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Revival of Potential Fields in Search for Hydrocarbon

There is a renewed interest in potential field methods in the recent years in the search for hydrocarbons. All the modern innovations in data reductions notwithstanding, the first and perhaps the most crucial step in gravity and magnetic data processing is the removal of the effects of the deep-seated structures from the observed Bouguer gravity and magnetic fields in order to enhance the signatures of the shallower bodies, often associated with the economic minerals and hydrocarbons. Here, in this communication we describe a more accurate and more reliable space-domain technique based on the finite element concept to separate the gravity regional and residual components. The performance of this procedure was tested on two synthetic data sets and one set of field data. The residual components for all three cases derived by this approach appeared to be more acceptable.

As an application to hydrocarbon exploration, we have chosen the gravity survey in Paradox Basin salt anticlines. There are two reasons for it. First, the Paradox basin is an important basin for hydrocarbon exploration; the maps are published and are easily accessible. Second, the Bouguer gravity data has already been processed by different techniques so that the residual gravity maps can easily be compared.

The newly derived residual map shows a number of anomalous zones, some of which are better defined compared to those obtained by different techniques in previous studies. Our approach opens a new avenue to compute regional and residual anomalies accurately and reliably with less assumption and less computational efforts, and more importantly, in absence of the interference from the anomalous zones lying in the survey area