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## Particle number concentrations and size distributions in Po Valley (Northern Italy) during PoAIR experiment

The densely populated and heavily industrialized area of the Po Valley is a well known hot-spot for PM pollution, especially in the cold season, due to the frequent thermal inversion and stagnant meteorological conditions. Nevertheless, knowledge on particle number concentration (PNC) and related size distribution (PNSD) in this area are still rather scarce.

Within the PoAIR experimental project, an intensive multi-site field campaign was conducted during February 2014, aiming to investigate the temporal and spatial variations of PNC levels and PNSD. Measurements with different instruments were taken at five sites: two urban background sites, Milano (MI-UB), Bologna (BO-UB), two rural site, Molinella (SPC-R) and Ispra (ISPRA-R) and one mixed site Padova (PD-MX).
Compared with the typical winter conditions in this area, February 2014 was warmer, more unstable and rainy during the first and last decade and very warm in the middle because of a southern anticyclonic configuration thus, particulate matter mass concentration levels were quite low.

At UB sites PNC showed similar daily time patterns, with two typical peaks in correspondence with the traffic rush hours; conversely, the SPC-R rural site showed a pattern mainly driven by the boundary layer evolution and much less affected by emission activity.

The contribution of ultrafine particles (UFP, 20-100nm) to PNC levels were between 74-76% at urban sites, in agreement with data reported for other similar urban areas (1); a lower UFP contribution (mean 63%) was observed at the rural site SPC-R and ISPRA-R. Data comparison highlighted a much larger variability for UFP concentrations at the urban sites than at the rural site, likely as a consequence of primary emissions from urban sources, namely traffic (2). Conversely, with the exception of PD-MX site, NoUFP (>100nm) displayed a less relevant spatial variability, apparently deriving from a diffused regional background. This behaviour was partially confirmed by the time series analysis: site correlations for NoUFP number concentrations were comparable to those observed for PM2.5, not so evident for ISPRA-R, whereas correlations for UFP, mainly influenced by local emission, were noticeably lower.
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