ABSTRACT SUBMISSION

Title: Prediction of PM10 Concentrations using a Modular Neural Network System and Integration with an Online Air Quality Management System

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Abstract

The development and application of Integrated Air Quality Management Systems (IAQMS), that increase the awareness of the local population and lead to the enforcement of measures for the avoidance of air pollution episodes, is a subject of great interest. These systems are decision support tools for policy makers that aid in the protection of the population's health in highly polluted urban and/or industrial areas.

The development of such a system is crucial for Kozani, the most populated area of western Macedonia in Greece. Western Macedonia is an industrialised area where a number of lignite power stations are operated using local lignite from nearby mines. This industrial activity as well as urban activities aggravate the air quality in the city, resulting in high PM10 (particle matter with aerodynamic diameter < 10 μm) concentrations. PM10 concentrations are a key factor of air quality, as several studies confirmed that these particles may induce severe effects on public health.

The effectiveness of an IAQMS depends directly on the accuracy of the predicted air quality. Several prediction methods have been developed and applied worldwide. This paper presents a PM10 concentration prediction method based on a modular neural network that was developed at the Laboratory of Air Pollution and Environmental Physics (www.airlab.edu.gr) of the Technological Educational Institute of Western Macedonia. The system receives several inputs from air pollution and environment monitoring stations. The modular structure of the system allows it to better approach the three different groups of data (PM10 measurements, current and predicted meteorological conditions). Network training is repeated regularly using updated information in order to improve its prediction capacity along time and to better approach seasonal variations of air pollution. Previous states of the system are stored for further analysis and validation. The method presented in this paper is validated using measurements acquired over a year. The neural network is integrated with an online air quality monitoring system and the results of current versus predicted air quality are available to the public almost in real time through the internet.

Permission Yes

Affiliations (1) Technological Educational Institute of Western Macedonia, Kozani, Greece

Authors
Ioannis Kapageridis (1) Presenting
Vasilios Evagelopoulos (1)
Athanasios Triantafyllou (1)

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Contact us if you have a problem or wish to withdraw a submission: statgis2009@heliotopos.net