**DEVELOPMENT AND APPLICATION OF THE SmartAQM HIGH-RESOLUTION AIR QUALITY FORECASTING SYSTEM FOR EUROPEAN URBAN AREAS**

Evangelia Siouti1,2, Ioannis Kioutsioukis3,David Patoulias2, George Fouskas2, Spyros N. Pandis1,2

1Department of Chemical Engineering, University of Patras, Patras, Greece

2Institute of Chemical Engineering Sciences (ICE-HT), Foundation for Research and Technology Hellas (FORTH), Patras, Greece

3Department of Physics, University of Patras, Patras, Greece

*\** Corresponding author. Department of Chemical Engineering, University of Patras, Patras, Greece.

*E-mail address:* spyros@chemeng.upatras.gr (S. N. Pandis).

**ABSTRACT**

Atmospheric pollution forecasting systems are useful tools to reduce human health risks and to eventually improve air quality on regional and urban scales. We have developed the SmartAQM (Smart Air Quality Monitoring) forecasting system that combines state-of-the-art chemical transport and meteorological modeling to produce detailed air quality predictions at 1x1 km2 resolution for the urban area of interest for the next three days. The Weather Research and Forecasting (WRF) [1] mesoscale numerical weather prediction model is used for the generation of detailed meteorological fields and the PMCAMx (Particulate Matter Comprehensive Air quality Model with extensions) chemical transport model for simulating air pollution [2]. SmartAQM operates automatically and in real-time and provides a 3-day forecast of the concentration of tens of gas-phase air pollutants (NOx, SO2, CO, O3, volatile organic compounds etc.) and the complete aerosol size/composition distribution. The system simulates the regional air quality in Europe at medium spatial resolution and can focus, using high resolution, on any urban area of the continent. Advantages of the SmartAQM include: (a) high spatial resolution of 1x1 km2 for the urban area; (b) use of improved emission inventories that include not only the traditional sources (transportation, industry, natural, etc.) but also residential biomass burning and cooking; (c) state-of-the-art treatment of the organic aerosol volatility and chemistry; (d) ability to predict not only the concentrations, but also the sources of each pollutant using the PSAT algorithm. The first application is for the city of Patras in which a dense low-cost sensor network for the measurement of PM2.5 (particles smaller than 2.5 micrometers) concentration is available. The predictions are available online (aqmmon.iceht.forth.gr) and are evaluated continuously against hourly measurements that are obtained from the low-cost particle measurement network.

**KEYWORDS:**

Air quality forecast

Atmospheric aerosols and gases

Air pollutant emissions

Modeling

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