



## **Modelling of the surface biogas flux in a MSW landfill: a neural network approach**

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The study of air-land interactions for the measurement of land surface fluxes has a very challenging application to the evaluation of biogas release from Municipal Solid Waste (MSW) landfills. In addition to the relatively usual approach to assess the state of the landfill, by producing a biogas flux map based on sporadic surface flux surveys, there is the possibility to make use of automatic monitoring systems for a substantially continuous measurement of the flux. Such an approach, provides a very detailed temporal information, while good spatial detail with poor time resolution is given by periodic mapping. The high temporal resolution of such data gives the opportunity to model the behaviour of the landfill in terms of the relationship between time, meteorological parameters and the biogas flux. The usage of Neural Networks for the behavioural modelling of complex systems gives a powerful mathematical tool, alternative to deterministic approaches, capable of predicting (or simulating) the behaviour of systems by observing their past behaviour. In this work, the behavioural modelling of an MSW landfill, based on a data series about two years long, has been implemented with a backpropagation Neural Network. Experiments made by running the model on separate training data sets and test data sets are presented. In order to determine the flux value, both the usage of the model as a predictor based on past values, and a pure modelling based on external variables, such as the meteorological data, is discussed. Results are also evaluated and compared in terms of performance with respect to real data, in terms of prediction accuracy.