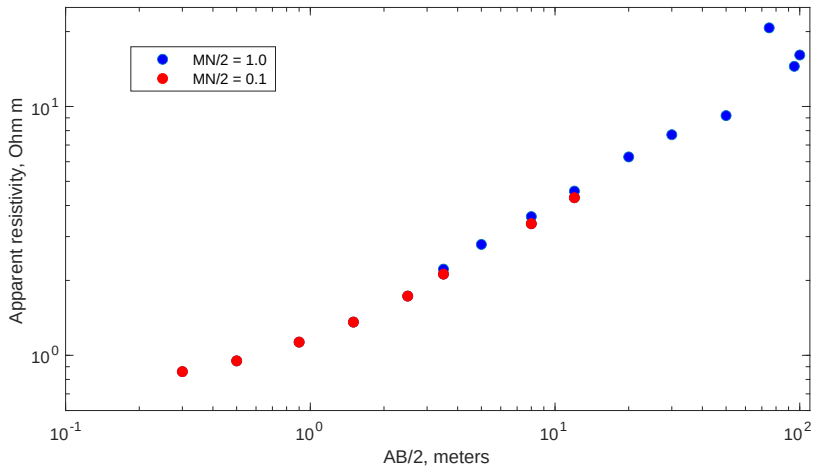
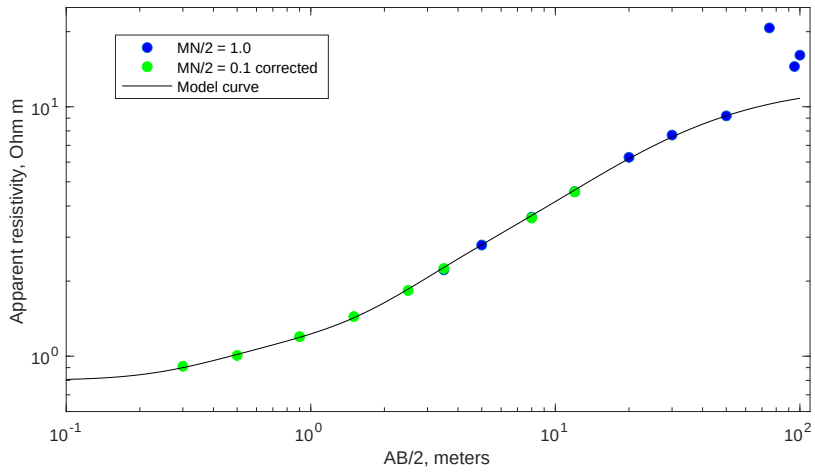
Resistivity Data Reduction, 2025

The raw data we collected can be found in the file `res2025.txt` which can be '`load`'ed into Matlab (Matlab will ignore all the lines starting with '`%`'). The 4 columns are AB/2, MN/2, apparent resistivity, and Q. Here is what the data look like:



I think it is safe to say that the data past 50 m are being affected by the pier and the sea wall, and should be ignored. You just can't get a jump in resistivity like the one at 75 m, and while the ones at 95/100 m look a little better, since 75 m is bad I would not trust them. We know that one electrode was up against the sea wall at 88 m.

Note the small, but systematic electrode effect when we increased the electrode spacing. We trust the data more at the larger electrode spacing and so we correct the MN/2 = 0.1 m by multiplying those data by a constant factor. Then we get:



Now we want to fit a model. This is actually a difficult data set to fit, since resistivity is increasing gradually with depth. That is, you can't fit these data with just 2 layers, even though it looks like a 2-layer curve. The trick is to start at the top with 2 layers, and fit the first data points with smallest AB/2. Then add layers one

by one to fit the data at larger and larger electrode spacing. You can see that a good fit is possible from my model curve.

Now you can estimate the porosity of the top and bottom layers, which are presumably unconsolidated beach sand and bedrock sandstone respectively, using Archie's Law (with an exponent of 2). Assume both the sand and bedrock are saturated with seawater with resistivity 0.25 Ωm. Ask yourself, "do these make sense?".

Write everything up for your resistivity report.