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Fossil and Non-Fossil Carbon Contents in the Tropical Indian Aerosols

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Atmospheric aerosols have serious impacts on the Earth's climate system directly by scattering and absorbing solar radiation and indirectly by acting as cloud condensation nuclei. They also cause adverse effects on human health and play an important role in atmospheric chemistry. Although carbonaceous aerosols that represent a large fraction of fine aerosol mass have been extensively studied, their origins and atmospheric processing are not fully understood yet in the tropical Indian aerosols. To apportion the fossil and non-fossil carbon in the tropical carbonaceous aerosols from the Indian region, we collected atmospheric aerosols (PM₁₀) on day- (approximately 6:00–18:00 LT) and nighttime (18:00–6:00 LT) bases in winter (January 23 to February 6, n = 29) and summer (May 22–31, n = 20) 2007 from a mega-city, Chennai (13.04°N; 80.17°E) located in the southeast coast of India. We measured the radiocarbon ($\delta^{14}\text{C}$), a unique tracer for distinct fossil and non-fossil carbon, isotope ratios of total carbon (TC) in the PM₁₀ using the Accelerator Mass Spectrometry (AMS). In addition, carbonaceous components, molecular composition and distributions of various organic classes of compounds and their stable carbon isotopic composition ($\delta^{13}\text{C}$) in TC were measured. Here we report the characteristics of $\delta^{14}\text{C}$ in TC (percent of modern carbon (pMC)), together with the comparison with carbonaceous components and molecular marker species in PM₁₀. Based on the results obtained, we discuss the importance of contemporary sources and aging of the tropical carbonaceous aerosols, including their diurnal and seasonal changes, in the southeast coastal region of India.

Student Submission

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