



Electrical methods for monitoring a site potentially contaminated by landfill leachate

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Electrical current methods are widely used in many different environmental applications. These methods are minimally-invasive and allow the collection of a large amount of data to obtain information about large areas with a good resolution. Therefore electrical methods are particularly used for monitoring sites that are potentially contaminated by highly conductive aqueous solutions, such as old landfills and their leachate. Moreover, application of electrical resistivity methods to the characterization of municipal waste landfills has become popular also because the electrical resistivity of waste in landfill disposal varies considerably with time because of waste decomposition and leachate formation. We present here the results of one such monitoring conducted at a test site, close to the city of Corigliano d'Otranto, in the Apulia region (Southern Italy). The site comprises an old quarry, utilized some thirty years ago for municipal waste disposal. The waste is thought to be more than 20 m thick, and the landfill bottom is (supposedly) confined with an HDPE geo-membrane. Near this site a new landfill is currently being developed and leachate has been found during the digging operations linked to the new site development. The whole area is fairly wide and a large effort has been devoted to the acquisition of geophysical data.

Surface electrical resistivity tomography (ERT) combined with a Mise a la Mass method have been conducted in the study area, in order to evaluate the thickness of the waste in the subsurface and verify whether the leachate is confined by the HDPE membrane within the landfill. The results show that electrical methods have been used successfully, allowing us to identify the ineffectiveness of the HDPE geo-membrane at confining the leachate at the bottom of the landfill. This was inferred from the electrical current that passes through the cloth and from the low resistivity anomaly, associated with the leachate, that has been found at depth as large as 40 m below the surface of the landfill, i.e. at a depth much larger than the expected 20 m thickness of landfill waste.