Odour dispersion modelling: influence of accuracy of topographic and spatial input data. A case-study.

Daniela Barbero[1,2], Alessandro Nanni[1] and Gianni Luigi Tinarelli[1]
[1]ARIANET S.R.L., 20159 Milan, Italy
[2]Department of DICA, Politecnico di Milano, 20133 Milan, Italy

Public attention to odour emissions is growing, as they can significantly affect human well-being. The issue of nuisance odours is complex, and different types of approaches have been developed to better address it; in particular, odour dispersion modelling is recommended in most odour directives. Models can provide information on the dispersion of odours on an entire area, and they are fundamental tools both for assessing the impact of existing sources and for planning and verifying the effectiveness of mitigation or prevention strategies.

Despite the advantages of using atmospheric dispersion models, the reliability of the results is affected by the uncertainty of the input data. Typical input needed for a model are emission data, meteorological data and topographic and spatial data characterizing the site, such as land use and orography, and, if the model works at building-resolving scale, building structure. Even if the main issue for odour modelling often arise with the quality of the emissions, also the accuracy of spatial data is fundamental for the goodness of the results. In fact, this information is used as one of the inputs of the meteorological simulation driving the pollutant dispersion and may introduce inaccuracies in the computation of mean wind and temperature and turbulent variables, which can strongly affect the final output odour concentration.

We studied the influence of the spatial data quality by analysing a case study on the impact of odours generated by a wastewater treatment plant, for which the predictive estimation of odour dispersion at the building resolution scale is operational with a microscale Lagrangian particle dispersion model. The input orography and land use are improved, increasing both resolution and accuracy of the corresponding surface turbulence characteristics, especially near sources. The effects of these improvements on the odour concentration fields are preliminarily estimated.