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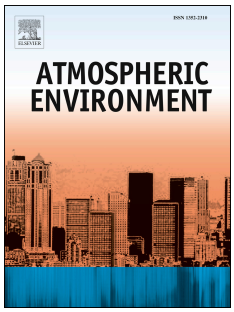

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Urban scale air quality modelling using detailed traffic emissions estimates

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Abstract

The atmospheric dispersion of NO_x and PM10 was simulated with a second generation Gaussian model over a medium-size south-European city. Microscopic traffic models calibrated with GPS data were used to derive typical driving cycles for each road link, while instantaneous emissions were estimated applying a combined Vehicle Specific Power/Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (VSP/EMEP) methodology. Site-specific background concentrations were estimated using time series analysis and a low-pass filter applied to local observations. Air quality modelling results are compared against measurements at two locations for a 1 week period. 78% of the results are within a factor of two of the observations for 1-h average concentrations, increasing to 94% for daily averages. Correlation significantly improves when background is added, with an average of 0.89 for the 24 hours record. The results highlight the potential of detailed traffic and instantaneous exhaust emissions estimates, together with filtered urban background, to provide accurate input data to Gaussian models applied at the urban scale.

Keywords

Urban air quality; Gaussian model; traffic modelling; emissions modelling; monitoring campaign; background concentration

1. Introduction

In the European Union 72% of the population lives in urban areas, a rate that is projected to increase (EEA, 2015a). Despite significant efforts to improve urban air quality, namely by reducing traffic