

Wavelet analysis of the concentration of air pollutants in Colombo Fort, Sri Lanka

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Air pollution is a major problem in Sri Lanka due to rapid urbanization and the development of industries. In Sri Lanka, the quality of air has a profound impact on the economy. The most obvious of these impacts is related to health problems associated with poor air quality and the corresponding cost of medical care and treatment. Therefore it is important to build air quality models, which are mathematical descriptions of the concentration of ambient pollutants. These mathematical models consist of several parameters which vary with respect to external variables such as meteorology and human behaviour. It is important to recognize air quality patterns with respect to measured direct parameters as well as auxiliary parameters such as wind speed, temperature and rainfall and to include these facts in the mathematical models.

The aim of this study was to identify whether there is a specific period during the year in which the pollutant concentration oscillates and to investigate the relationship between air quality and meteorological phenomena, which include temperature, wind speed and rainfall. This paper deals with the wavelet analysis of the air pollutant concentration in Colombo Fort, Sri Lanka. The daily average values of air pollutants such as Carbon Monoxide (CO), Nitrogen Oxide (NO), Nitrogen Dioxide (NO₂) and Sulphur Dioxide (SO₂) were studied. The continuous wavelet of air pollutants was investigated. Simulation was carried out using the MATLAB package. Data was collected from the Central Environmental Authority, Sri Lanka. According to the study all the pollutants have similar periodic oscillatory behaviour from January to March and from October to December. Rainfall is high during the months September to December and low from January to March. Daily average wind speed from January to March and from September to December is also low. These were the reasons for the periodic oscillation of pollutant concentration during these periods. These results are important to determine the dynamic behaviour of the model parameters.