Utilizing Aeromagnetics and Micromagnetics to Define Petroleum Reservoirs in the Denver, Forest City and Cherokee Basins

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Abstract

The use of aeromagnetics in petroleum exploration to define basement structural features has been well established. The use of micro-magnetics to find petroleum reservoirs has been more controversial. The presence of magnetic minerals in the near surface has been related to seeping hydrocarbons depositing magnetic minerals under a variety of soil conditions. The literature has several case histories that show strong correlation between micro-magnetic anomalies and existing oil fields. Discussed here will be aeromagnetic surveys and their micro-magnetics derivative analysis over three areas in the Midcontinent USA. One survey was flown over Lincoln County, Colorado, Denver Basin where production is from 1.2 to 3 kilometers in depth; a second survey was flown over Anderson and Linn counties, Kansas, Forest City Basin where production is from 45 to 760 meters in depth; and the survey was flown over an area in part of Brown County, Kansas, Forest City Basin where production is from 800 to 1050 meters in depth. The aeromagnetic surveys defined basement features and in many cases imply fault systems that coincide strongly with existing oil fields both post and pre-survey. The results of the aeromagnetic surveys and the derivative micro-magnetic analysis will be discussed along with problems, caveats, and ideas for going forward with this type of work.