

## Possibility of detecting a conductor under shallower sea using GREATM survey

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It is important to carry out a geophysical survey at sea-land boundary area to detect distribution of fresh and salt water aquifer. But it is difficult to survey at coast area, especially in shallower sea where a survey ship is difficult to enter. To overcome the issue, we tried to estimate the possibility of detecting some conductors under the shallower sea using GRounde Electrical source Airborne Transient ElectroMgnetics (GREATM). We computed response of time-domain EM responses for 3D structures under a shallower sea applying a 3D EM modeling scheme. Due to computational complexity in the time-domain, frequency-domain modeling followed by the Fourier transform is an attractive choice if a sufficiently powerful solver is available. The scheme is based on finite difference (FD) staggered rectangular non-uniform grid formulation for the secondary electric field with continuous components of tangential electric and normal magnetic fields (Fomenko and Mogi, 2002). The 3-D response were calculated by computing secondary EM field originating by 3D anomalies which induce the primary EM field on a horizontal multi-layer structure by a grounded electrical dipole source. Time-domain responses were computed by the sine or cosine transformation from the frequency-domain data. The range of computing in frequency-domain is 100000 to 1Hz and transient time responses were obtained at 0.0001 to 0.1 sec. The computer simulation results for EM responses to 3D structure models at different depths under sea bottom have shown the possibility to detect some conductors under shallower sea depth. We computed some models; depths of sea at 10m, 20m and 50m, conductor to host rock conductivity ratios C/H =(1:10, 1:100)and conductor depths ranging from 0.0m to 100m from sea bottom. The results showed that, for example, a conductor of size(100m x 100m) which C/H ratio =1:10, located at 100m depth from sea bottom can be detected under a shallower sea at depth of 20m at measuring altitude in 50m high. When C/H ratio= 1:100 ,the same conductor can be detected at altitude in 150m high. .

Keywords: Air born survey at cost line (GREATM)