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CHARACTERIZATION OF BTEX EMISSION SOURCES IN INDUSTRIAL AND URBAN AREAS USING PRINCIPAL COMPONENTS ANALYSIS AND NONPARAMETRIC REGRESSION METHODS

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BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) come from different sources, such as fossil fuel combustion due to transport and industrial activities. Previous studies identify the petrochemical industry and traffic as the main sources of BTEX emission in the study region. In order to deepen these studies, in this work different tools were applied to characterize the emission sources. One of them is a Principal Components Analysis (PCA) that was used to study the quantity of BTEX sources. With the goal of considering available wind data, a Nonparametric Wind Regression (NWR) was executed so as to obtain the relationship between contaminants concentration and wind speed and direction. Using these regressions and an estimate of the wind density, we obtained a Source Apportionment (SA), which offers information regarding the directions with a higher contribution of BTEX. We also performed a Nonparametric Trajectory Analysis (NTA), using the back-trajectories of the pollutants from the three different receptor sites; a nonparametric regression was used so as to obtain an estimator of the expected concentration of pollutant on a geographical coordinate. The results show areas with different characteristics: residential and urban zones evidence predominance of a single source, presumably associated with traffic, while the industrial zone presents the contribution of two main sources, presumably associated with the petrochemical industry and also with traffic.