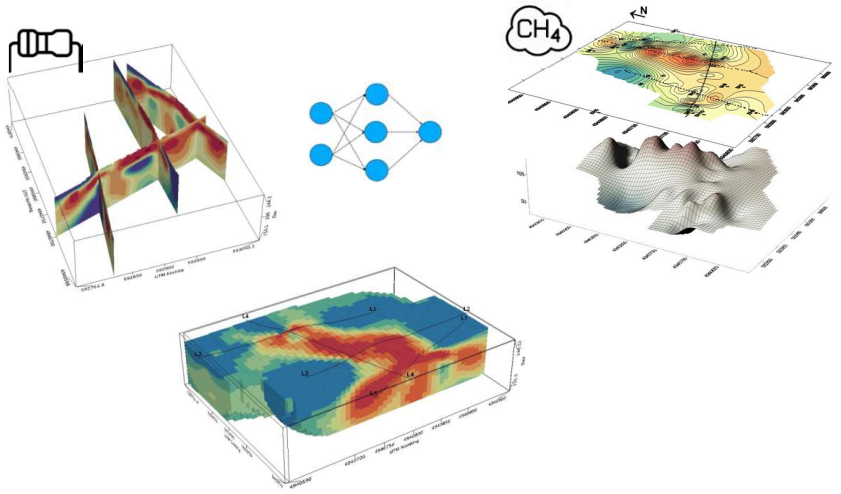
NUMERICAL MODELING OF FLUIDS MIGRATION IN A SANITARY LANDFILL, BY COMBINING GEOPHYSICAL AND GAS EMISSION DATA

We have developed a non-invasive, low-cost, and time-effective methodology to characterize and monitor contaminated sites as sources of groundwater pollution.

The methodology combines a geoelectrical study with measurements of surface methane emissions in sites where organic matter degradation is involved. The 2D, 3D, and 4D (time-lapse) tomographic images that could be obtained from either ground-based direct current or UAV-based electromagnetic surveys, show contrasts of conductivity used to monitor the transport and accumulation of contaminants in groundwater.

Besides, we determined the possible coupling between methane emissions and leachate's geoelectrical proxies in landfills via optimization and statistical tools. This numerical approach, applied to a site in southern Ontario, has given rise to a statistically significant inference that describes the causal relationship between the combined effects of the multiple leachate parameters in the waste stabilization zone and methane concentrations in the biogas.

Although the application of this methodology does not preclude the need for direct borehole probing in a contaminated site, it provides essential information to optimize the number and location of the exploratory wells to be drilled. Besides, it assists in decision-making about the most appropriate prevention, mitigation, or remediation actions to be taken.



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