

Reconstructing the record of anthropogenic pyrogenic carbon emissions since the onset of the industrial revolution: Location, location, location

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Despite our recent understanding on the influence of combustion processes on natural and human systems, large uncertainties still exist in our efforts to characterize spatial and temporal heterogeneities in past and present emissions of radiatively important pyrogenic carbon (PyC). Historical records of PyC emissions at sufficiently large scales are paramount to the efforts of climate modelers, and even epidemiologists, since they provide datasets against which the wide-scale distribution of modelled PyC emissions can be gauged. Here we synthesize results from a number of historical combustion reconstructions, using elemental, isotopic, and molecular signatures of PyC in sedimentary archives from the U.S. and Europe. We illustrate how the local nature of fuel sources and consumption leads to geographical heterogeneities in PyC emissions and distribution. Discrepancies between modeled estimates of PyC emissions for the 20th century at large scales *vs.* actual reconstructions from historical archives at local scales, point to the need for increasing the resolution of historical reconstructions. In particular, stable isotope carbon signatures of soot PyC show a strong potential for identifying fuel sources and regional distribution of combustion emissions from anthropogenic activities.