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POLYCYCLIC AROMATIC HYDROCARBON PATTERNS IN THE CITY OF RIO DE JANEIRO

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In this study, the concentrations of 16 polycyclic aromatic hydrocarbon (PAH), considered priority by US EPA (US Environmental Protection Agency), in fine particulate matter (PM2.5) were determined in a forest reserve and in an urban area in the city of Rio de Janeiro. The PM2.5 samples were collected in the Tijuca Forest (TF) and on the Maracanã campus of the State University of Rio de Janeiro (UERJ), using PM2.5 high-volume air samplers, from November 2015 to April 2016. The organic matter was extracted, separated by liquid chromatography, and analyzed by gas chromatography-mass spectrometry (GC-MS). The mean total PAH (excluding naphthalene, acenaphthene and acenaphthylene) concentrations were 0.46±0.61 ng m-3 and 1.12±0.71 ng m-3 in PM2.5 collected at TF and UERJ, respectively. The diagnostic ratios suggested vehicular sources for both sites with no clear distinction between light and heavy vehicular sources. Cluster and principal component analyses were also used to clarify the possible PAH sources. Simulations of air mass trajectories confirmed the transport of pollutants from the city to the forest. Mutagenicity tests revealed that the PM collected in the UERJ presented mutagenic positive activity, likely for nitro-PAH and amino-PAH, which may be related to vehicular emissions. For the TF, although the forest was impacted by the pollutants, no positive activity was detected. Correlation and cluster analyses showed different PAH distributions for the TF and UERJ sites, which indicates that the TF receives the air masses from the city but is also impacted by local emissions.

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