EPSS 136A, Lab 06 Resistivity
Due: Feb 16th 17:00

1 Introduction

Today's lab will use our collected data to determine the resistive profile of the ground around the San Andreas. We will invert resistivity data from the San Andreas Fault (San Bernardino) to check the consistency of our results with the geology thought to be present. Before the inversion, we will edit the resistivity data to remove spurious data points, after which the RES2DINV program will complete the inversion.

We will do the inversion for the resistivity data collected during 2018 and 2019 field trip. You will see that we are not able to identify the fault from 2019 data, possibly due to the heavy rains in San Bernardino area before the field trip.

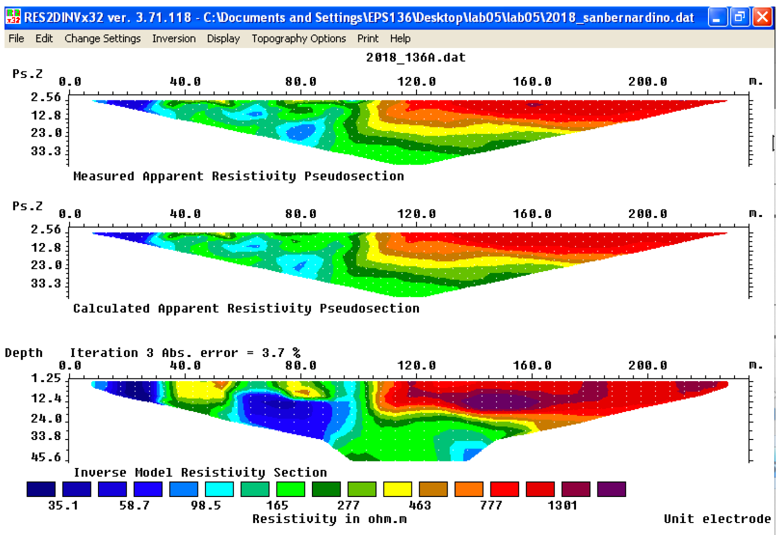
The line coordinates for the 2019 and 2018 resistivity data are stored in the files named 2019_coordinates and 2018_coordinates, respectively. By plotting these 2 lines on Google map, you can see that these 2 locations we selected are quite close to each other.

In this figure, the red markers on the Northwest corner indicate the 2018 array location, while the markers on the Southeast corner represent the 2019 array location. (Please ignore the rightmost marker, which should be a typo).

2 Resistivity

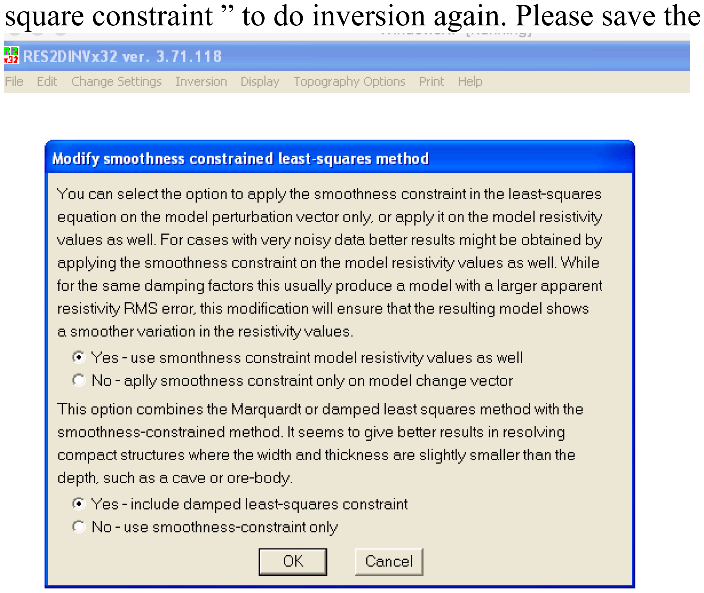
The resistivity data inversion consists merely of loading the data into the RES2DINV program, and letting the program do the inversion. Our data contains a few spurious data points however, and we want to eliminate these before we do the inversion.

Start by launching the RES2DINV program from the desktop. You can then load a data file by using the first option on the *File* menu. To see what the data looks like without removing the bad data points, go to the *Inversion* menu and select *Carry out Inversion*, the first option. This should produce three plots: the Measured Apparent Resistivity Pseudosection, which assumes a half-space, the Calculated Apparent Resistivity Pseudosection, and the Inversion Model Resistivity Section. Please take a screenshot or save the figure into BMP format (go to *print* then select *save screen as BMP file*), and add this figures in the final report.



Next remove the bad data points by going to the *Edit* menu and select *Exterminate bad datum points*. This will bring up a screen which allows you to select the bad data points with your mouse. When you are satisfied that you have removed the bad points, go to the *Exit* menu, and select quit edit window. The program will then prompt you to save the file under a new name. Save the edited file, and reload it into the program, and repeat the inversion. When you have done this you may print the file for your report using the *Print* menu. This will print the screen image to a file, which you will then be able to insert into a Word document.

Next, Select *Inversion methods and settings* and select *Modify smoothness-constrained least-squares method* to change inversion damping. Please select “Yes - include damped least-square constraint ” to do inversion again. Please save the figures as previous steps.



Start from the 2018_SanBernardino.dat data and then repeat the procedure for the 2019_SanBernardino.dat data, and make comparison between the results you obtain from the two dataset. Interpret your figures and explain if you believe that the data indicates the presence of an anomaly across the San Andreas fault.

3 Brief Report/Write-up

The brief report should include:

1) The background information on resistivity (i.e. what it measures, and how, what is the Wenner array)
2) Figures of inversion results of 2018 and 2019 data before and after removing the bad data points. The inversion results with and without damped least-squares constraint (6 figures in total).
3) The minimum and maximum resistivity values and the location of any fault distinctive features. What these values might suggest about the substances present in the area.
4) Compare the inversions with and without damped least-squares constraint.
5) How would you interpret the 2018 and 2019 results, and the difference between them. (Hint:heavy rains in San Bernardino area before the field trip)