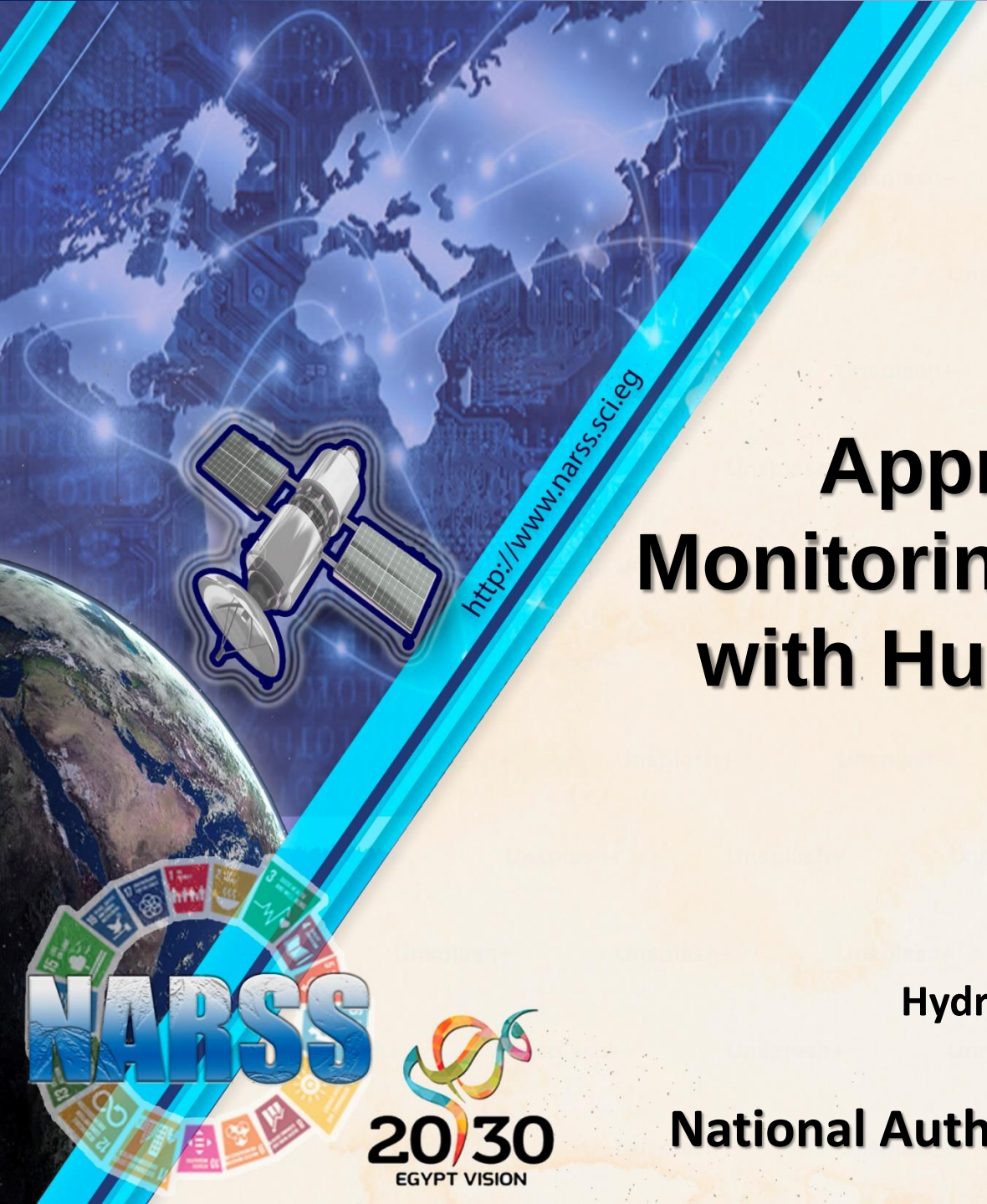


جمهورية مصر العربية
وزارة التعليم العالي والبحث العلمي
الهيئة القومية للاستشعار من البعد وعلوم الفضاء
National Authority for Remote Sensing and Space Sciences

Approaches to Detecting and Monitoring of Environmental Problems with Human Activities Development

Prof. Mohamed Attwa

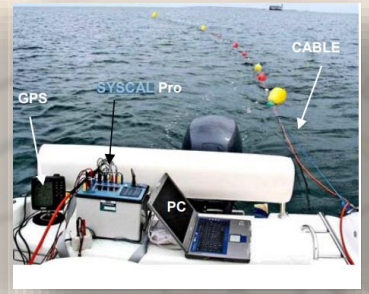
Hydrogeophysics and environmental geophysics

National Authority for Remote Sensing and Space Sciences

NARSS

20/30 EGYPT VISION

NARSS Geophysical Equipment Facilities



2 units of SYSCAL PRO (France)

GEM GSM-19 Overhauser Magnetometer (Canada

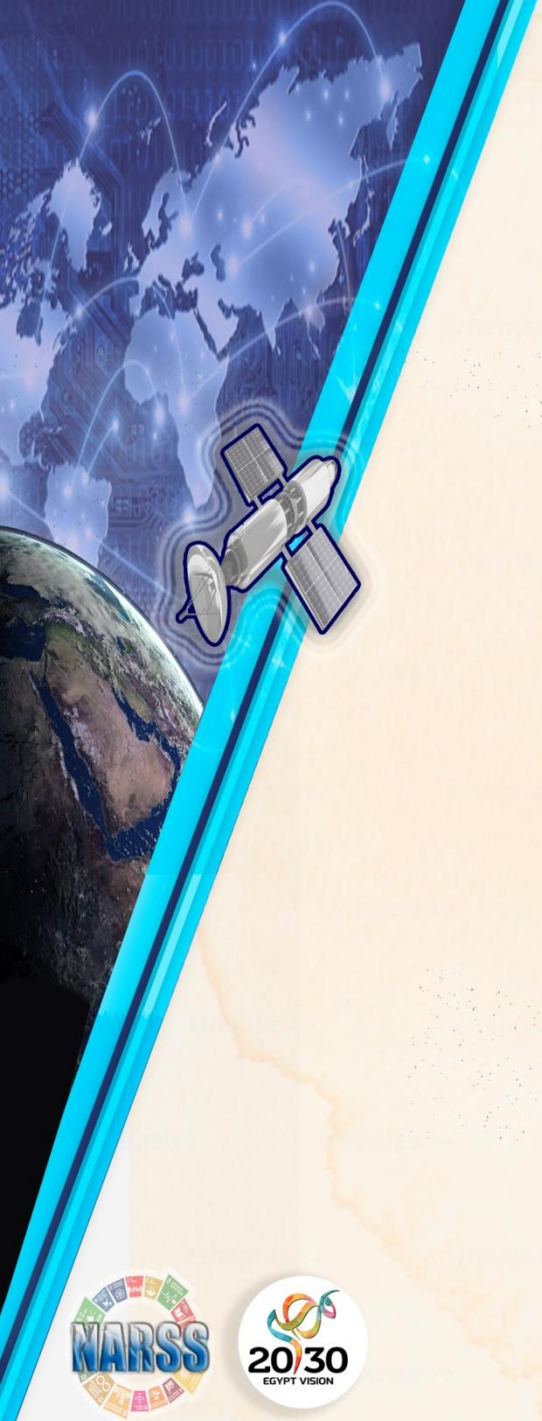
Summit X One (Seismic)-Germany

MALA System (Georadar/GPR)-Australia

Outlines

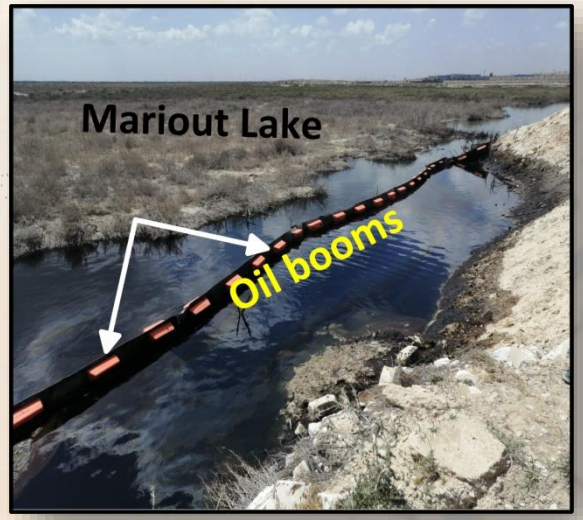
- A novel approach for oil spills mapping via Electrical Resistivity Tomography (ERT) technique.

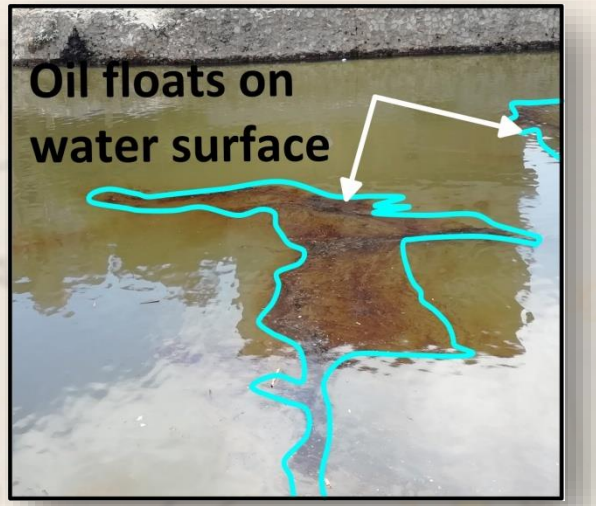
- An integrated approach for Qualitative and Quantitative Characterization of Municipal Waste in Uncontrolled Dumpsites and Landfills.

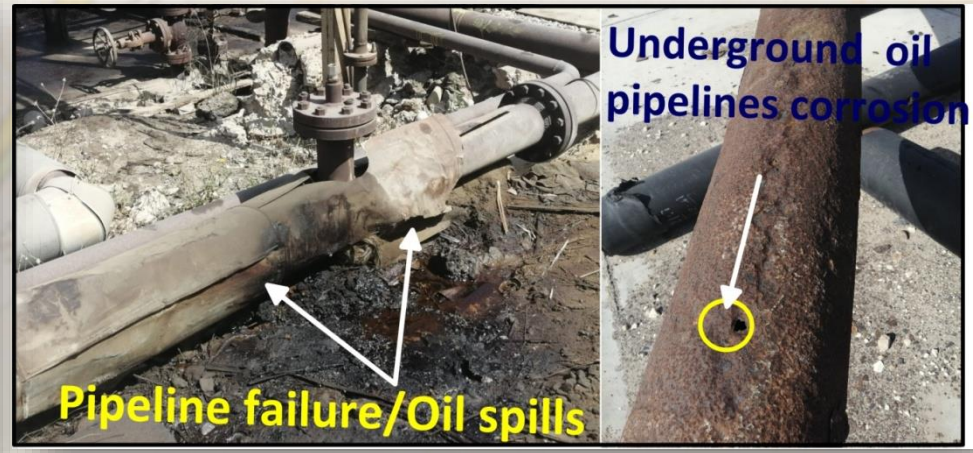


1- Oil Spills Mapping, Monitoring and Remediation

Oil Spills Problem

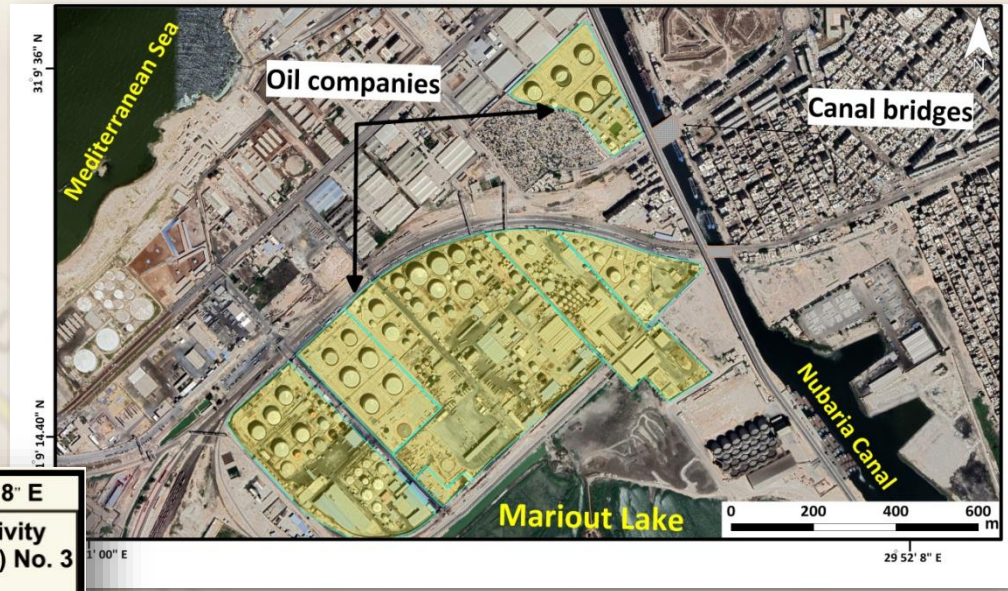




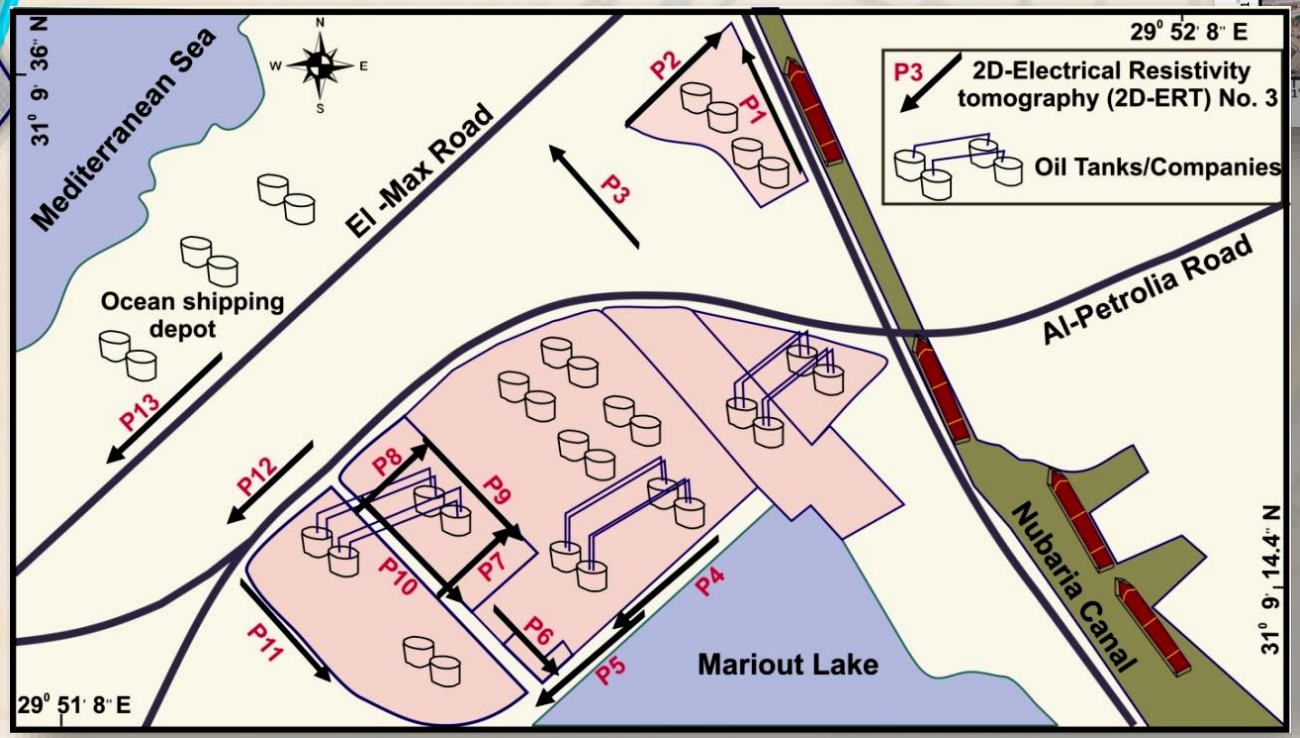


The environmental impact of oil spills on the coastal environments.

Oil Spills Problem



Google Earth image showing the area of interest and the largest petroleum companies' distributions at Alexandria city.

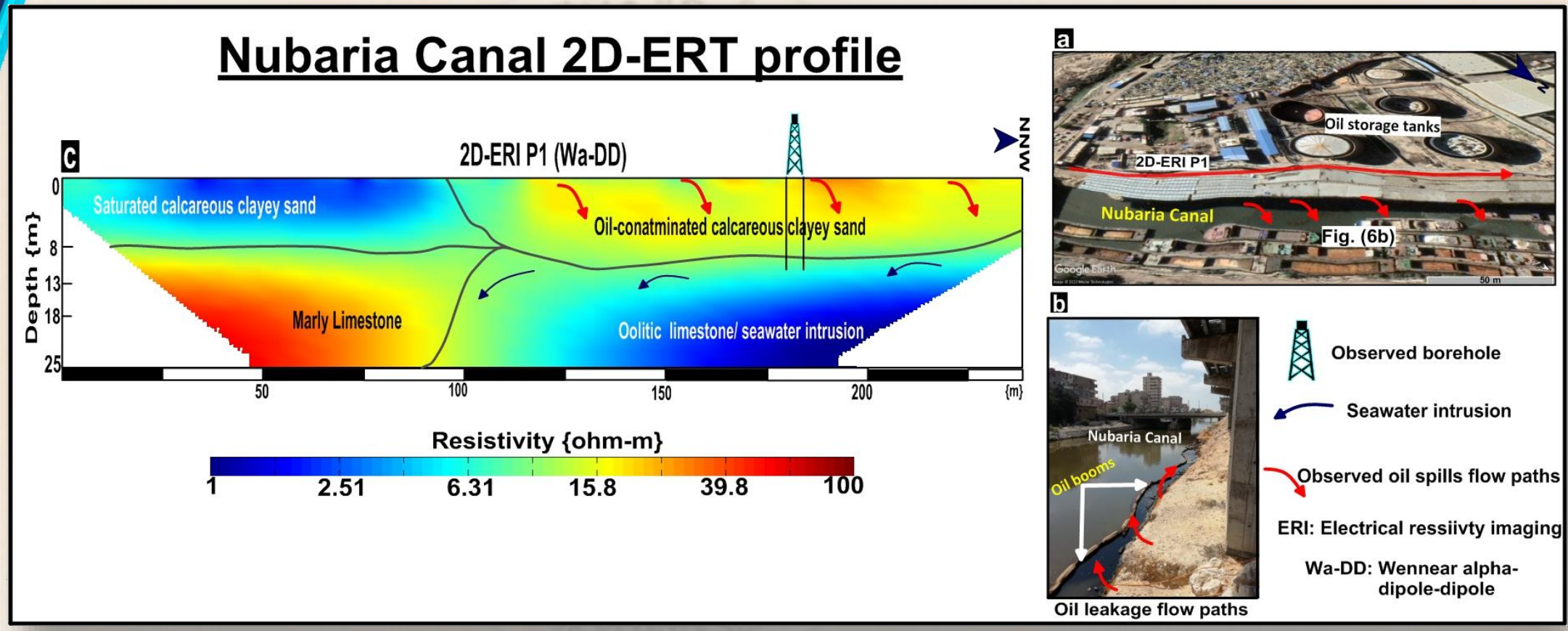


Location map showing the measured 2D-ERT profiles (black lines) locations over the entire study site.

Oil Spills Mapping

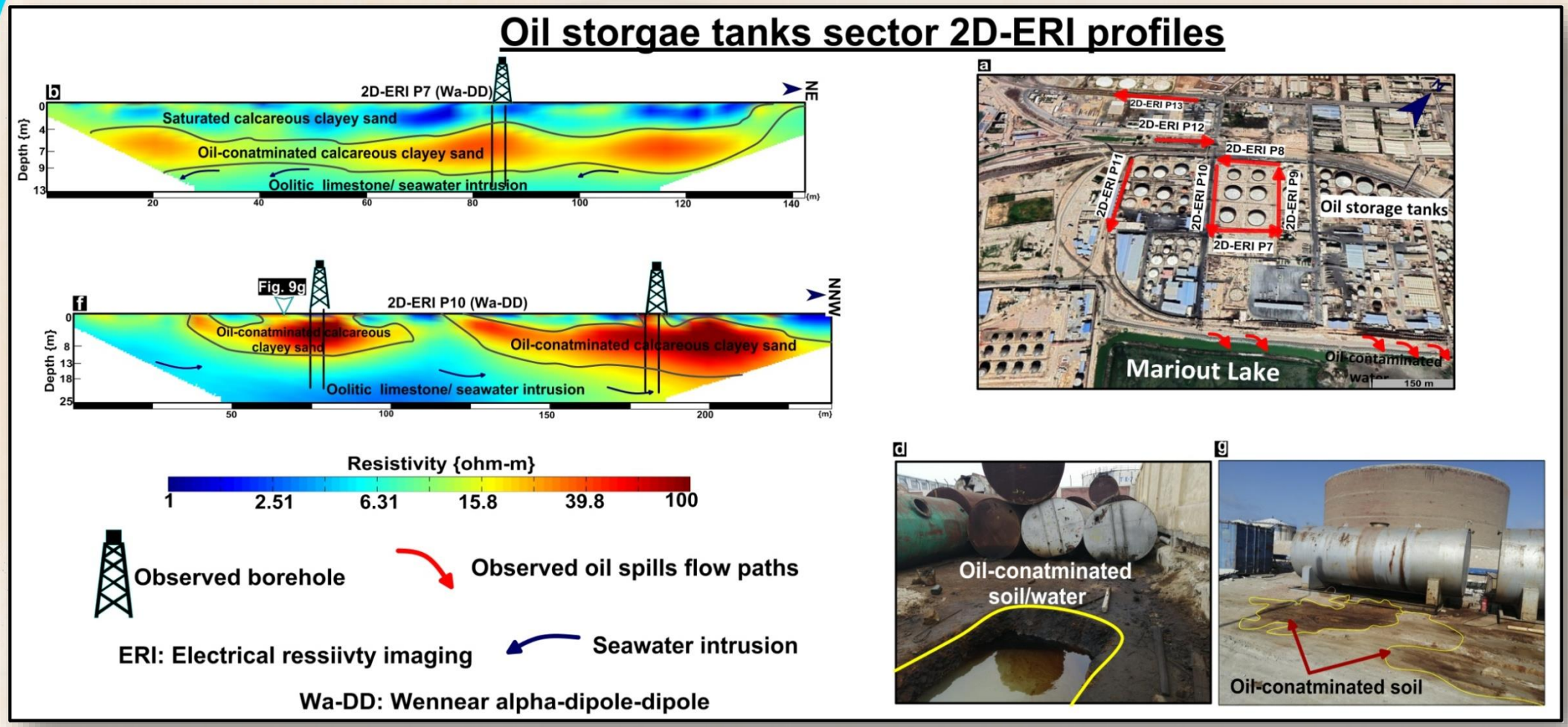
Field photos showing the geophysical measurements/data acquisition for oil spills mapping.

Oil Spills Mapping



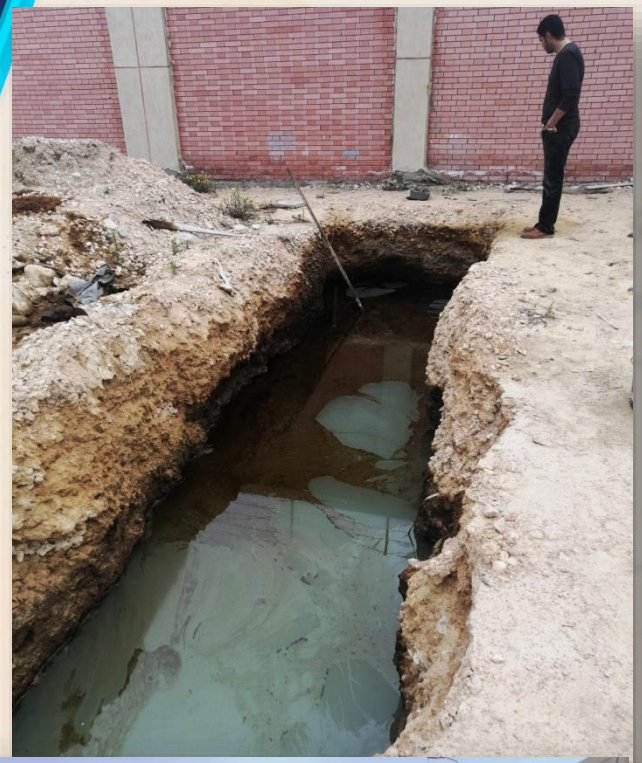
2D-ERT P1 at Nubaria Canal showing the oil-contaminated soil and oil leakage flow path towards the Nubaria Canal.

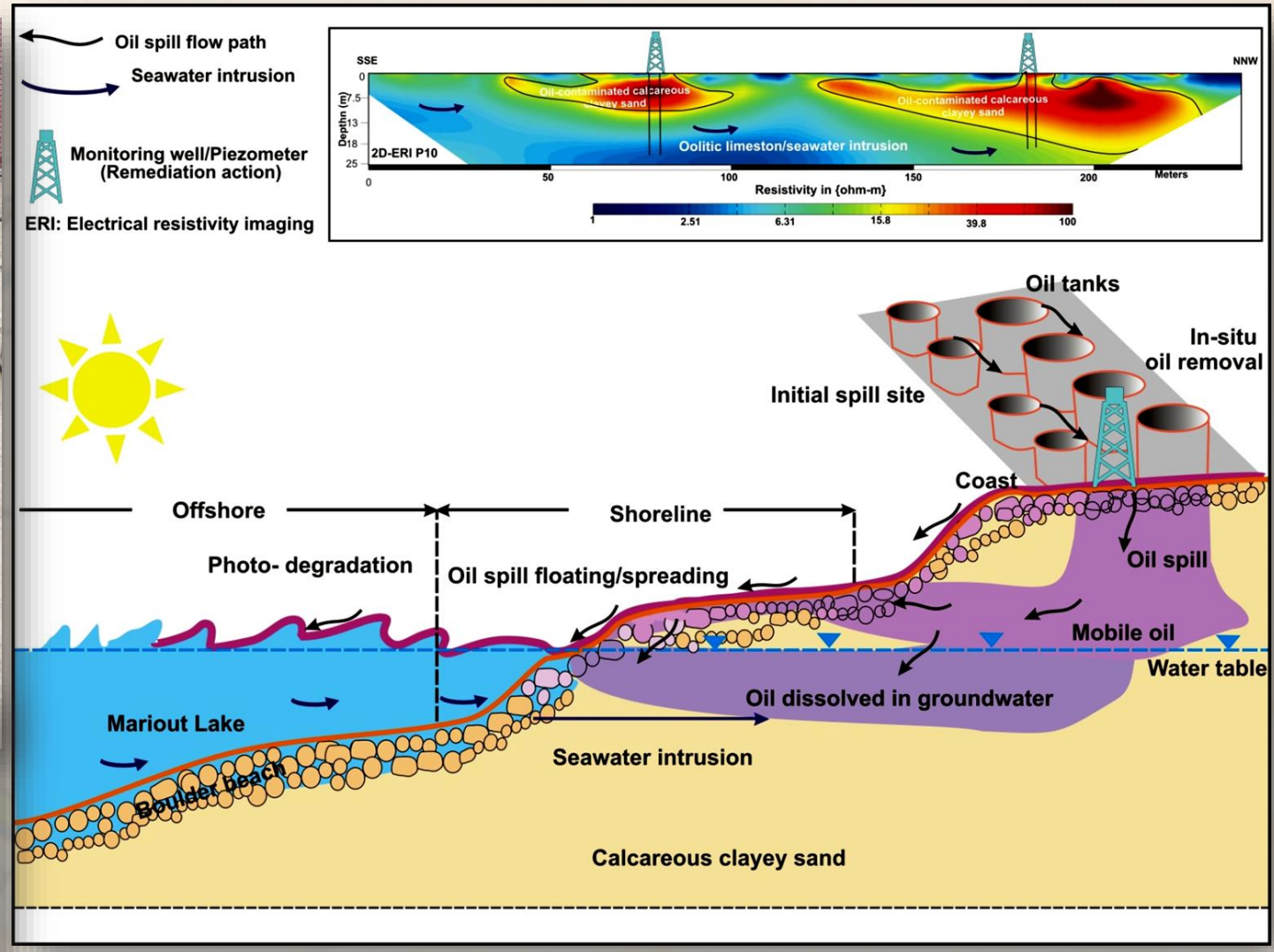
Oil Spills Mapping



2D-ERT P7 and P10 showing oil-contaminated water and soil at oil storage tanks zone within the biggest oil companies at Alexandria coast.

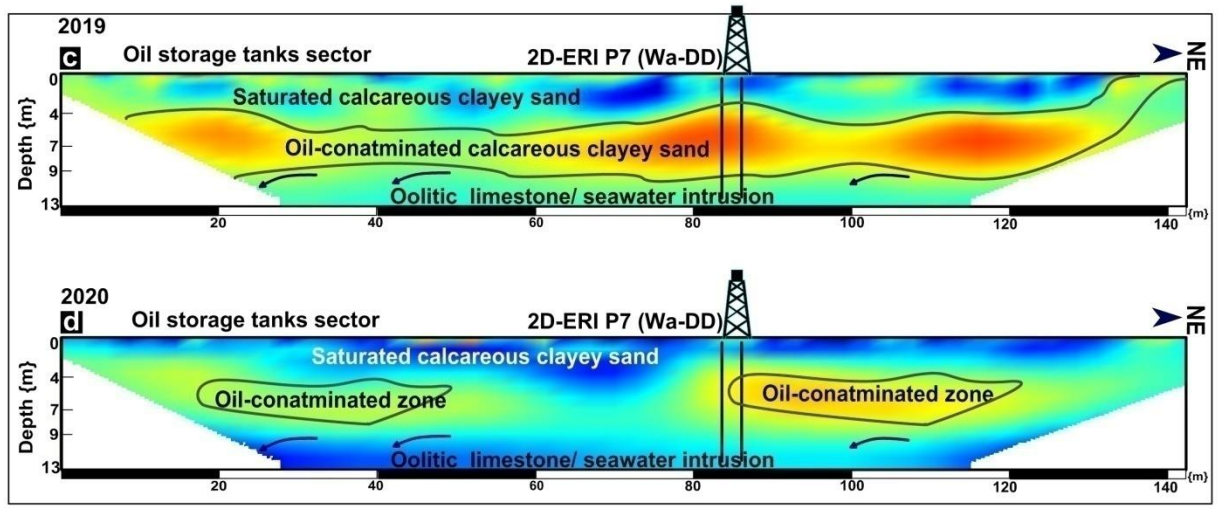
Oil Spills Understanding

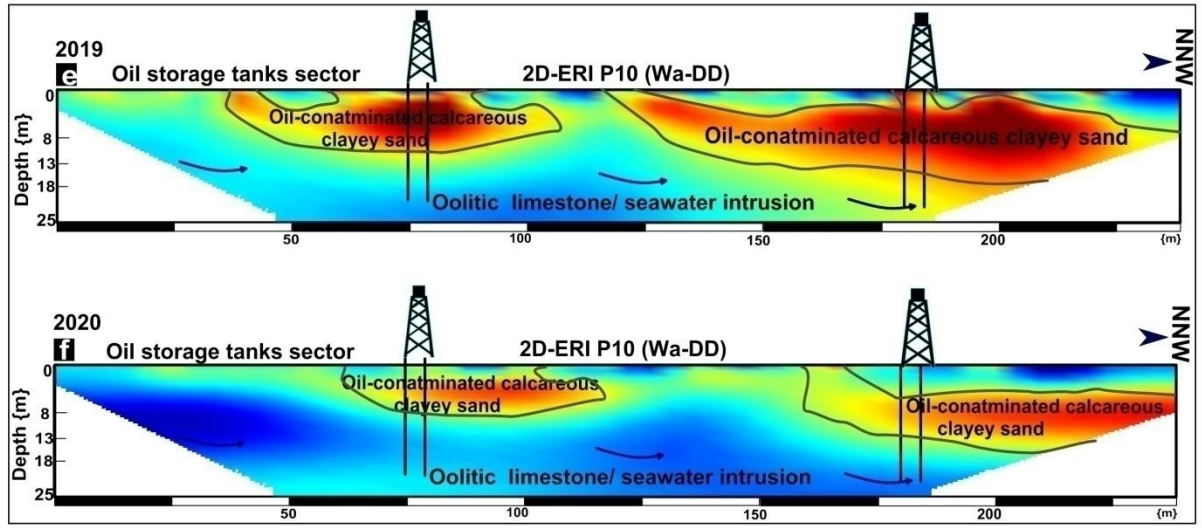


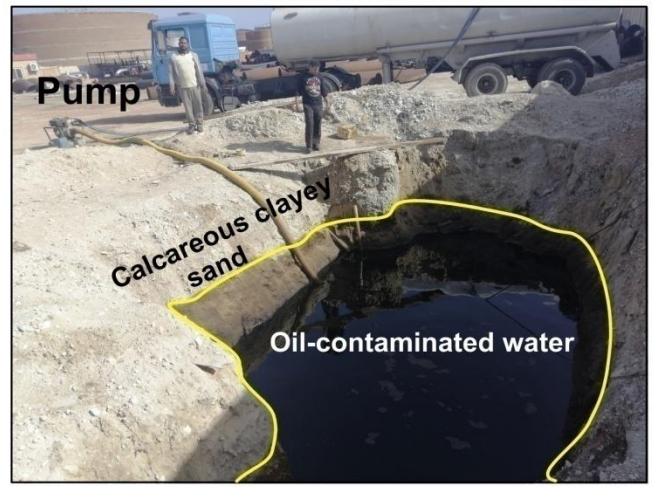


A Simulation model for a better understanding of the oil spillage representing the proposed remediation action along the coastal zone.

Oil Spills Monitoring







Piezometer/monitoring well

Observed oil spills flow paths

Seawater intrusion

ERI: Electrical ressiivty imaging

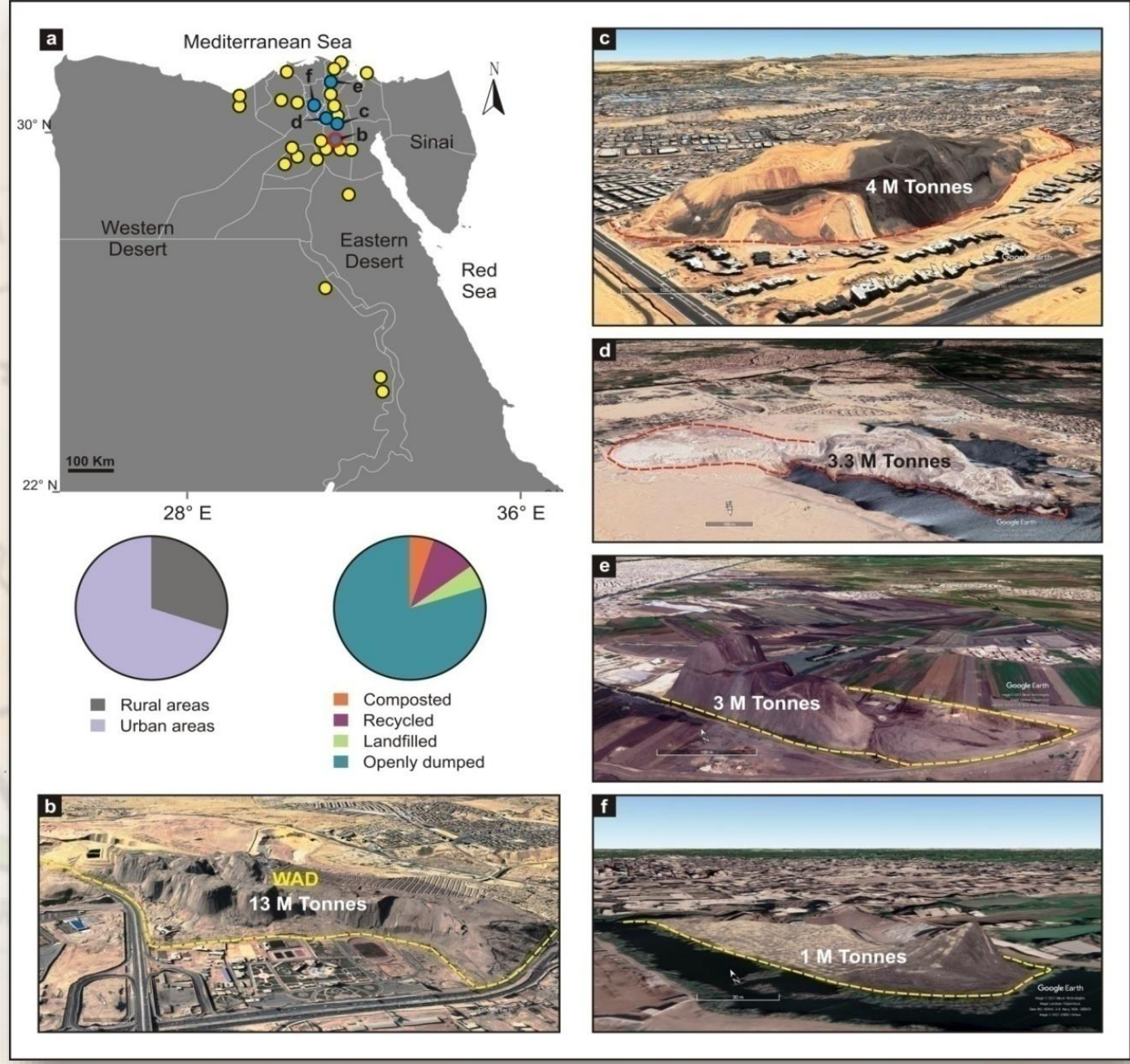
Wa-DD: Wennear alpha-dipole-dipole

2D ERT time lapse 2D-ERT measurements over two years showing the subsurface resistivity variations as a result of installing tube wells and withdrawing the oil-contaminated water.

2- Municipal Waste Mapping, Classification and Quantification in Uncontrolled Dumpsite

Municipal Waste Mapping

- ✓ **Egypt disposes about 21 million tons per year of municipal wastes (MW) into uncontrolled open dumpsites.**
- ✓ **Some of MW sites in Egypt (e.g., Sandoub, Munifiea, Abu Zabal) ; pie charts show the percentage of waste sources and its characteristics (left).**

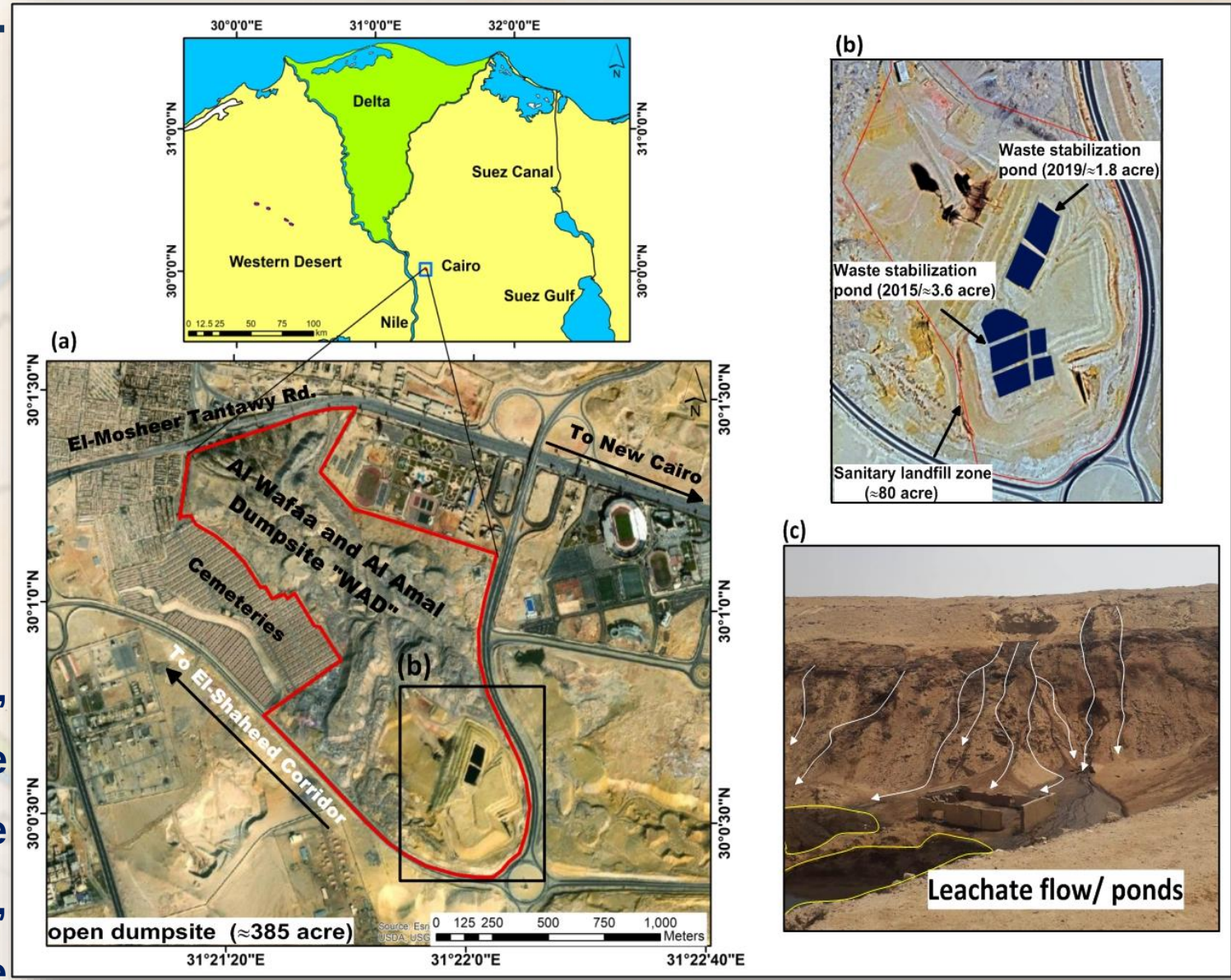


Some of the MW sites in Egypt after Waste Management Regulatory Authority classification (mostly open dumps).

Municipal Waste Mapping

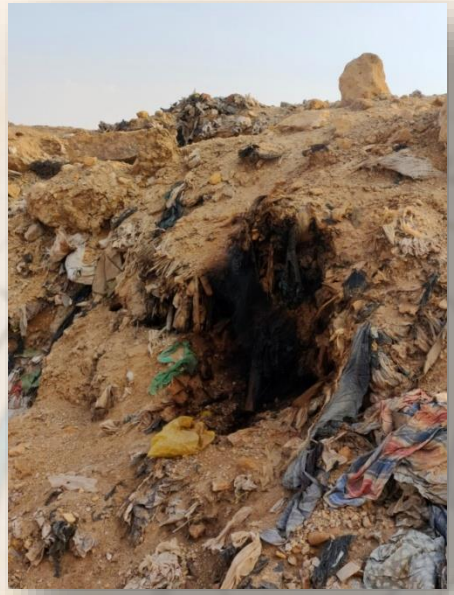
Al Wafaa and Al Amal Dumpsite "WAD"

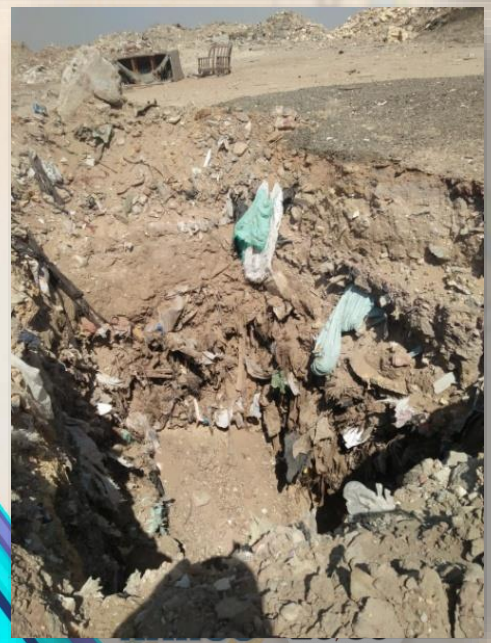
- ✓ At the WAD, landfilling started in the late 1970s as open dumping in a sandy desert.
- ✓ In June 2002, a sanitary landfill was established covering an area of about 80 acres.
- ✓ With urban expansion, the works in the sanitary landfill were suspended in 2019, leaving waste stabilization ponds.



Location map of the study dumpsite (i.e.,WAD) and (b) the sanitary landfill zone showing (c) field photo showing the negative environmental impact of the open dumps in the form of leachate and surface ponds.

Municipal Waste Mapping

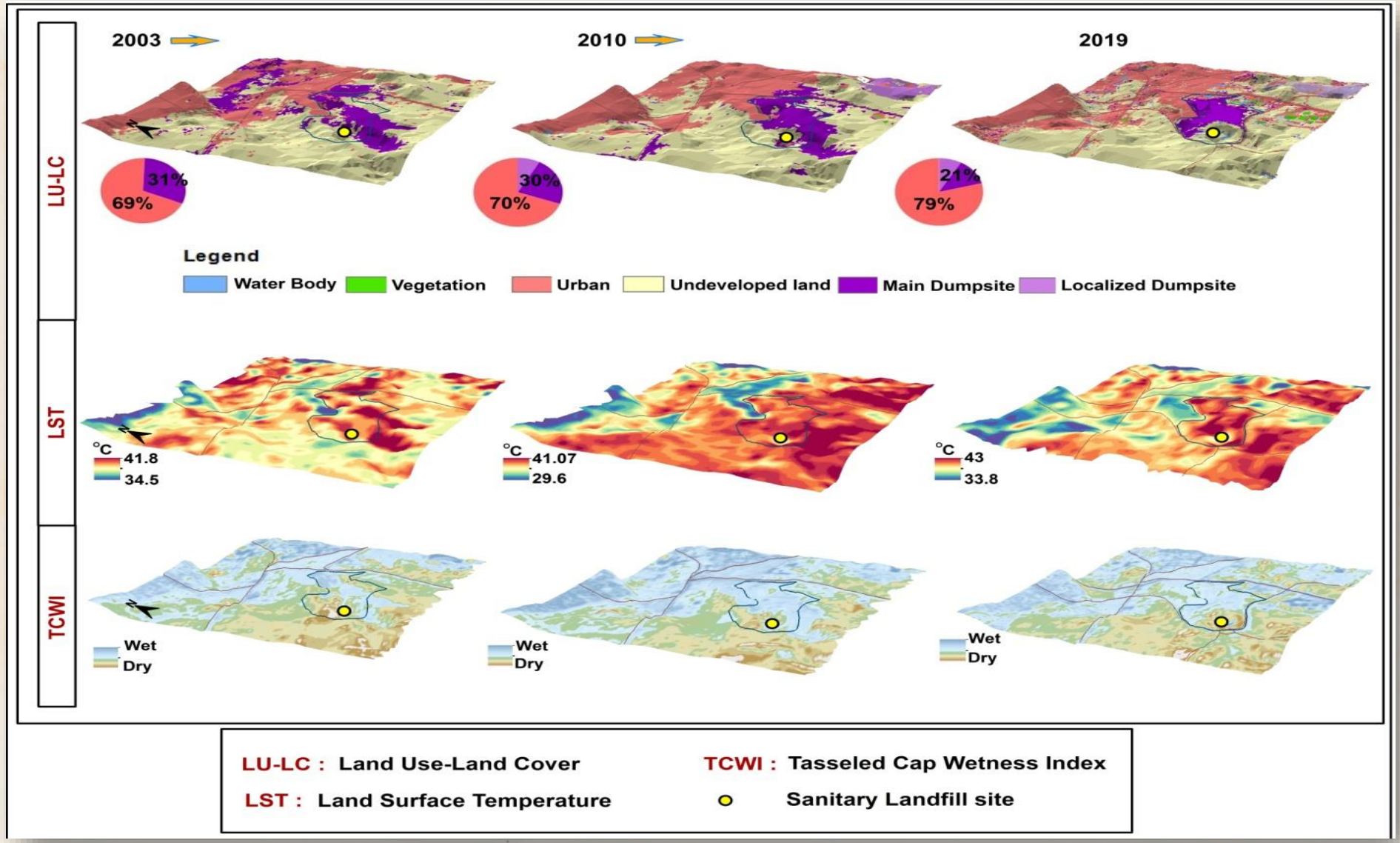




Field photos from WAD.

Municipal Waste Mapping

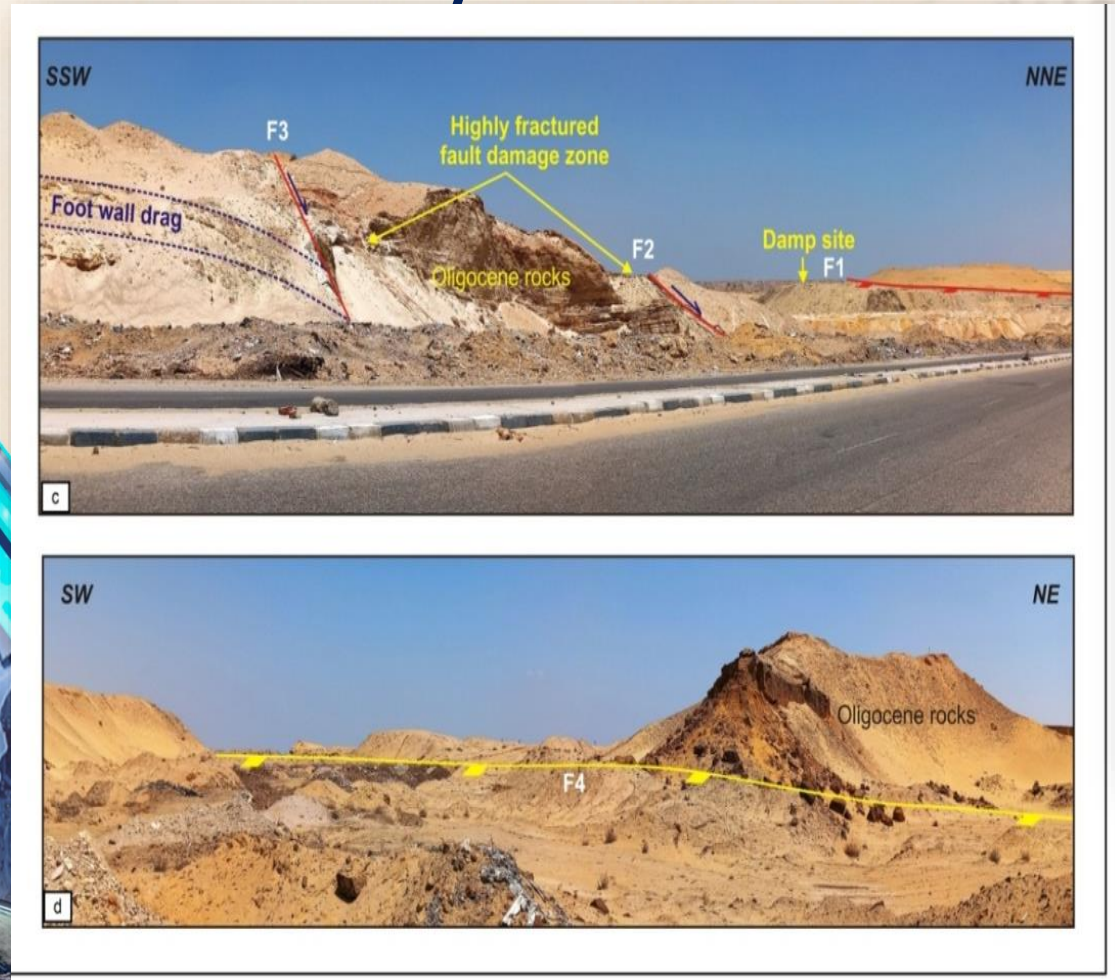
Remote Sensing Data

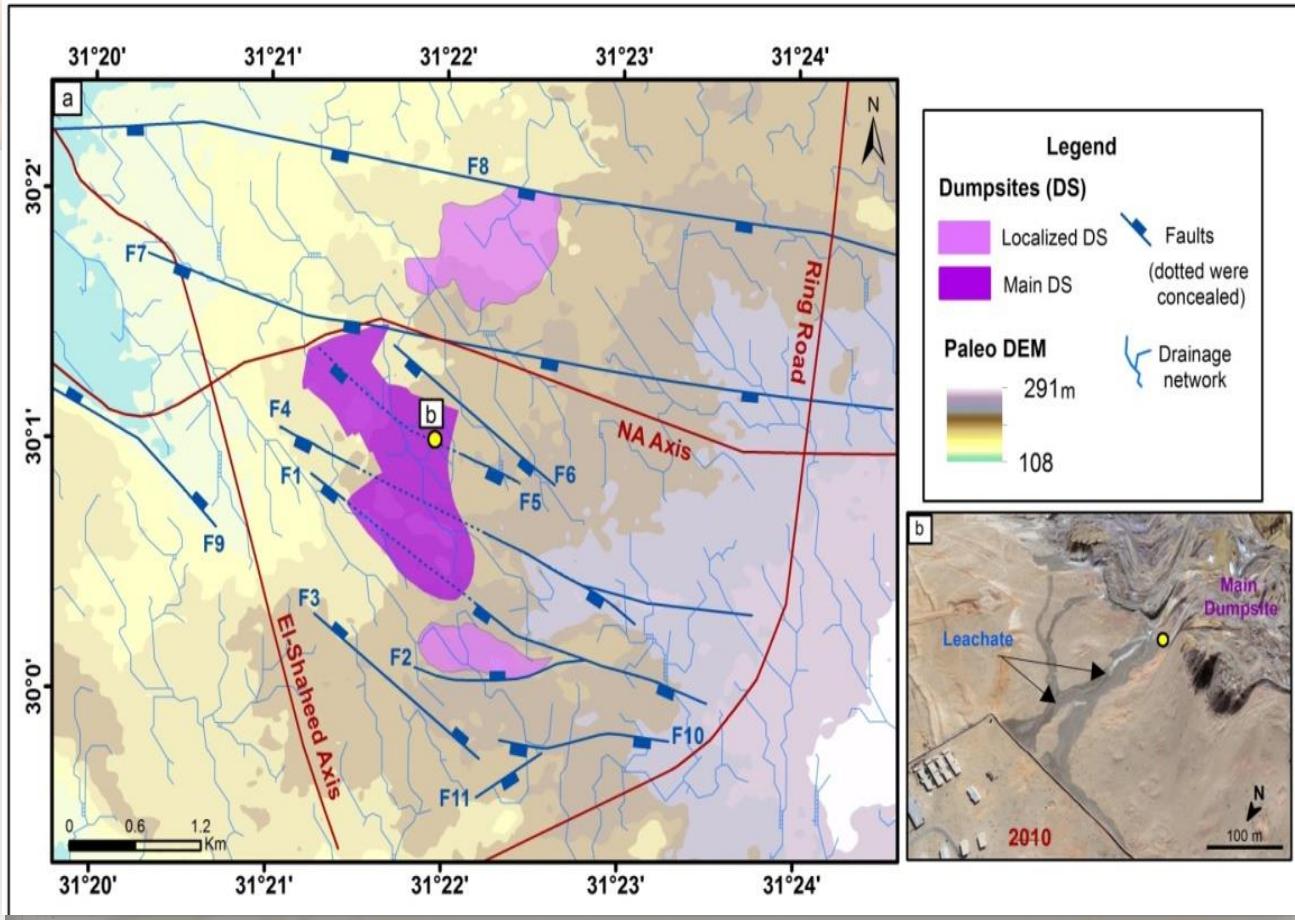


The relation between the population growth accompanied by waste accumulation growth which in return raise the temperature as well as increasing water leakage problems.

Municipal Waste Mapping

Surface Geological Data of Undocumented Dumpsite



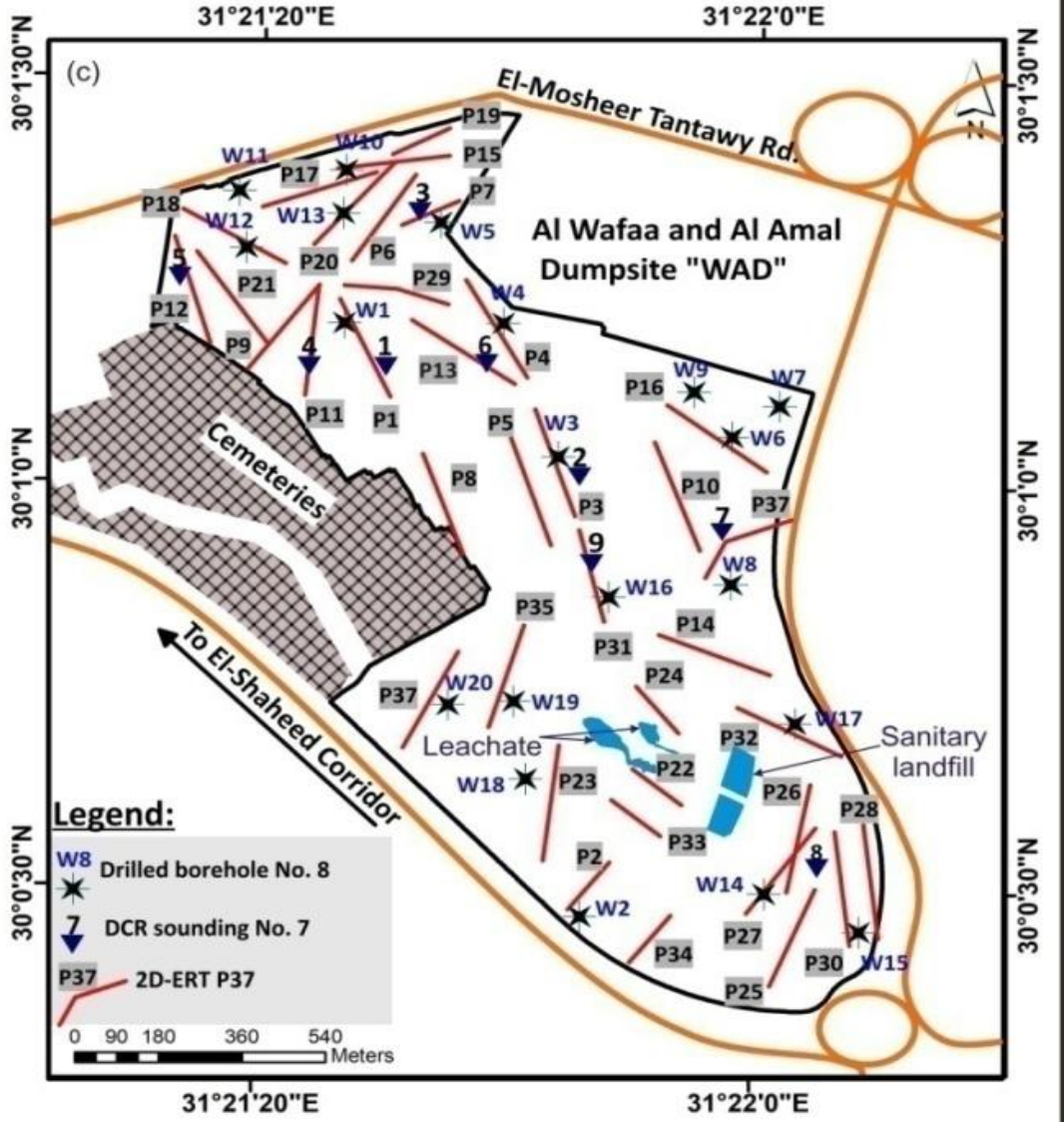


The effect of faulting on shaping the paleotopography of the area which controls the quantities of wastes along the downthrows of faults.

Municipal Waste Mapping

(a) Geophysical field measurements at the uncontrolled dumpsite

(b) Geophysical field measurements around the inactive sanitary landfill.



The challenges to accomplish the geophysical data at the open uncontrolled dumpsite. (c) Positions of the DCR soundings and 2D-ERT profiles with the drilled boreholes in the WAD.

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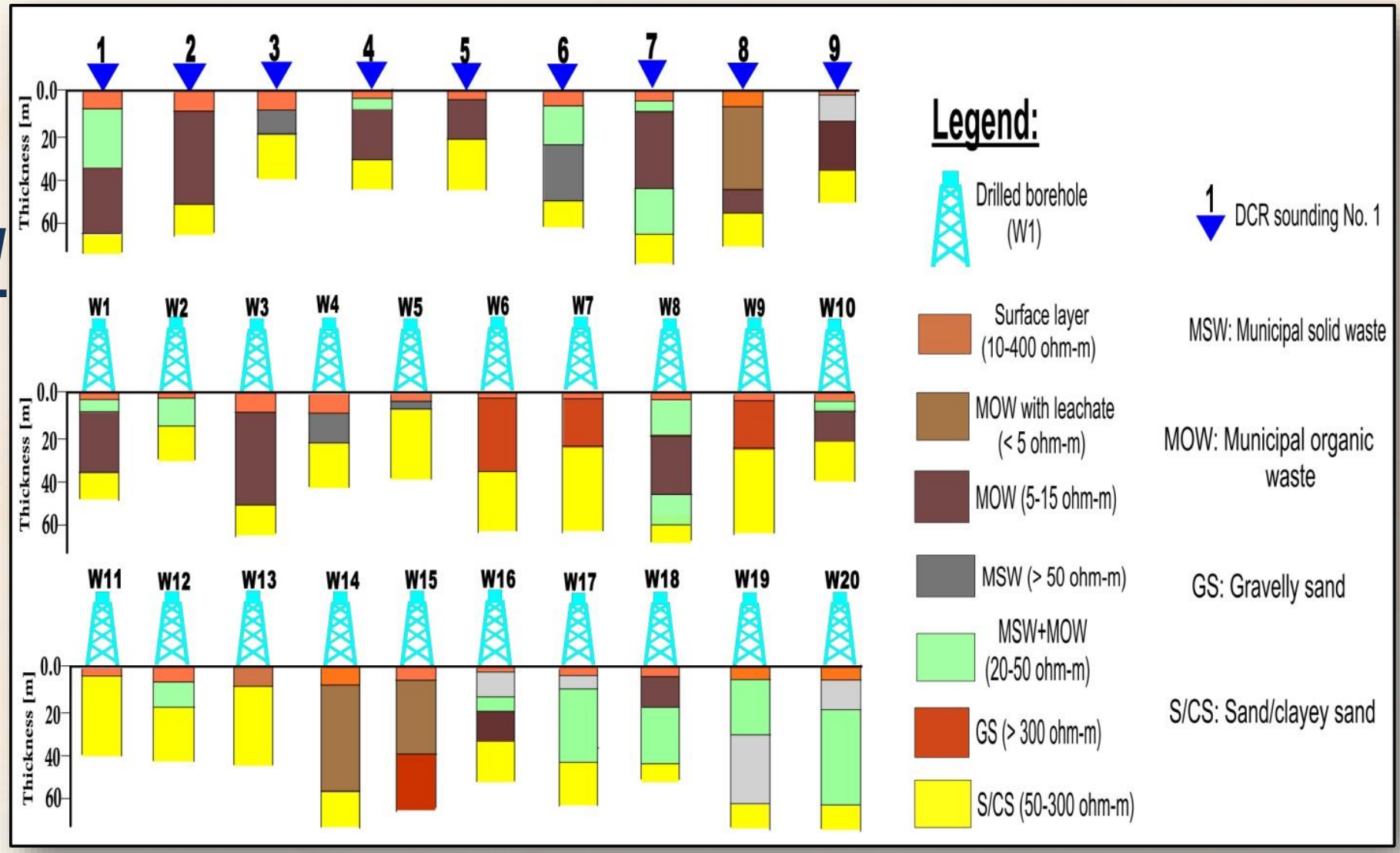
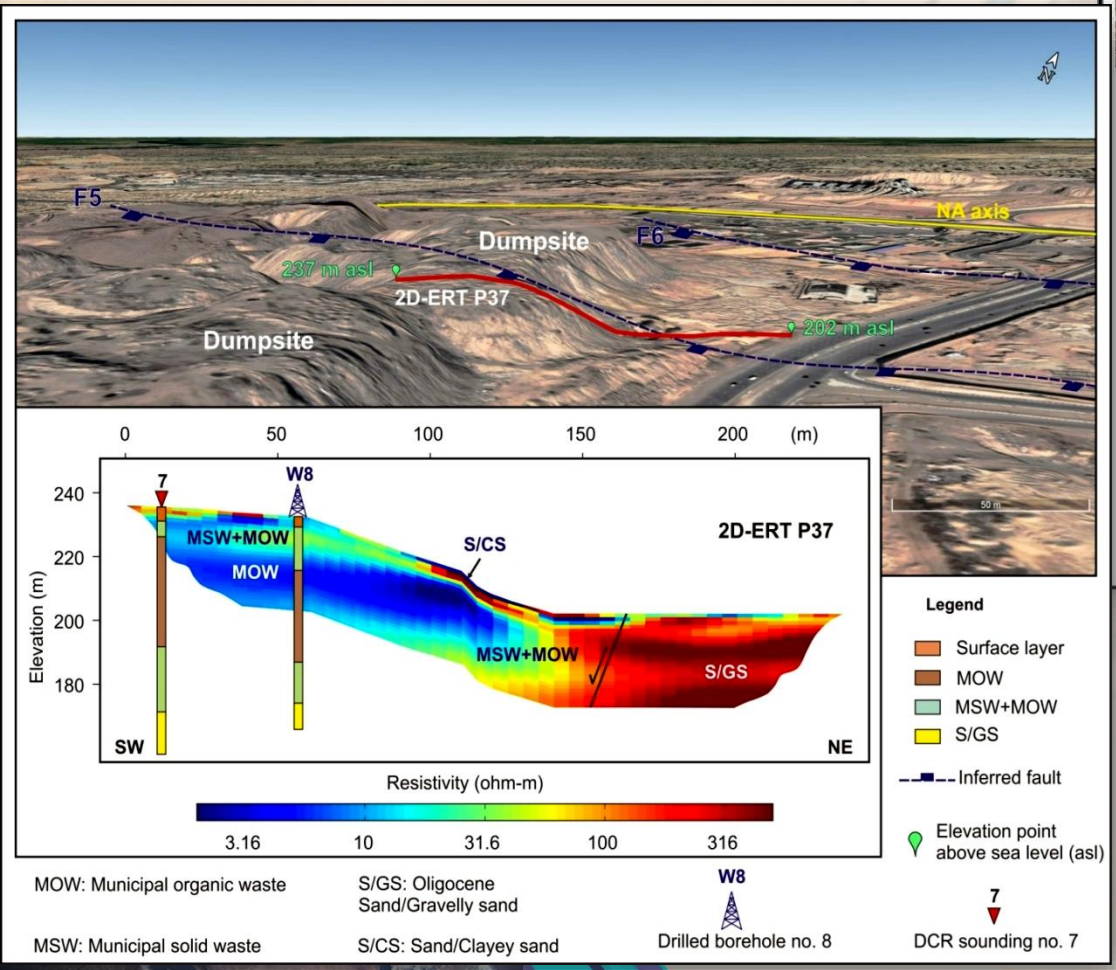
Municipal Waste Mapping/ Classification

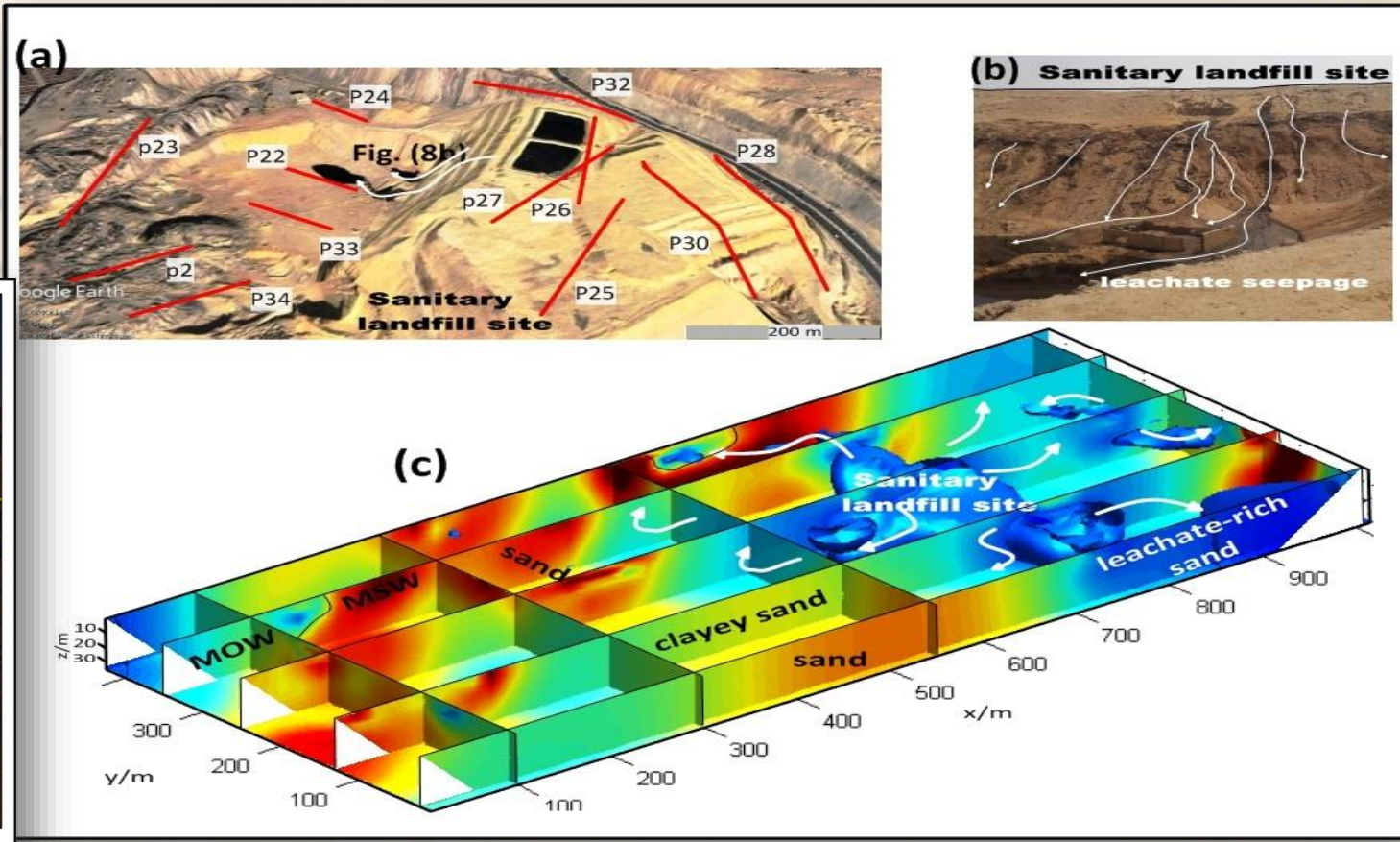


Interpretation of DCR soundings and drilled borehole data to characterize the subsurface municipal waste (solid and organic) distribution at the study area.

Municipal Waste Mapping/ Classification

2D-ERT profile representing the MW distributions considering the observed surface structures.



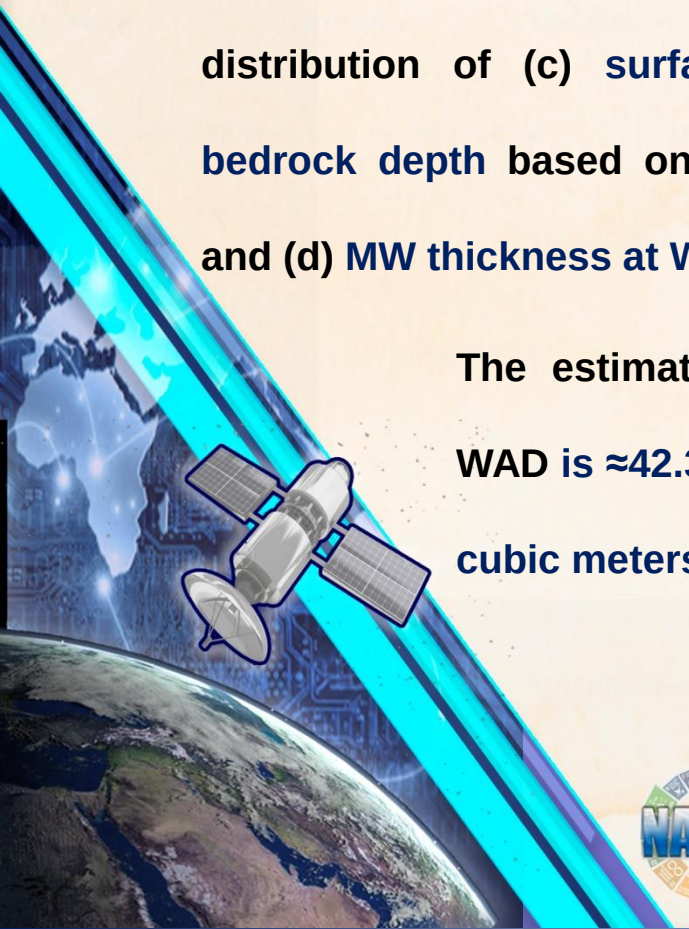


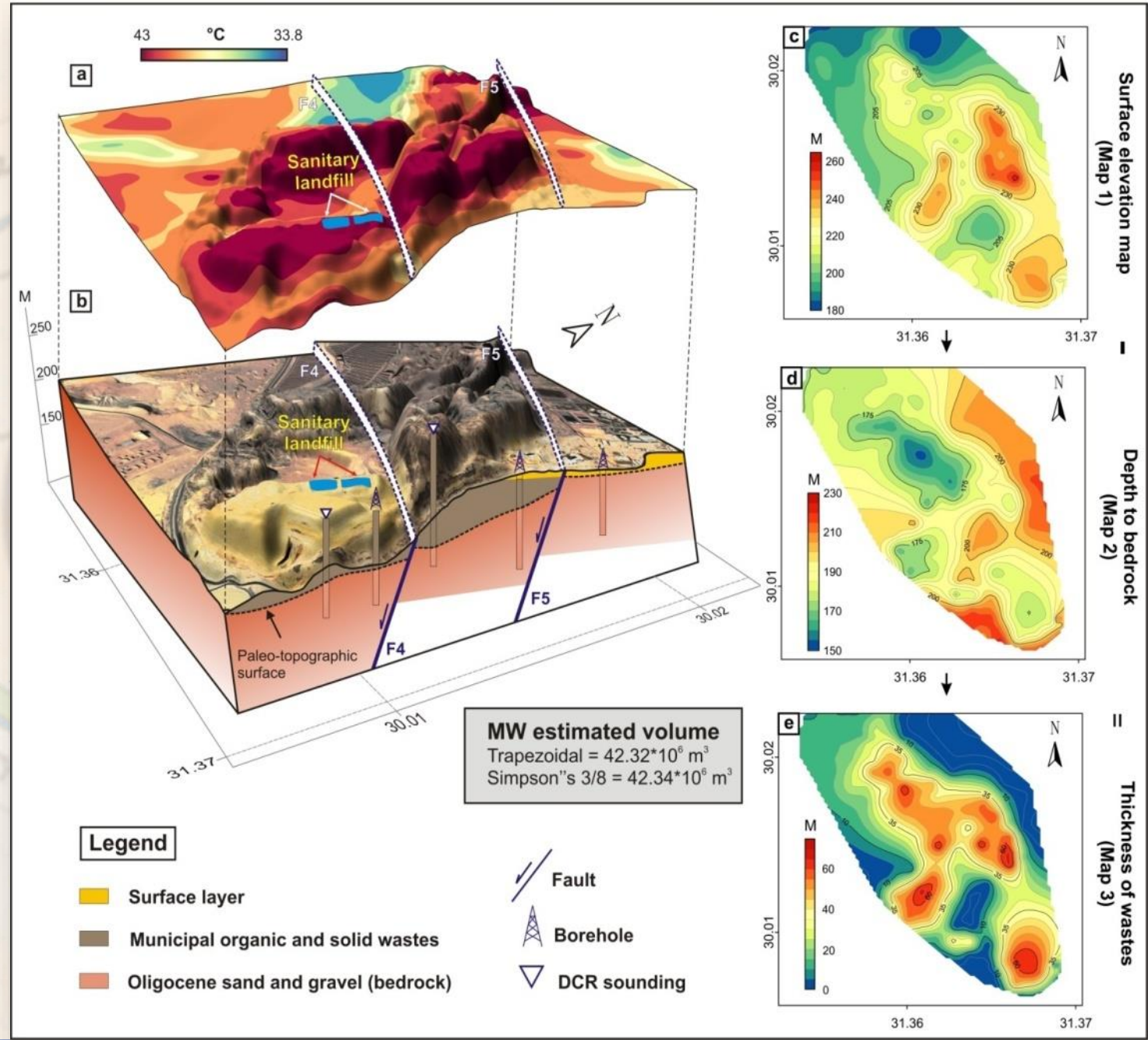
3D view of resistivity model from 3D inversion of data around sanitary landfill outlining the leachate flow.

Municipal Waste Quantification

A 3D schematic model for the MW showing the relation between the LST values and the distribution of MW through the structural controlled paleo-lows. (c–e) Spatial distribution of (c) surface elevation, (d) bedrock depth based on geophysical data and (d) MW thickness at WAD, respectively.

The estimated MW volume of WAD is ≈42.32 and 42.34 million cubic meters .





Conclusion

✓ **NARSS is interested in cooperating with the partners in the areas of standards, technical and environment regulations.**

„

✓**NARSS is interested in being a member of a network aiming at information exchange and technical cooperation.**

Thank you