Electrical Resistivity Tomography Exercise

The given dataset is **ROS_180427_5.0Hz.dat**, measured in Rosalia study area on the 27th of April, 2018. The Rosalia field consists on a thin layer of sediments laying on top of crystalline rock, which may be fractured in the near surface. The aim of the survey was to delineate the thickness of the sediment layer and to evaluate whether the crystalline rock is fractured or not. Ths ERT profile was collected on the same location as the seismic profile processed in the first exercise from this lecture. In comparison to the exercise for the seismic methods, electrode 1 from the electrical resistivity tomography (ERT) profile is co-located with the 24th geophone (and the last electrode corresponds to the 87th geophone).

For the ERT survey, data were collected deploying 64 electrodes with 1 m separation between them using a Dipole-Dipole configuration.

For the this exercise, the matlab files are given for plotting the pseudosection and histogram of the raw data, as well as for plotting the inversion results.

Steps and questions

For the exercise, please write a short protocol which covers the following steps, insert images (pseudosection, histogram, inversion results) and answer the questions. Also please include a brief (1 to2 lines) description (in your own words) of a histogram and pseudosection. Why are they needed for?

- Open the data (**ROS_180427_5.0Hz.dat**) with **basis.m**
  - Could you open the data?
  - Why not? (Hint: if you cannot open the file, you cannot run the inversion)
- Save the Pseudosection and histogram image
  - Which number of bins did you choose and why?
- Create a crt file as it shown in the presentation
  - First line should state how many measurements you have, From second line:
  - First column is A*10000+B
  - Second column is M*10000+N
  - Third column is the Resistance (only positive numbers)
  - For fourth column create a 0 vector
  - Check that the number of measurements defined in the first is right
- Run the inversion with the adequate grid files
  - Open the cfg file and change relative error parameter (line 19) to:
    - 1, 5 and 10 (line 20 should remain 0.001)
    - Compare the results (plot them, see below)
  - Chose one relative error parameter from before (Why did you chose that one?) and change absolute error parameter (line 20) to:
    - 0.1, 0.001, 0.00001 (line 19 should remain what you chosed)
    - Compare the results (plot them, see below)
- Plot the Data with **plot_ERT_sensitivity.m**
  - Chose the proper elm file

    - Chose the proper elc file
    - Chose the proper rho#.mag file, always with the highest number
    - Explain the coverage plot

- One jpg file from the field trip is given, mark the granite and the sediments
- Plus point:
    - A crt file from the field trip is also given, you can run the inversion with the proper grid files and guess, which relative error parameter was used