**Unravelling the chemiodiversity of organic matter in atmospheric aerosols: contribution from CN-linkAIR and ORGANOSOL projects**

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Atmospheric particulate organic matter exerts a highly uncertain effect on radiative climate forcing and could have serious impacts on human health. The water-soluble component is a ubiquitous and highly variable fraction (10–80%) of particulate organics in the atmosphere. Nevertheless, major gaps still exists with respect to its structural and molecular composition, spatiotemporal variability, and source apportionment (natural versus anthropogenic). The CN-linkAIR and ORGANOSOL projects aimed at contribute to reduce these uncertainties by focusing on fine carbonaceous aerosols (PM2.5) over a time span of 2 years at an urban area in the Western European Coast. These research projects set-up an integrated approach, combining bulk measurements of the carbonaceous fraction (organic carbon, elemental carbon, water-soluble organic carbon, and alkaline-soluble organic carbon) with characterization of molecular fragments and intermolecular bonds of the water-soluble and alkaline-soluble organic matter (WSOM and ASOM, respectively) by different high-resolution analytical techniques. Components under investigation also included the inorganic counterpart and, for the first time in this region, the 86Sr/87Sr isotope ratios. This presentation gives an overview of the CN-linkAIR and ORGANOSOL goals, and reports on the key findings as a guide to the results detailed in the papers that follow (e.g., Matos et al. 2015a & 2015b).

Major findings include a 3D map of the structural heterogeneity of aerosol WSOM and its seasonal variation. This organic fraction is composed of a dynamic mixture of compounds, with an important contribution of aromatics to organic matter in autumn and winter, and the presence of a ubiquitous oxygenated aliphatic component (with a probably primary and secondary origin). The aerosol ASOM fraction contains most of the fossil material that is emitted through human activity. A new source apportionment fingerprint has been also created for urban aerosol WSOM and ASOM, revealing a distinctively unique signature as compared to other profiles (Decesari et al. 2007). The comprehensive chemical dataset also suggests the importance of both crustal dust and marine sources to the chemiodiversity of fine urban aerosols.

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