

Master 2: Stage en laboratoire 2024-2025

Laboratory: LPCA

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Determination of the Physico-Chemical Properties of Aerosols in Urban-Industrial and Port Areas

The study of the physico-chemical properties of atmospheric particles (also known as aerosols) in urban-industrial and port sites, such as Dunkirk, is critically important due to the high intensity of emissions from human industrial and maritime activities. These emissions generate a wide variety of atmospheric pollutants in the form of fine and ultrafine particles (PM₁₀, PM_{2.5}, and PM₁). These particles consist of primary particles emitted directly into the atmosphere (such as carbonaceous species, heavy metals, and sea salts) as well as secondary particles formed in the atmosphere through chemical reactions of gaseous precursors. The variability in the composition and size of these particles influences their behavior in the atmosphere, their ability to be transported over long distances, and their potential impact on air quality and human health.

Therefore, it is essential to characterize the physico-chemical properties of these atmospheric aerosols. To achieve this, particles can be collected using a sampling system developed at LPCA, the TRAPS (NGagine et al., 2022; <https://doi.org/10.3390/atmos13020244>). Automated particle analyses using scanning electron microscopy coupled with X-ray diffraction (SEM-EDX) are then used to characterize them (elemental composition, size, morphology). However, these measurements result in a characterization of the particles without allowing for the quantitative determination of the "real" aerosol concentration in the atmosphere due to particle losses in the sampling system. Therefore, to improve this methodology, the intern will initially be involved in quantifying, in the laboratory, the losses caused by the use of the TRAPS sampling system in order to determine a corrective factor that allows for the real concentration of atmospheric aerosols to be determined. Subsequently, the intern will conduct a measurement campaign aimed at sampling aerosols at the LPCA measurement platform using TRAPS during pollution events, in order to determine their physico-chemical properties using SEM-EDX.

The intern will carry out their internship at LPCA (<https://lpca.univ-littoral.fr/>).

Key-words : Aerosols, sampling, SEM-EDX, cascade impactors