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High-resolution large-eddy simulations for odour-impact assessment

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The most common disposal method for municipal solid wastes is burial in landfills. These sites create secondary atmospheric pollution such as leakage of gases and offensive odours creating annoyance within communities. The main objective of this study is to identify relationships between local atmospheric dynamics and odorous pollution events from a landfill located in complex terrain. An approach using data classification and numerical modelling has been developed to identify potential links.

A set of atmospheric scenarios leading to odorous pollution at the local scale have been built from meteorological data recorded *in situ* using Principal Component Analysis. High-resolution large-eddy simulation approach has been used to study representative periods of each defined scenarios. Numerical simulations have been conducted with the Advanced Regional Prediction System (ARPS) model with several nesting levels. The coarser domain was driven by the European Centre for Medium-Range Weather Forecasts (ECMWF) gridded analyses. The finer grid encompassed a domain of about 10 km $\times$ 10 km with a 100-m horizontal resolution. A specific eulerian model of dispersion has been developed to follow odours. A realistic hourly emission inventory characteristic of a week day has been realized during a one-day measurement campaign within the landfill site.

Results of this study enable to explain the majority of odorous events leading to complaints from urban surrounding community. This study focuses on an 3-day episode which favoured odorous pollution as high-pressure systems located over the area produced clear skies, weak thermally driven winds and hot temperatures. Results have been evaluated by comparing predicted odour intensities with complaints received

from the community. Predicted location of odour intensities are in good agreement with the complaints. These results are expected to be useful to limit risks of odorous pollution according to local meteorology and landfill operation management.