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Source apportionment of sedimentary PAHs in Sakudrada Moat of Imperial Palace, Tokyo using compound-specific radiocarbon analysis

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Polycyclic aromatic hydrocarbons (PAHs) form one of the most important classes of persistent pollutants (Blumer 1976). Some PAHs are carcinogenic and mutagenic. Owing to their adverse effect on human/ecological health and widespread distribution around in the environment, identification of the sources of PAHs is of special concern (Pedersen et al. 2004). Thus, elucidating and evaluating the source of PAHs is of importance for being essential to achieving better source control and pollution abatement. PAHs are generally produced through the incomplete combustion of organic matter (e.g., fossil fuels, biomass, or detrital organic materials) and emitted to the atmosphere. Because of their hydrophobic nature, once these semi-volatile organic compounds enter aquatic environments through atmospheric deposition, PAHs accumulate in the underlying sediment and are stored for a long time. Especially, sediments from urban reservoirs such as moats and canals provide an ideally homogenized natural archive of particle-borne pollution, integrating the input over the past several decades as a result of the combined processes of deposition, runoff, water mixing, and sedimentation. So far, the source apportionment of PAHs using natural level radiocarbon is used as a useful tracer to sedimentary and aerosols, for example, for industrial countries (Asian megacities) and urban reservoirs (Kanke et al., 2004; Kumata et al., 2006, 2024). The purposes of this study were to quantitatively apportion modern and fossil sources of PAHs by determining radiocarbon and δ13C contents of individual PAHs extracted from an urban reservoir, namely, one of the moats surrounding the Imperial Palace (the Sakurada Moat), located in the central Tokyo metropolitan area, which is recognized as one of the most urbanized areas in the world. samples and to reconstruct historical trends of the relative inputs of PAHs from fossil fuel combustion and biomass burning. In this conference, we present radiocarbon and δ13C data of sedimentary PAHs and source apportionment of PAHs using the Markov Chain Monte Carlo-driven Bayesian modeling.

Reference:
Kanke, H.,et al. (2004) *NIMB*, 223-224, 460-465., Kumata, H., et al. (2006). *Environ. Sci. Technol.*, 40(11), 3474-3480., Kumata, H.,et al. (2024) *Radiocarbon*,in press.

Student Submission

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