

Practical methods for data evaluation and air quality characterization in the Rio de Janeiro city

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A Data Quality Assessment (DQA) is a scientific and statistical assessment that determines whether environmental data obtained is in its correctly shape and whether it has quality and quantity enough to support its intended uses. (USEPA, 2000)

In this sense, a set of data with sufficient quality to represent the environmental conditions can be used to help governmental decision-making, to estimates secondary variables and in several scientific researches, being able to regard a wide variety for various problems.

Beside, considering general studies of air quality, ozone is a photochemical oxidant, that when present in high concentrations at tropospheric layer, may cause damages to human health, such as irritation of the eyes and respiratory tract, as well as diseases and allergic reactions such as rhinitis, sinusitis and bronchitis, among others . (CETESB, 2003)

Rio de Janeiro Metropolitan Region (RJMR), as well as other major urban centres in Brazil, often is affected by high ozone concentration (INEA, 2009), being related to the high amounts of solar radiation mainly in spring and summer seasons.

In addition, the monitoring of the tropospheric ozone concentration and its precursors compounds have been continuously done in the region, seeking a better understanding of the pollutant (ozone) formation processes in urban areas such as this.

However, the evaluation of air quality data available in RJMR is fundamental, firstly to aggregate knowledge about local characteristics and how these environmental data can varies with the time, seeking for some periodicity in its time series and identifying some anomalies in these data distribution, and, on a second stage, the data quality assessment is fundamental to support theoretical models and concepts about tropospheric ozone formation processes that have not yet been consolidated.

The main goal of this study, therefore, is to present the steps on which data quality assessment is developed, incorporating a statistical point of view and a scientific discussion about the quality of the environmental data obtained in situ through Meteorological and Air Quality Monitoring Network Stations managed by the Rio de Janeiro Municipal Department of Environment - SMAC.

Meteorological and air quality data such as solar radiation, air temperature, relative humidity and ozone and nitrogen oxides concentrations are statistically evaluated and presented as part of the environmental characterization of the city, highlighting the region of higher concentrations of ozone and its pollutant correlation with other variables monitored.