

CASE STUDY: UNDERSTANDING THE SOURCES OF PARTICULATE POLLUTION (PM) FOR PLANNING DUST REDUCTION MEASURES

Client: Environmental authority

Objective:

Carry out a comprehensive characterization of PM₁₀ and PM_{2.5} over a one-year period at three sites with different characteristics from the cantonal monitoring network (urban background, urban near traffic, rural), over a three-year period, in order to improve the understanding of particulate pollution sources and to plan effective dust reduction measures.

Challenge:

Develop a global, cost-effective, and rapid concept for PM source differentiation, including the quantification of primary particles (e.g. tire wear, brake dust, and road surface abrasion) as well as secondary particles (sulfates, nitrates, ammonium, etc.).

Solution:

Specialized dust monitoring and source attribution through the combination of automated single-particle analysis assisted by machine learning, morpho-chemical differentiation of primary particles (ASPA MC²®), and advanced bulk analysis to quantify secondary particles.

Added Value and Impact:

Because the contribution of each source could be quantified, effective dust reduction measures were implemented. The action plan accounted for the seasonal variability of pollutants and adapted the strategy to the specific requirements of each time of year. Moreover, the study provided fundamental insights that enable future particulate pollution monitoring to be source-specific—thus supporting efficient medium- and long-term monitoring.

