MODELLING IP EFFECTS IN AIRBORNE TIME DOMAIN ELECTROMAGNETICS

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The presence of chargeable material can significantly impact the data in electromagnetic (EM) surveys. This affected data has traditionally been treated as noise that must be removed prior to interpretation or inversion. The ability to extract induced polarization (IP) information from an airborne platform would be a valuable tool in the mineral exploration industry and the pursuit of this ability has recently led to significant interest in the interpretation of IP effects in airborne data. A variety of interpretation methodologies have been proposed to aid in the identification and extraction of information from time domain EM data containing IP effects.

Any interpretation scheme needs to be thoroughly tested on realistic synthetic examples so that the strengths and weaknesses of the method are well understood. In this work, we present a methodology for accurately and efficiently simulating the response of a time domain EM experiment by modelling the convolution that occurs in Ohm's Law in the presence of a frequency dependent conductivity. This method is free of any assumptions about the dimensionality or frequency dependence of the chargeable material and can be used to simulate the response of any time domain system. The importance of considering the problem in three dimensions is demonstrated, and the problems that could arise from working with a reduced dimensionality are demonstrated.