansgaard-Oeschger interstadial and stadials respectively. In the frame of the Euroclimate-Resolution project we intend to analyse several cores from the North Eastern Atlantic ocean to create a first database of fire history in Western Europe. These new data will be useful for a better modelling of climatic changes integrating climate, vegetation, and fire interaction.