



Landfills as critical infrastructures: synergy between non-invasive monitoring technologies

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This work deals with a methodology for estimating the behaviour of a landfill system by means of the integration between two different non-invasive technologies. In fact, there is a widespread agreement on the fact that these infrastructures produce about 23% of the total anthropogenic methane released to the atmosphere. Despite that, there's still no internationally accepted protocol to quantify the leakage of biogas from a landfill with a common standard approach.

This work proposes an assessment of the performance of a landfill system in terms of biogas release to the atmosphere. Such evaluation is performed by means of a direct measurement of gas flux with the accumulation chamber method, combined with the detection of thermal anomalies by infrared radiometry.

In order to derive flux maps from a set of punctual measurements and calculate an overall quantity of emitted gas, a geostatistical technique is necessarily applied and briefly illustrated.

A case study regarding an infrastructure located in Tuscany (Italy) is shown, where a discussion about the evolution of the landfill site through successive campaigns is also suggested. The role played by infrared thermography and its synergy with direct flux measurements is clearly perceivable in this context.

The main benefit of the presented approach is a significant increase of the energy recovered from the landfill sites by optimising the collection of biogas, which implies a reduction of the total anthropogenic methane originated from the disposal of wastes released to the atmosphere.