

TBL # 6: Dahlin, Rosqvust and Leroux (2010) Resistivity-IP mapping for landfill applications

DUE: November 25, 2016

Overview

In this case history, DC resistivity and IP data are acquired across abandoned landfills. This is an opportunity to think critically about the relationship between two physical properties and the associated site geology. The questions asked are meant to emulate those faced in real life situations. You, as the lead geological engineer or geologist, are faced with the problem of remediating a waste dump. You have someone acquire and invert geophysical data and it is up to you to make inferences from those physical properties to answer your initial problem.

Instructions

Answer the following questions within the context of the 7 step framework. Your answers should be brief, and point form can be used where appropriate. Individual exercise:

- Read the article:[Dahlin, Rosqvust and Leroux \(2010\)](#) and answer the following questions before the in-class TBL

Resources

- [Dahlin, Rosqvust and Leroux \(2010\)](#)
- [GPG:DC Resistivity](#)
- [GPG:Induced Polarization](#)

Setup

Q1. What are the geotechnical goals of the study?

Physical Properties

Q2. Which physical properties are used as diagnostic physical properties in this study?

Q3. Why are these appropriate physical properties to be investigated?

Geophysical Survey

Q4. Consider the survey for the Waterval waste deposit. Which way were the data collected? Along the valley floor or perpendicular to it? Do you know which DC/IP array was used to collect data?

Data and Processing

Q5. Consider Figure 1 of the paper (partly reproduced below)

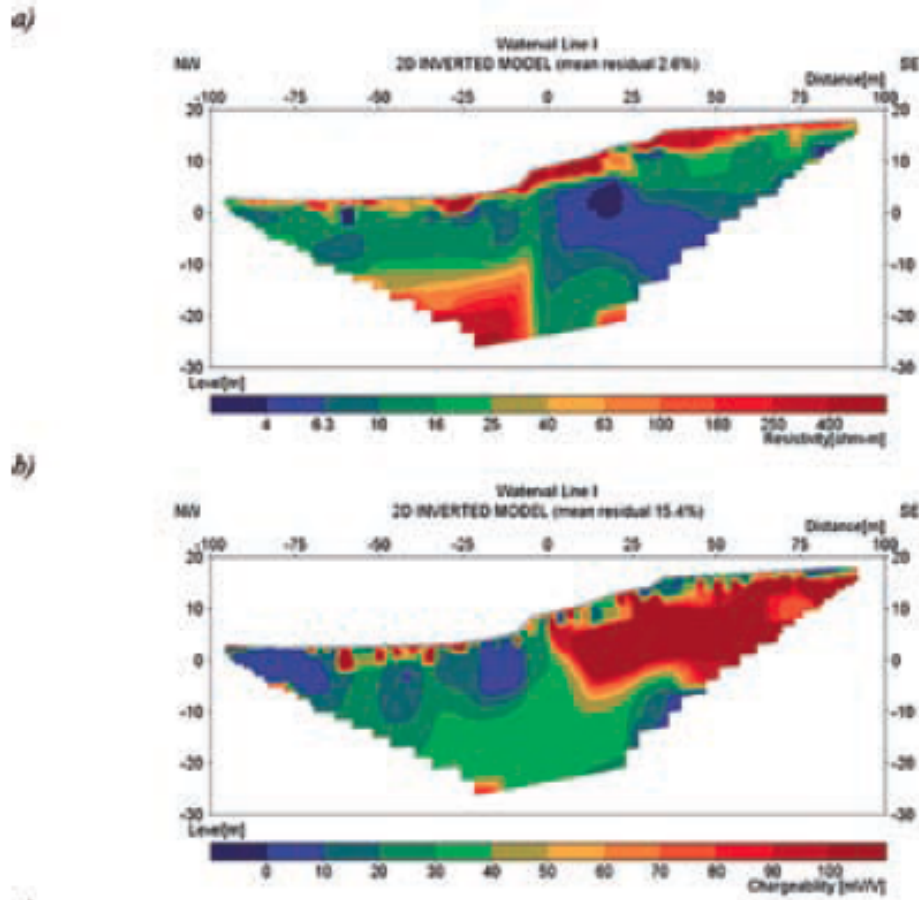


Figure 1: Parts a and b of Figure 1 from [Dahlin, Rosqvist and Leroux \(2010\)](#) : “2D inverted models from Line I at Waterval waste deposit; (a) resistivity, (b) IP,”

a. What is the first plot? Is it a pseudosection? What processing must have been done to obtain this plot?

- b.** What is the second plot? Is it a pseudosection? What processing must have been done to obtain this plot? Could this plot have been obtained without knowing the results provided in the first plot?

Interpretation

Q6. Consider the plots in Figure ??.

- a.** There are two regions of high resistivity. One is along the surface and the other is at the bottom left. To what do these likely correspond geologically?
- b.** What might be the cause of the large low resistivity region on the right hand side of the plot? Is there supportive information obtained from any borehole measurements?
- c.** What is a potential explanation for the large chargeability on the right hand side of the second panel?

d. How would you use the two physical property maps to estimate the boundaries of the waste dump? Draw your interpretation on either of the color plots provided. Explain your reasoning for deciding upon your boundaries.

e. On the left hand side of the plot near the surface there are regions that show positive and negative correlations between resistivity and chargeability. (that is high resistivity and high chargeability; or low resistivity and high chargeability.) What is a potential explanation for these?

f. What indications, if any, are there that leachate might exist down toe of the landfill? How do you use the chargeability and conductivity to arrive at your conclusion?