

## THE TOPOGRAPHIC EXPRESSION OF OIL AND GAS FIELDS IN THE GULF COAST

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### ABSTRACT

Anticlines, the structural and stratigraphic features in which oil and gas accumulate, are reflected in topography in two styles, erosional patterns and gross uplifts. The relationship of erosional patterns to anticlines is developed by comparison of the aerial photograph of the Solitario, a large anticline in the Big Bend Area, to its topographic map. Fields in Texas which exhibit erosional patterns are Trinity, South Stowell, West Ranch, Lovell Lake and Bear Creek. Fields in Louisiana which exhibit erosional patterns are Duck Lake, Laurel Ridge, Bourg, Fordoche Wilcox and False River. Gulf Coast fields which show gross uplifts are Jennings, Spindletop, Helen Gohlke, the Rincon Field area and Pierce Junction. A topographic analysis of an undeveloped area in the Gulf Coast demonstrates how this technique shows the anticlinal axes and the significant uplifts along them, how seismic lines should be placed to secure maximum information at minimum cost and how the whole area consists of anticlines, with synclines being merely the dividing lines between them. Topographic anomalies show the length, breadth and center of anticlines. They are not always clearly present because of inadequate maps, intersecting anticlines and locally complex structure, loose sand on the surface, timing of the uplifts, amount of erosion and other factors. This technique is not the ultimate answer, but it certainly is the cheapest and most effective starting point of exploration.

For many years our exploration has been controlled by the anticlinal theory. The common concept of an anticline is that it is a positive structural feature with four-way dip. An anticline so defined has many other characteristics which can also be used to define it, quite independently of the dip. In the process of sedimentation the sediments are deposited on anticlines in circular patterns, which may be identified by all of the standard geophysical methods, by their appearance on aerial photographs, by the erosional patterns shown on topographic maps and by simply being gross uplifts of the surface, also shown on topographic maps. The purpose of this paper is to show how erosional patterns and gross uplifts correlate with the location of the oil and gas which have accumulated in the anticlines defined by these studies and how these studies can be used effectively in exploration.

Since topographic analyses identify and measure the length and breadth of anticlines, it follows that these techniques should be useful in ascertaining how much oil and gas remain to be found in the United States. Studies of the Gulf Coast and many other areas of the United States have failed to disclose any significant anticlines, ones large enough to contain a significant oil or gas field, that have been condemned by drilling. Therefore, a comparison of the number of untested significant anticlines to the number of tested and productive significant anticlines should provide a reliable indication of how much oil and gas remain to be found. Preliminary studies based on this theory indicate that we have found only 10 percent of the total. The official guess made by the USGS, based on "intuitively reasonable approximations", states quite positively that we have found two-thirds of the total. This is a computer analysis that does not include basic structural geology.

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