The objective of this lab is to constrain the depth, volume, and magnetization ($M$) of the buried material beneath the Kualoa Park mound. The diagram below illustrates the approximate geometry of our two survey lines.

First plot the measurements along each line. The script “lab9_start.m” already does this for you. Note that it also reverses the coordinates so distance increases from south to north. The coordinates therefore matches the orientation of the profile in the Matlab code that you wrote for computing the total field anomaly $F_{AT}$ due to a dipole. Now fit each of the two profiles (A and B) using your Matlab code. Here are some things you’ll need to do.

1. Remove the regional field ($F_{EU}$) so that the measurements at the two ends of each profile are near zero. “lab9_start.m” has code set up to do this. In so doing the data is reduced so that it only shows variations due to the dipole, i.e., $F_{AT}$.
2. Shift the coordinates of your measurement points or of your theoretical profile so that the dipole source is in the middle of the measurement profile. For example, this could simply mean adding xshift0 $\sim$ 25 m to the coordinates produced by your Matlab code.
3. Adjust the radius of the sphere $a$, its magnetization $M$, its depth $z$ below the magnetometer, and the inclination $I$ (assuming it is the same for the Earth’s field as it is for the dipole moment $m$) find a set of parameters that fit the data. Remember $a$ should be small enough that is below the ground and the magnetometer itself is $\sim$2 m high off of the ground.
4. Identify a range of depths $z$ and magnetizations $M$ that bracket the observations. That is, keep $a$ and $I$ fixed and find two depths and the corresponding values of $M$ that bracket (i.e., fit on the high or low side) the data.

Please make sure you include plots of your fits and indicate the range of parameter values that fit the data. Based on your fits to the magnetics and to the seismic data, at what depth do you think the magnetized material is beneath the mound.