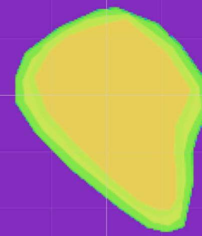
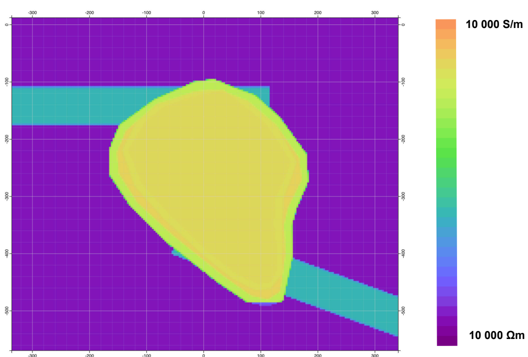
MGEM

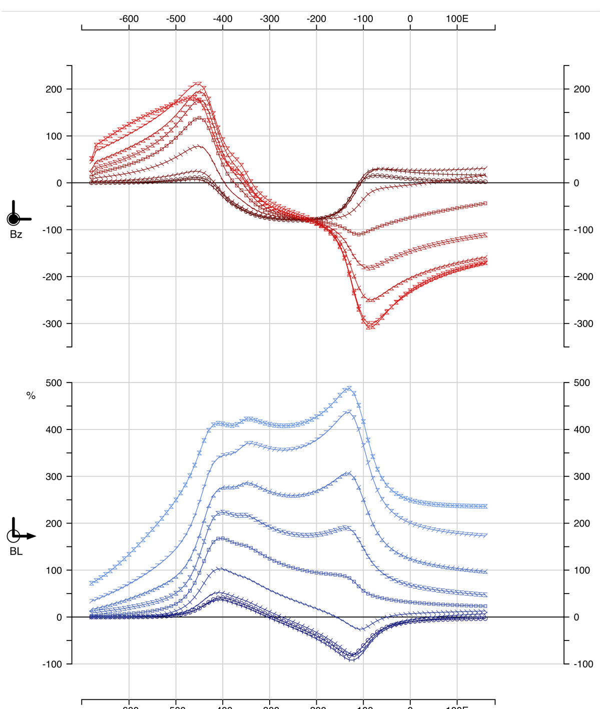
full volume finite difference modelling

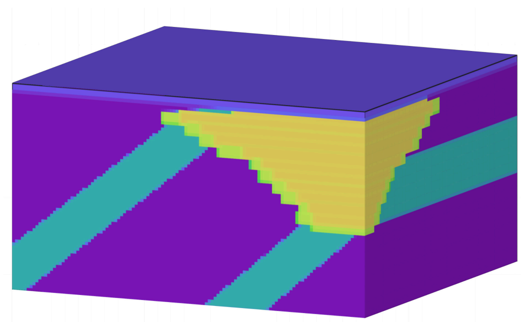


MGEM is a new 3D EM modelling tool suitable for modelling complicated geological models encountered in mineral exploration. Powered by a full volume multi-grid finite-difference solver capable of conductivity contrasts of 1:10 000 000, MGEM generates finely meshed grids encased in coarser larger grids. Finer geological details can be modelled over areas of interest while larger and regional electrical structures can be incorporated in the coarser grids. In this manner, high resolution EM data can be generated in the time frame suitable for mineral exploration.



The Voisey's Bay Ovoid is an example that demonstrates the need for both fine and regional electrical structures. The near surface less than 20m depth-to-top of the highly-conductive massive sulphide deposit requires a detailed conductivity grid while the regional variably mineralized troctolite dykes encasing the ovoid requires the need for a large grid spanning multiple kilometres. Attempting to solve for both the ovoid deposit and the dykes on a single grid would require 100's of millions of conductivity cells. Conversely, not incorporating the dykes over a large enough strike length results in an inadequate fit of the measured data as a large current system is required to generate the strong current-channeling response on either side of the ovoid.

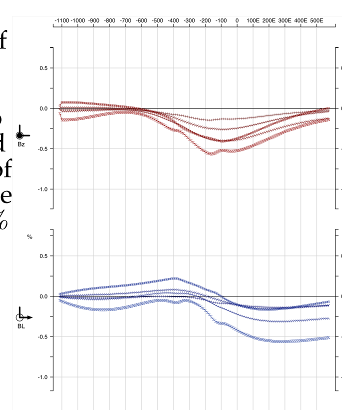




With MGEM the ovoid and the proximal troctolite dykes were modelled in a finely-meshed cube of 875m sides (3m and 6m conductivity and model cell size, respectively), while the larger and regional-scale conductivity structures were modelled on six progressively coarser grids, the largest grid being a cube of 7200m sides. Using MGEM both the ovoids' highly conductive inductive response as well as the large regional current channeling were able to be accurately modelled.

Modelling Detectability

To showcase the versatility and accuracy of both MGEM and the UTEM system, the ovoid was lowered to a depth to top of 500m and modelled to simulate the response of a 0.5Hz UTEM survey. The model data shows a ~0.5% anomalous response in both the vertical and in-line component, clearly showing that the ovoid deposit would still be detectable at this greater depth.



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