

Evaluation of Low-Cost passive sampling for urban ammonia (NH₃) measurement: Insights from the Akouédo Landfill, Côte d'Ivoire

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This study, conducted as part of the European DACCWA project (Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa), presents the first long-term measurements of atmospheric ammonia (NH₃) near the Akouédo landfill in Abidjan, Côte d'Ivoire. From February 2015 to March 2017, simultaneous passive sampling was performed using INDAAF sensors and ALPHA badges. Ammonia concentrations were determined by ion chromatography to compare sensor performance and assess temporal variability in this polluted urban environment. A strong correlation was observed between the two samplers ($r = 0.90$; $R^2 = 0.82$), indicating consistent temporal patterns. Moderate discrepancies occurred during peak pollution events (MAE = 11.55 ppb; RMSE = 13.16 ppb), with the ALPHA sampler showing a systematic overestimation (mean bias = -28.3%) relative to INDAAF. Concentrations ranged from 8.0–59.0 ppb (mean = 29.2 ppb) for INDAAF and 16.4–73.2 ppb (mean = 40.8 ppb) for ALPHA. Seasonal trends revealed a marked increase in NH₃ levels during the rainy season (June), likely linked to enhanced microbial activity and waste decomposition. The strong agreement between passive samplers demonstrates their suitability as cost-effective tools for monitoring ammonia pollution and evaluating air quality dynamics in tropical urban environments.

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