

## **Optimization study on Windtrax model: potential applications in case of odourous emission**

Francesca Tagliaferri, Marzio Invernizzi\*, Selena Sironi

Politecnico di Milano, Dep. Chemistry, Materials and Chemical Engineering "Giulio Natta", Piazza Leonardo da Vinci 32, 20133 Milano, Italy  
marzio.invernizzi@polimi.it

In recent years, atmospheric dispersion models have reached a considerable popularity in environmental odour research field. As known, the reliability of these tools depends on the quality of the input dataset: in particular, the emission rate has a strong (linear) correlation with the ambient air estimated concentration. Unluckily, in case of non-point sources, this quantity may be very difficult to estimate. To this end, it would be extremely useful to apply an inverse dispersion model that, by knowing a measured downwind concentration in ambient air, provides an estimation of the emission rate of the source.

This paper discusses the application of the Lagrangian backward model Windtrax. In particular, acknowledging the reliability of the model, this paper proposes an optimization study in order to identify the ideal conditions that provide the best response from the model. More in detail, the meteorological conditions (i.e. atmospheric stability conditions) and the sensor arrangement (i.e. distance from source, sensor height vs source height and number of sensors) that show the highest accuracy of the model will be investigated.

From the results of the simulations conducted, based on real experimental field datasets, it appears that Windtrax shows better performances in neutral conditions, whereas in stable conditions higher accuracy may be achieved by moving the ambient air concentration sensor far from the source. Moreover, reduction of the number of sensors does not necessarily improve the model quantification.

In addition, some considerations about a possible implementation of Windtrax in case of odour will be discussed. In this regard, although some limitations due to the difficulty of measuring odour concentrations in the ambient air, potential applications have been identified.