

Continuous monitoring of odour emissions at plant fence line for the real-time detection of anomalous events

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Instrumental Odour Monitoring Systems (IOMS) is an emerging tool that has recently found increasing use for monitoring plants with odorous emissions that potentially may cause annoyance to the population living nearby. This paper concerns the application of a multi-sensor system for real-time monitoring of odorous emissions of a waste treatment plant (WTP) which treats the municipal organic fraction of the wastes to produce biomethane and compost. In particular, two electronic noses were installed at the plant's boundary to continuously analyse the ambient air with the aim of estimating the odour concentration. A specific experimental protocol was defined for the realisation of the IOMS system and a detailed data processing procedure was implemented to address the issue of humidity and temperature variations. The developed classification and quantification models were evaluated by means of field performance verification (UNI 11761) proving the capacity of the IOMS to detect and classify WTP odour sources with an accuracy above 95%, providing odour concentration estimates in line with dynamic olfactometry. The validated models were then used to characterize the measurements acquired by the instruments throughout their operating period obtaining results in terms of percentages of odour impact differentiating between different odour events based on the emitting source and assigning their detected equivalent odour concentration. The monitoring results were finally cross-referenced with reports of malfunctions and issues provided by the plant operators with the aim of evaluating the instruments' ability to detect these 'anomalies' and potentially provide useful indications to the plant personnel for a prompt intervention.