Methodology

The results of the campaigns were introduced in the ESRI Geographic Information System software ArcGIS and the extension Geostatistical Analyst was used to obtain distribution maps. Several interpolation methods available such as IDW were tested.

The selected method was the geostatistical interpolation method – kriging, because it relies on the similarity of nearby sample points to create a surface and assesses the uncertainty of the predictions. Both prediction and error maps were performed for the Summer and Spring campaigns.

Maps representing the factors that influence air quality patterns were also produced for discussion purposes:
- Type and location of the major air pollution stationary sources;
- Population density and major agglomerations;
- Topography;
- Meteorological conditions

Zones were delimited based on administrative regions, pollutant background levels distribution maps, topography, climate and meteorological patterns, population density and land use.

SO2

Sulphur dioxide background levels are also low; the pattern of concentrations, can be explained looking to the location of the main sources of SO2 and the wind regime in both campaigns.

NO2

Nitrogen dioxide background results are generally low but are higher closer to urban areas (high population density) caused by high road traffic levels.

O3

Finally, the concentration values found for O3 are, in absolute values, very high; Topography, wind direction, and the location of the main sources of ozone precursors (NOx and VOC’s) were the most relevant factors.

References


Conclusions

- The use of diffusive sampling method within a systematic grid (20x20 Km²) combined with the geostatistical interpolation method Kriging as proved to be a low-cost and efficient way for mapping of SO2, NO2, and O3 background levels in a country like Portugal;
- The geostatistical interpolation method - Kriging provides the possibility of obtaining probability and error maps which are very useful on the perception of patterns and the interpretation of data;
- Making maps of the potential factors that influence air quality such as wind rises of both campaigns, population density, major point industrial sources and topography was also helpful in the interpretation of campaign results;
- The pollutant distribution maps produced were fundamental in the delimitation of the 10 zones for Portuguese Continental Regions. Also important were the administrative limits, topography, climate and meteorological patterns, population density, and land use maps.

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