Synthetic Study for Optimizing an Efficient Grid Size for MT and Long Period MT Measurements

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While the Ultra Wide-Band Magnetotelluric technology (10,000Hz - 50,000 seconds) covers AMT, MT and LP bends in simultaneously measured time series, many research and exploration projects use dedicated MT (300Hz to 10,000 seconds) or LP (10 seconds - 50,000 seconds) systems. This is usually dictated by available equipment or a traditional approach to deep target studies. Surface anomalies (up to 2-5km) formed by conductive mineral bodies or fault systems considered to be less important and are often completely ignored during deep lithospheric studies. The upper layers conductivity is being estimated and averaged over the whole survey area. As it is very well known, the Magnetotelluric sounding signal measured on the surface represents an apparent resistivity at a depth dependent on frequency and conductivity of averaged ground thickness above. This assumption works generally well in smoothly layered geology, but might integrate an error in estimations and inversions in more complicated situations. In our previous studies we observed an effect of an upward shift of anomalies obtained after inversion of smaller grid size data for long period measurements. This seems to happen when the localized 3D conductive bodies are becoming dominant over the average layer conductivity and it cannot be assumed as a homogeneous thickness. In this study, our intention is analysing the efficient grid size that would be effective for MT band and LP band surveys. To achieve our estimated results, we designed a geoelectrical model that would be typical for Canadian shields with different grid sizes for MT band signal and LP band signals. We did run inversions using ModEM and observed vertical fit of inversion results to an original model.