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Calibrating microcharcoal in recent marine sediments: implications to reconstruct paleofire regimes on African continent

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Fire is a worldwide terrestrial process and has shaped the ecosystems and life on Earth over millions of years. Today, fire regime metrics such as burned area, intensity and frequency, depend on a set of climatic and environmental variables, but under anticipated climate warming scenarios, it is projected that fire characteristics will change, posing great threats to the environment and society. Large uncertainties remain in better understanding this complex process, integrating it in Earth system global models and better forecasting the response of fire to future climate changes.

Paleofire records from marine sediments capture information about regional-scale relative changes in biomass burning over long timescale and can help understanding the relationships between climate change and fire activity. We still lack, though, what a change in biomass burning in the paleorecord means in terms of fire regimes.

The present study aims at exploring the link between charcoal accumulation in marine surface sediment samples of modern ages from about 150 sites across the African coast and fire regimes on land. It is based on an integrated approach using fire proxy, climate, environmental and historical information, and satellite data. Exploratory in character, this study is designed to investigate this link among different biomes, describing latitudinal and longitudinal transects, and to test the influence of different physical site-specific variables (climate, vegetation, size of the source area etc.) on land and transport-deposition processes into the marine realm.

This study aims to provide a novel sediment-based proxy for a key physical parameter unlocking specific technical and theoretical problems related to fire research; it may also help to better understand local to regional processes controlling the fire signal and contextualize current and past environmental changes.