

Three-dimensional inversion of GREATEM data using simulated annealing

Eiji Nakayama[1]; Toru Mogi[2]; Elena Fomenko[3]

[1] AeroGRAV; [2] ISV, Hokkaido Univ.; [3] Moscow Univ.

We developed a new 3D inversion scheme for airborne electromagnetic (AEM) data, by combining a 3D electromagnetic modeling algorithm applicable for AEM with ground electrical source, and the simulated annealing (SA) which is a stochastic combinational optimization algorithm. The EM modeling algorithm is based on the staggered grid finite difference method, and is designed to enhance the stability and speed of calculation. In our scheme, the earth is divided into the assemblage of the tabular cells, and the resistivity of each cell is determined by the SA with a smoothness constraint. We show the result of 3D inversion for the synthetic data and discuss its accuracy and stability, particularly with emphasis on the following points: a) introduction of a new smoothness constraint and sensitivity control, which reduce random and stochastic fluctuation in the null space, b) inversion using multi-frequency data.