AIRBORNE MEASUREMENTS OF NATURAL SOURCE EM INDUCTION RESPONSES TO STUDY SHALLOW SURSURFACE FEATURES – RESULTS FROM 3-D NUMERICAL CALCULATIONS

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Major difficulties associated with airborne geophysical surveys are rapidly disappearing with the development of precise position systems. These techniques could be useful in observing the natural source EM inductive field from a moving airborne platform. Recent studies show that fluxgate magnetometers with high sensitivity along with real-time precise positioning techniques could be used in making such airborne measurements. The concept of airborne measurement of natural source EM induction is similar to the ground based geomagnetic depth sounding (GDS). The only difference is that instead of simultaneously observing the magnetic field with an array of ground stations, airborne system is flown over an area of interest and measures a range of high frequency signals at a pre-defined interval. The 3-component fluxgate magnetometer data thus collected could be processed using the GDS method to study the lateral conductivity variations within the subsurface. The depth from which the information is returned depends on the frequency (or periodicity) selected and subsurface conductivity situations. This method could therefore be successful applied to exploration in cratonic areas (e.g. Canadian Plateau) where there are lots of fresh rock exposures. However it is uncertain how successful this method could be applied in areas of thick regolith cover such as in Australian conditions. Numerical modeling could possibly test the likely success of this method under those conditions. In this paper I shall discuss how one can utilize the 3-D Finite Difference forward modelling approach to compute the airborne responses of shallow subsurface lateral conductivity anomalies under various surface/subsurface conditions.