

Tracing the sources of atmospheric ultrafine particles in urban areas

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Several sources of ultrafine particles (or nanoparticles, NPs) can be distinguished, according to their natural or anthropogenic origin. Natural processes such as volcanic activity, deserts, dust storms, forest fires, wind erosion and microbial processes can produce the NPs. Among anthropogenic NPs one can distinguish those manufactured from those released unintentionally into the environment: from vehicle exhaust, industrial activities (steel and foundry, construction) or domestic activities. Due to their high reactivity, NPs present a (eco)toxicological risk and therefore constitute a new class of micropollutants. Their health effects depend in particular on their chemical composition and size. These physico-chemical characteristics are closely dependent on their sources, which also confer on each NP a specific chemical composition. The use of innovative tools such as sp-ICP-MS ToF, allows the measurement of chemical composition, number concentration and size distribution of NPs. In the present study, we aimed at determining if the chemical composition of atmospheric NPs collected in urban area could be related to the chemical composition of their different anthropogenic and/or geogenic sources. Thanks to the acquisition, using sp-ICP-ToF-MS, of the chemical composition of the different sources of NPs, as well as data processing of elementary ratios measured, a spatial mapping of NPs collected in urban could be carried out. This allowed to highlight the different sources to be obtained and to distinguish, in a close future, anthropogenic NPs from geogenic ones at the agglomeration scale.