# Organophosphorus flame retardants (OPFRs) in $PM_{2.5}$ in urban and e-waste recycling regions in southern China: concentrations, sources, and emissions

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$PM_{2.5}$ were collected in few different kinds of industrial parks in an urban region and e-waste recycling parks in a rural region in the Pearl River Delta, South China. Concentrations, compositions, and spatial distributions of organophosphorus flame retardants (OPFRs) in the air were investigated. The emission inventories of OPFRs from these parks were estimated.

The median concentrations of OPFRs in urban parks and e-waste parks were 2854 and 3321 pg/m$^3$, respectively. The dominating OPFRs in $PM_{2.5}$ from the whole urban region were TCIPP and TMPP. TPHP, TCIPP, TMPP were the most abundant OPFRs in the e-waste region. The median emission rate of OPFRs associated with $PM_{2.5}$ was 73 kg/yr (8.8 – 546 kg/yr) in the urban region while the emission rates of OPFRs in the e-waste region (27 – 45 kg/yr, median = 33 kg/yr) were lower. Most of OPFRs presented no significant correlation with PAHs, OC and EC except EHDPP and TEHP in both urban and e-waste regions, which indicates EHDPP and TEHP were more related with combustion or pyrolysis processes in the industrial parks.

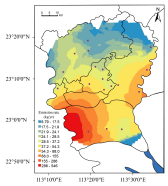

**Figure 1:** Spatial distribution of yearly emission rate of OPFRs in $PM_{2.5}$ from different industrial parks in main districts of the urban region.