

## Air quality conditions inside taxis

T. MORENO<sup>1,\*</sup>, A. PACITTO<sup>2</sup>, A. FERNÁNDEZ<sup>1</sup>, F. AMATO<sup>1</sup>,  
E. MARCO<sup>1</sup>, J. GRIMALT<sup>1</sup>, G. BUONANNO<sup>2,3</sup>, X. QUEROL<sup>1</sup>

<sup>1</sup> Institute for Environmental Assessment and Water Studies  
(IDAEA-CSIC), Barcelona, Spain. (\*correspondence:  
teresa.moreno@idaea.csic.es)

<sup>2</sup> Dept. of Civil and Mechanical Engineering, Univ. of  
Cassino and Southern Lazio, Italy

<sup>3</sup> International Laboratory for Air Quality and Health,  
Queensland Univ. of Technology, Brisbane, Australia

We overview our ongoing programme to study vehicle interior air quality (VIAQ) in Barcelona urban transport and in this presentation turn our attention especially to city taxis. Taxi drivers are chronically exposed to traffic-related air pollutants as an occupational hazard. While many city taxi fleets are still dominated by diesel-powered engines, this is changing rapidly with the introduction of alternative fuel systems. Air quality measurements inside taxis were registered every 10s with: i) Mini-aethalometer (BC); ii) DiSCmini (particle number, size mode, lung deposited surface area LDSA); iii) IAQ-track (CO<sub>2</sub>, CO, T and RH); iv) a GPS. Furthermore, the set was also equipped with a Personal Environmental Monitor to collect PM<sub>10</sub> on quartz microfiber filters, and a low-volume VOC collector.

Most taxi drivers elected to drive with windows open, keeping levels of CO<sub>2</sub> and internally-generated VOCs low but exposing them to high levels of traffic-related air pollutants entering from outside. Median values of N and LDSA were reduced to c. 10<sup>4</sup>#/cm<sup>3</sup> and <20µm<sup>2</sup>/cm<sup>3</sup> respectively under closed conditions, but more than doubled with windows open. In exceptional traffic conditions, transient pollution peaks caused by outside infiltration exceeded N=10<sup>6</sup>#/cm<sup>3</sup> and LDSA=1,000µm<sup>2</sup>/cm<sup>3</sup>. Indications of self-pollution were implicated by higher BC and CO levels, and larger UFP sizes, measured inside diesel taxis as compared to their non-diesel pair, and highest concentrations of CO (>2ppm) were associated with older, high-km diesel taxis. Median PM<sub>10</sub> concentrations (67µg/m<sup>3</sup>) were treble those of urban background, mainly due to increased levels of OC and EC. Enhancements in PM<sub>10</sub> concentrations of Cr, Cu, Sn, Sb, and Zr-related elements are attributed mainly to the presence of brake-derived PM. 2-methylbutane and n-pentane were the most abundant VOCs. Internally sourced VOCs included high monoterpene concentrations from an air freshener.

*This work was supported by the ACS Foundation, the Spanish Ministry of Economy and Competitiveness and FEDER funds within the I+D Project CGL2016-79132 (BUSAIR).*