

Deploying an Early-Warning Odour Monitoring and Forecasting Platform (odourCEM + SUEZ AirAdvanced) Using a Weber-Fechner-Based EOC Framework

Odour pollution linked to waste and biosolids management facilities is a major driver of community complaints and a technical challenge for both operators and authorities. This is largely due to the strong temporal variability of odour emissions, the complexity of multi-compound mixtures, and the need to anticipate episodes before they affect sensitive receptors. This abstract presents the deployment of an integrated early-warning odour platform within a European project, combining continuous monitoring at **emission** and **immission** points (odourCEM) with spatial analytics and odour-impact forecasting.

The solution integrates a distributed sensor network around the **Copero Environmental Complex (Seville, Spain)**, developed under the **MITLOP-EMASESA** project, consisting of **six immission devices** and **four emission devices** enabling continuous measurement of key odorous gases (H_2S , NH_3 and VOCs). Emission monitoring is based on a CEM approach with conditioned sampling and dilution to prevent condensation and compound carry-over, supporting robust measurements and lower operational effort compared to discontinuous methods.

All observations are integrated into the **AirAdvanced** web-based platform (“control tower”), providing supervision, validation, automated reporting, time-series visualization, and geospatial analysis. The platform supports operational features tailored to odour management, including network status dashboards, station-level trends, impact maps, event calendars, and scheduled communications, while enabling advanced modules such as hypervision, back-trajectory analysis, forecasting, and scenario simulations.

To translate chemical measurements into an operational metric more closely aligned with perceived nuisance and to enable forecasting, the system applies an **Equivalent Odour Concentration (EOC)** framework based on the **Weber-Fechner law**, incorporating odour thresholds and compound-specific slope factors (K) to estimate relative contributions in mixtures. In the case study, a strong relationship is observed between H_2S emissions and odour emissions ($R^2 \approx 0.82$), supporting the use of continuous indicators as practical operational proxies and their integration into an early-warning scheme.

Overall, the proposed system enables proactive odour management by connecting continuous emission/immission monitoring with analytics and impact forecasting to reduce episodes, improve traceability of root causes, and support both operational decision-making and stakeholder communication.

Keywords: odour, odourCEM, CEMS, immission, emission, early warning, forecasting, Weber-Fechner, EOC, waste management.