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Key turbulence parameters influencing pollutant concentrations during summer and winter field campaigns in a hot spot in Madrid

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TECNAIRE-CM project (Innovative technologies for the assessment and improvement of urban air quality: Ref. S2013/MAE-2972), funded by Madrid Regional Research Plan, has developed different field campaigns during the last years in two of the main hot spots in the city of Madrid (Spain). In 2015 (both in winter and summer) an extensive field campaign [1] was carried out in the surrounding of Fernández Ladreda square, which is representative of the traffic stations outside M-30: the main inner ring-road of Madrid. Along 2016 (summer) and 2017 (winter) two other field campaigns were performed nearby another traffic station, this time inside M-30, with the particularity of being in front of the main park of the city (Retiro park). Stability situations occur frequently, both in summer and winter, leading to high levels of NO_x and Particulate Matter (PM) concentrations. Turbulent parameters such as sensible heat flux and turbulent kinetic energy, together with other standard meteorological variables, as well as traffic flow in the surroundings, are analysed. These variables are useful in order to determine the key parameters responsible for máxima in pollutant concentrations, and the differences found between summer and winter seasons. In addition, the different turbulent scales present during these episodes are evaluated from Multi-Resolution Flux Decomposition (MRFD) techniques.

[1] Borge, R., Narros, A., Artíñano, B., Yagüe, C., Gómez-Moreno, F.J., delaPaz, 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.