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**Basement Topographic Control of Structural Highs and Lows in the
Sedimentary Section in the Midcontinent, U.S.A.**

One of the petroleum geologist's most useful tools in the search for oil in the Midcontinent has been, and continues to be structural contour maps. Yet, in spite of many decades of constant everyday use of these maps we know little of the origin of the many structures visible on them. We hear and read such generalized explanations as "Devonian uplifts", "Pennsylvanian compressional forces", "basement movements", etc. However, none of these explanations are helpful in explaining specific structures or in searching for new ones. The authors have reason to believe that they have discovered, or re-discovered, the cause of many of the structural highs and lows present in the sedimentary section, why these structures show a certain order in some ways and randomness in others, and how it is possible to predict new structures in unknown areas. Much structure apparently results from compaction over basement topography, especially structure in the lower parts of the stratigraphic section. Through the use of quite new and different aeromagnetic processing techniques that map the detailed lithology of the basement surface rocks, we have found dozens of one-on-one correlations of structural features with individual basement rock units. This implies the existence of basement highs carved on erosionally resistant rocks and the structural closures forming over them by compaction of the overlying sedimentary rocks as demonstrated by Walters (AAPG, 1946 and 1953) for specific structures in Kansas over thirty years ago.

Additionally, most individual basement rock units appear to be bounded by faults, or shear zones, and it is over these ancient basement breaks that the majority of faults in the sedimentary section are located.