

Compound specific radiocarbon analyses to apportion sources of combustion products in sedimentary pyrogenic carbon deposits

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Pyrogenic carbon (PyC) is a collective term for carbon-rich residues comprised of a continuum of products generated during biomass burning and fossil fuel combustion. PyC is a key component of the global carbon cycle due to its slow intrinsic decomposition rate and its ubiquity in the environment. It can originate from natural or anthropogenic vegetation fires, coal mining, energy production, industry and transport. Subsequently, PyC can be transported over long distances by wind and water and can eventually be buried in sediments. Information about the origin of PyC (biomass burning vs. fossil fuel combustion) deposited in estuarine sediments is scarce.

We studied the highly anoxic estuarine sediments of the Pettaquamscutt River (Rhode Island, U.S.) in high temporal resolution over 250 years and found different combustion proxies reflect local and regional sources of PyC (Hanke et al. *in review*; Lima et al. 2003). The polycyclic aromatic hydrocarbons (PAH) originate from long-range atmospheric transport, whereas bulk PyC, detected as benzene polycarboxylic acids (BPCA), mainly stems from local catchment run-off. However, to unambiguously apportion PyC sources, we need additional information, such as compound specific radiocarbon (^{14}C) measurements. We report ^{14}C data for individual BPCA including error analysis and for combustion-related PAH. First results indicate that biomass burning is the main source of PyC deposits, with additional minor contributions from fossil fuel combustion.

References

Hanke U.M., T.I. Eglinton, A.L.L. Braun, C. Reddy, D.B. Wiedemeier, M.W.I. Schmidt. Decoupled sedimentary records of combustion: causes and implications. *In review*.

Lima, A. L.; Eglinton, T. I.; Reddy, C. M., High-resolution record of pyrogenic polycyclic aromatic hydrocarbon deposition during the 20th century. *ES&T*, 2003, 37 (1), 53-61.