TECNAIRE winter field campaign: turbulent characteristics and their influence on air quality conditions

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An urban field campaign was conducted at an air pollution hot spot in Madrid city (Spain) during winter 2015 (from 16th February to 2nd March). The zone selected for the study is a square (*Plaza Fernández Ladreda*) located in the southern part of the city. This area is an important intersection of several principal routes, and therefore a significant impact in the air quality of the area is found due to the high traffic density. Meteorological data (wind speed and direction, air temperature, relative humidity, pressure, precipitation and global solar radiation) were daily recorded as well as micrometeorological measurements obtained from two sonic anemometers. To characterize this urban atmospheric boundary layer (uABL), micrometeorological parameters (turbulent kinetic energy -TKE-, friction velocity -u_*- and sensible heat flux -H-) are calculated, considering 5-minute average for variance and covariance evaluations. Furthermore, synoptic atmospheric features were analyzed. As a whole, a predominant influence of high pressure systems was found over the Atlantic Ocean and western Spain, affecting Madrid, but during a couple of days (17th and 21st February) some atmospheric instability played a role. The influence of the synoptic situation and specially the evolution of the micrometeorological conditions along the day on air quality characteristics (Particulate Matter concentrations: PM10, PM2.5 and PM1, and NO_x concentrations) are analyzed and shown in detail.