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How do traffic intensity and turbulence levels affect pollutants concentration in urban traffic hot spots? Analysis from field campaign data in Madrid

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Several extensive field campaigns have been developed during the last years in two of the main urban hot spots of the city of Madrid (Spain) in the frame of the TECNAIRE-CM project (Innovative technologies for the assessment and improvement of urban air quality: Ref. S2013/MAE-2972), funded by Madrid Regional Research Plan. Two of them were developed in the winter and summer seasons of 2015 around Fernández Ladreda square [1], which is an area representative of the traffic stations outside the main inner ring-road of the city (M-30). To complement these analyses, two new field campaigns were carried out in summer 2016 and winter 2017, but this time inside M-30, in a location close to the main park of the city (Retiro Park). Stability situations occur frequently in Madrid, both in summer and winter, leading to high levels of NO_x and Particulate Matter (PM) concentrations. In this work, we analyse the influences of standard meteorological variables, turbulent parameters (such as the turbulent kinetic energy) and traffic intensity to the pollutants concentrations. The differences between experimental results of different locations and seasons are analysed, as well as the different turbulent scales contributing to the diffusion of pollutants during episodes characterised by high levels of nitrogen dioxide.

[1] Borge, R., Narros, A., Artíñano, B., Yagüe, C., Gómez-Moreno, F.J., de la Paz, D., Román-Cascón, C., Díaz, E., Maqueda, G., Sastre, M., Quaassdorff, C., Dimitroulopoulou, C. and Vardoulakis, S. (2016): Assessment of microscale spatio-temporal variation of air pollution at an urban hot spot in Madrid (Spain) through an extensive field campaign. Atmos. Env., 140, 432-445.