

**AIR POLLUTION ASSESSMENT MODEL BY PASSIVE BIOMONITORING, IN SÃO MATEUS DO SUL,
PARANÁ, BRAZIL**

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In developing countries significant sources of air pollution may go undetected in areas that do not have qualified structure to measure air contaminants. In this study, simplified methods to measure trace elements in tree barks and in fine particles in filters to evaluate the pollution of the emissions of a shale oil plant operating in São Mateus do Sul (Paraná, Brazil) were used. The trace element contents were determined in tree barks samples, across a wide area within the city and in the vicinity of the shale plant. In addition, campaigns of measurement of particulate matter with an aerodynamic diameter below 2.5 μm ($\text{PM}_{2.5}$) were conducted in five areas of the city, downwind of the shale plant, using portable particle impactors. These analyses were carried out by EDXRF to determine concentrations of Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, S, Si, V and Zn in tree bark and Fe, S and Si in $\text{PM}_{2.5}$. The resulting data were evaluated obtaining element concentration distribution maps. These maps were used to identify hot spots and to estimate element mobility of Fe, S and Si present in the airborne. The results of the present study indicated that emissions from the shale oil industry affect the city of São Mateus do Sul, as demonstrated by measurements of $\text{PM}_{2.5}$ and accumulation of trace elements in the tree barks. Factor Analysis (FA) from data sets suggests that Fe, Si and S may be used as tracers of the shale industry. According to FA, three main components, which accounted for 70% of the total variance, were considered. Factor 1 was probably related to the traffic; Factor 2 was representative of shale oil activities because of the presence of sulfur (emitted during the oil production), Fe and Si were related to mining and drilling. There was no a distinct hypothesis to explain Factor 3.

Keywords: Tree bark, $\text{PM}_{2.5}$, EDXRF.