

Testing Landfill Coverture Leaks Using Surface Geochemical Techniques San Justo, Entre, Argentina*

P. Kokot^{1,2}, H. A. Oстера^{1,2}, and G. Garbán¹

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¹DTP Laboratorios S.R.L., Buenos Aires, Argentina (pkokot@dtplaboratorios.com)

²Universidad de Buenos Aires, Buenos Aires, Argentina

Abstract

Landfill emissions constitute one of the main anthropogenic contributors to greenhouse gases (ATDSR, 2001). In Argentina, the main landfills are located near the most populated cities. However, small cities and communities have also the problem of waste disposal. A study of a four year closed landfill belonging to a small town (population: 2000) located 350 km north from Buenos Aires was conducted using geochemical and geophysical techniques in order to test methane leaks and effectiveness of the seal, due to the concerns of local residents. Although soil gas probe data revealed the presence of gas anomalies for methane, T-VOCs, and carbon dioxide associated with landfill cells, there is no evidence of harmful methane emissions at the surface, revealing that the clay seal is working properly. No anomalous values for radon were found. This suggests that the use of combined non-invasive geophysical and geochemical techniques constitutes a valuable tool in order to evaluate risks and evolution of landfills.

References Cited

ATDSR, 2001, Landfill Gas Primer - An Overview For Environmental Health Professionals: Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), Division Of Health Assessment And Consultation, Atlanta, GA.

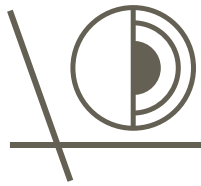
EPA, 1997, Emission Factor Documentation For Ap-42 Section 2.4 Municipal Solid Waste Landfills: EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, 125 p.



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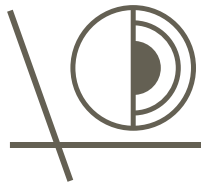


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Outline

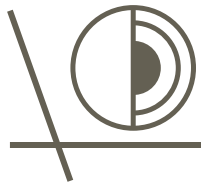
- Introduction
- Objectives
- Geological setting
- Methodology
- Results
- Conclusions



Introduction

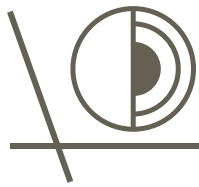
Landfill emissions constitute one of the main anthropogenic contributors to greenhouse gases. In Argentina, the main landfills are located near the most populated cities. However, small cities and communities have also the problem of waste disposal.





Introduction





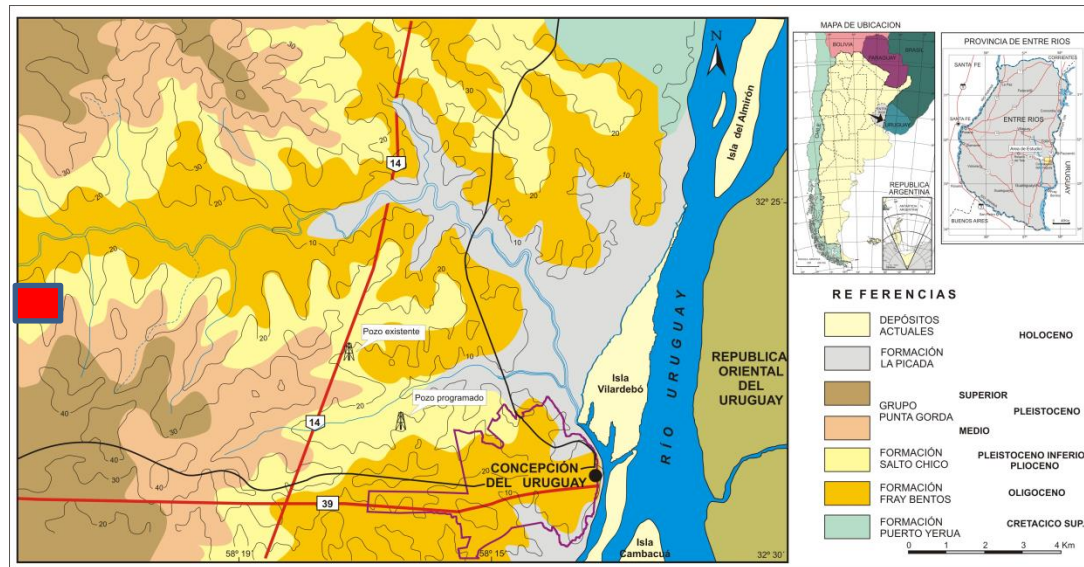
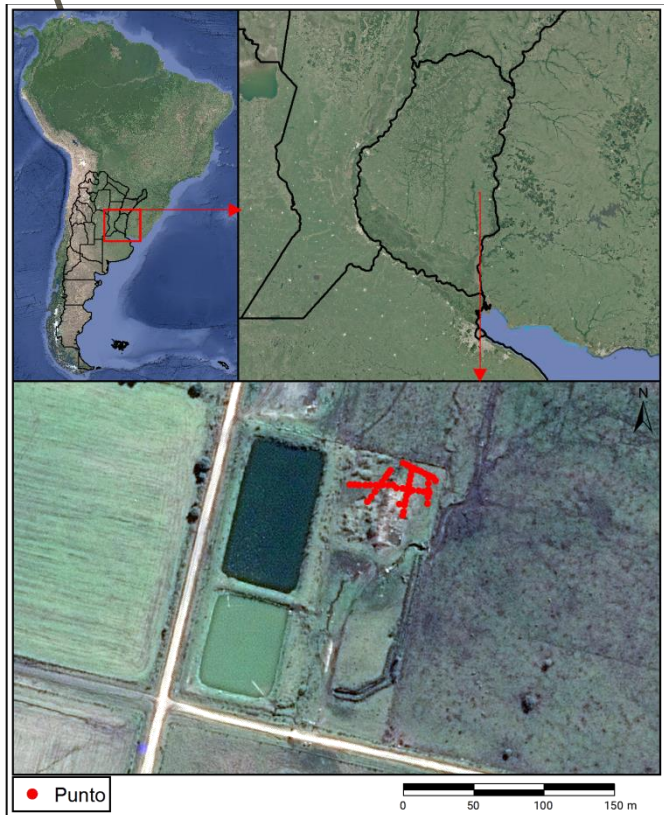
Objectives

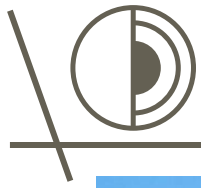
A study of a four year closed landfill belonging to a small town (population: 2000) located 350 km north from Buenos Aires City was conducted using geochemical and geophysical techniques in order to test methane leaks and effectiveness of the seal, due to the concerns of local residents.





Location and geological setting





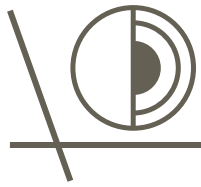
Geological setting



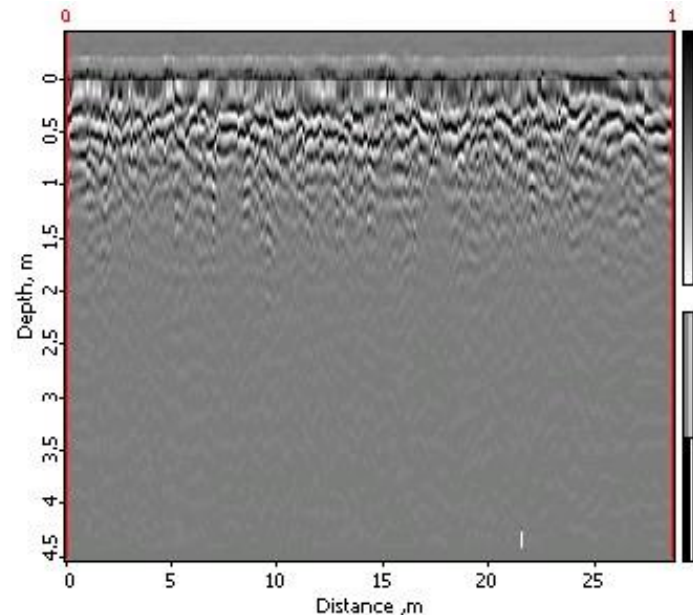


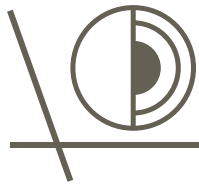
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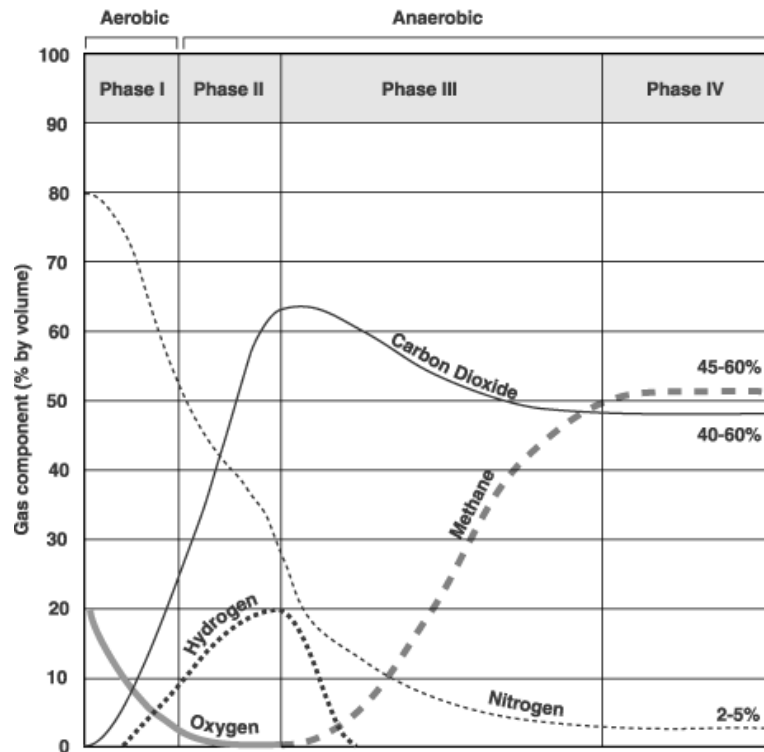


As all the landfill was covered by dense vegetation, ground penetrating radar (GPR) was used to identify the cells of the landfill. This technique has been already proven in other cases. After the location of them, a geochemical and biogeochemical survey was carried out, crossing the cells to differentiate the gas measurements from the presumed background.





Methodology



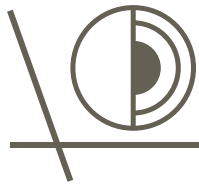
Note: Phase duration time varies with landfill conditions

Source: EPA 1997

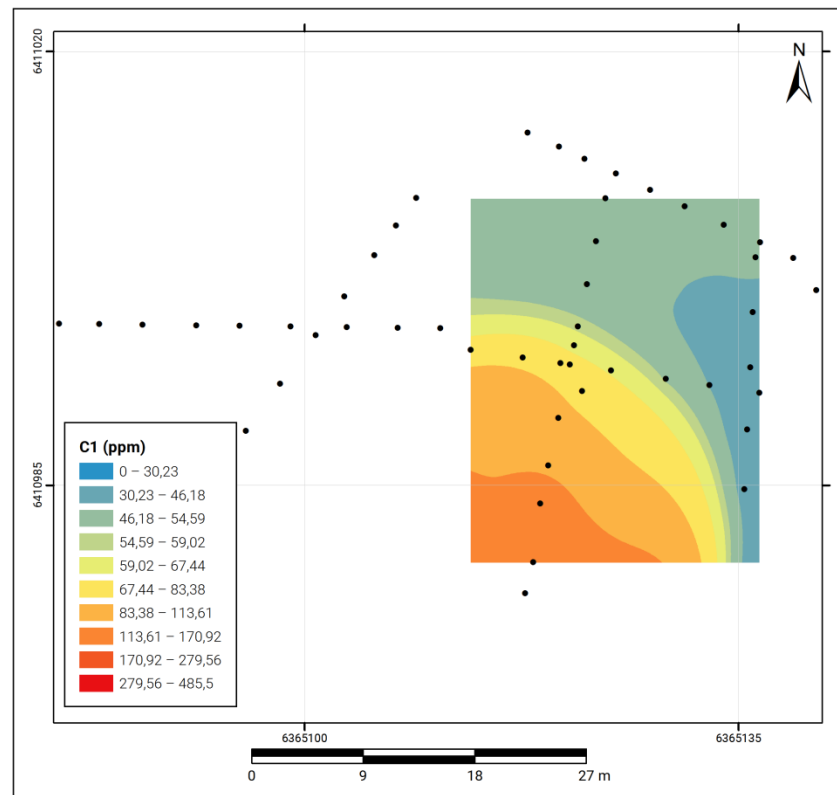
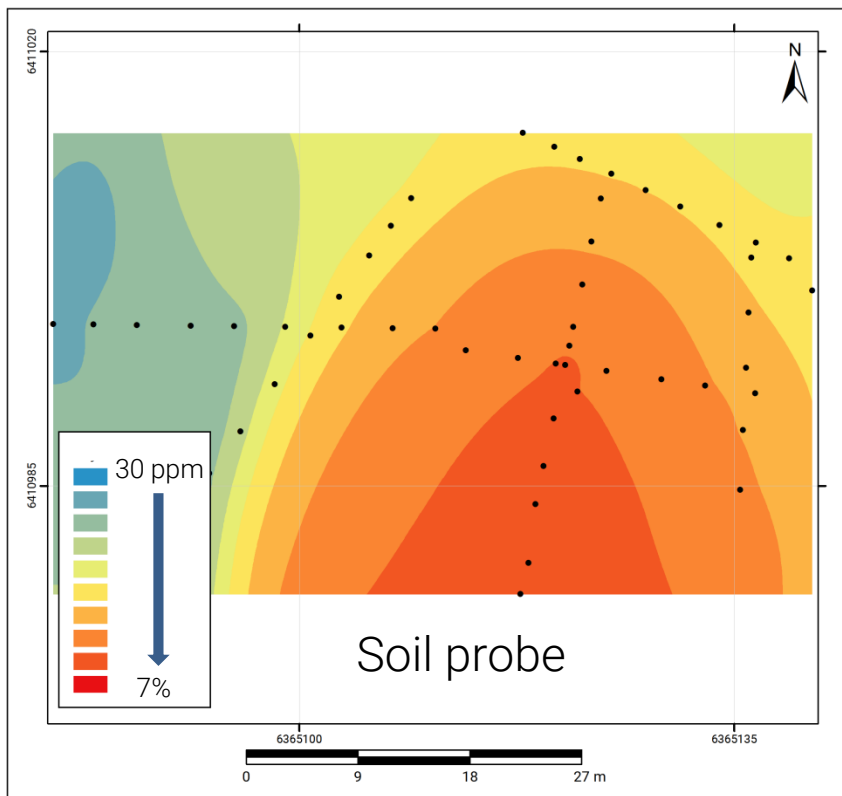


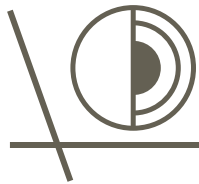
Methodology



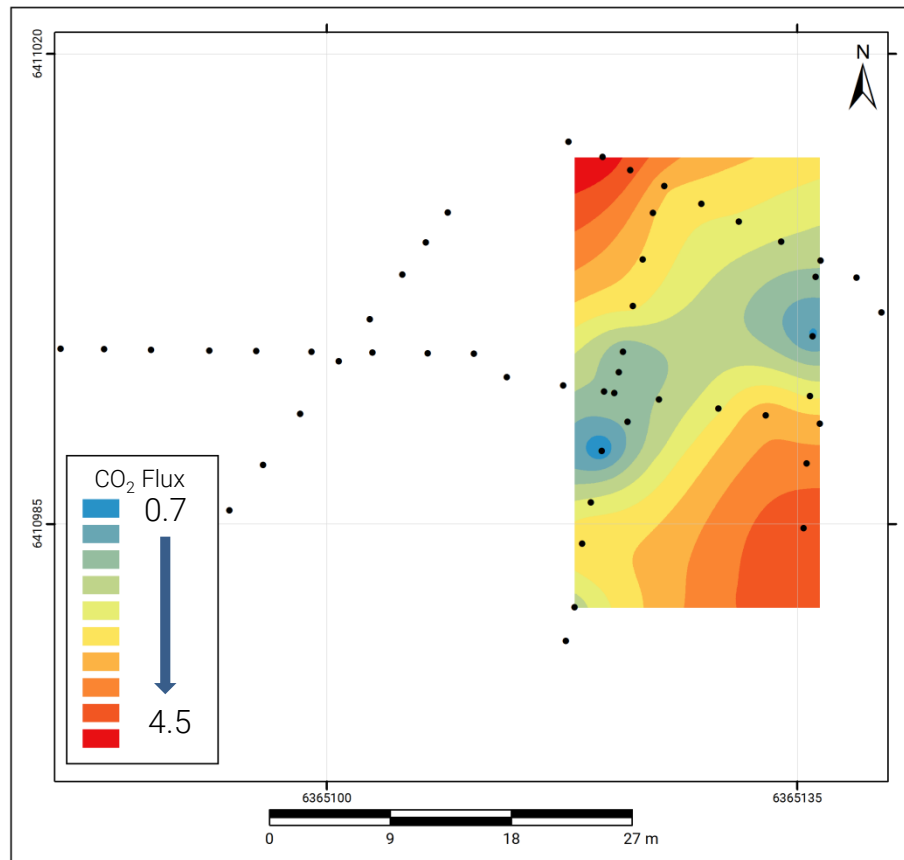


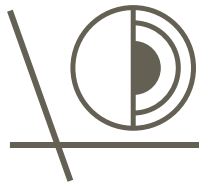
Results



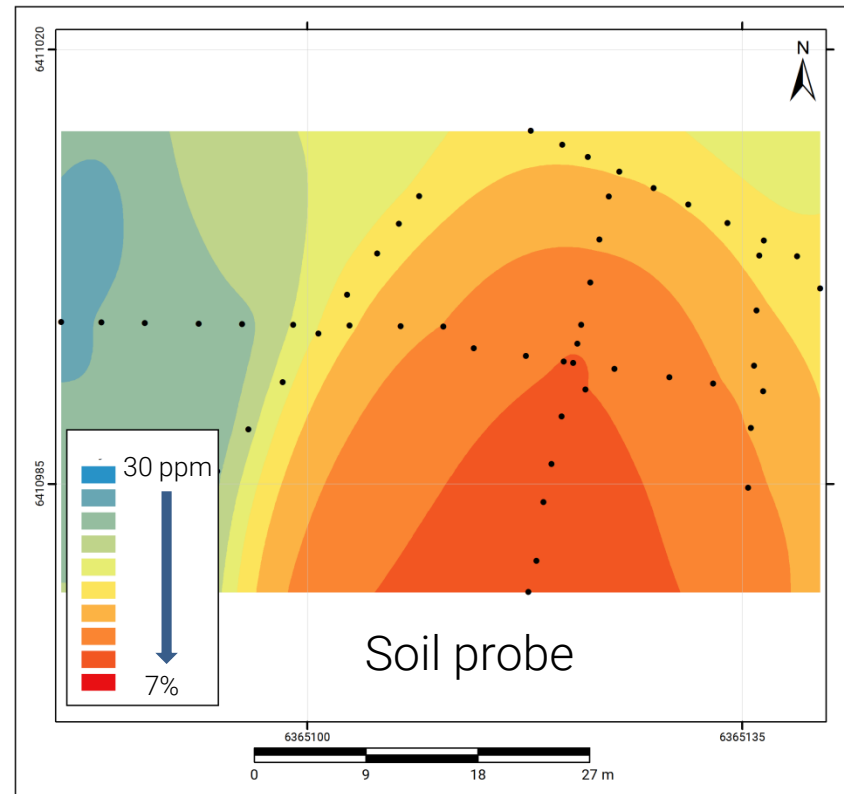
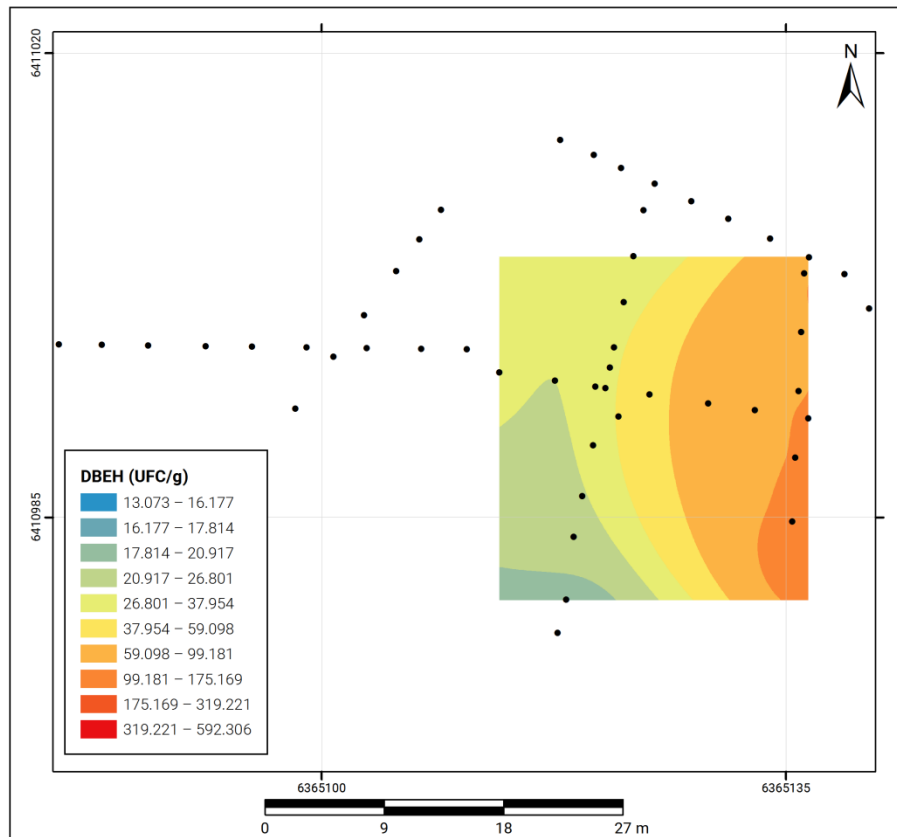


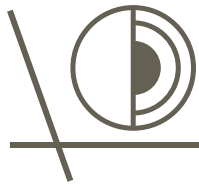
Results





Results





Conclusions

Surface geochemical techniques have been applied to test for landfill leaks in a specific case. Although soil gas probe data reveal the presence of gas anomalies for methane, T-VOCs and carbon dioxide associated with landfill cells, there is no evidence of harmful methane emissions in surface, revealing that the clay seal is working properly. However, microbiological analysis reveals that leaks can occur in the landfill borders associated with improper coerture. No anomalous values for radon were found. This suggests that the use of combined non-invasive geophysical and geochemical techniques constitutes a valuable tool in order to evaluate risks and evolution of landfills. Further research is in progress in order to determine groundwater pollution, methane sources and oxidation processes using gas isotopes.



Thanks for your attention!