

# Use of Gravity and Magnetism for Low-Cost Exploration and Development in Mature Areas Such as Kansas

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New Geographic Information Systems (GIS) technology allows us to combine rapidly the traditional color gravity and magnetic maps with pseudo-sun shading and a variety of geologic and geographic overlays. This approach can be used to readily identify and characterize structural and stratigraphic features within the basement, and correlate these features with structural and stratigraphic features in the overlying strata, including the location of oil and gas fields. Interpretation of the color and sun-shaded gravity and magnetic maps shows major Precambrian tectonic features, as well as numerous but more subtle structures and lithologic trends associated with these features. On these maps, the important features for petroleum exploration and development are the boundaries between anomalies, and alignments of anomalies. These lineaments are indicated by steep gravity or magnetic gradients which cause increased shading on the maps, or by the regional alignment of gravity and magnetic gradients and the anomalies associated with them. The lineaments seem to correlate with numerous geologic features, including Precambrian lithologic boundaries and structures interpreted from well control, flexures or faults that cut various levels of overlying strata, variations in Paleozoic lithofacies and stratal geometries, and trends of numerous oil and gas fields. These lineaments are interpreted as simple lithologic boundaries or Precambrian structures, some of which may have influenced deposition, structural evolution, paths of fluid migration, and the location of oil and gas fields in overlying strata. In light of this interpretation, the gravity and magnetic maps could be used as a low-cost way of identifying structures and stratigraphic changes that affect oil and gas accumulations and, thus, continue trends of existing fields and plays.