and 1.1 MMCFGD. This well tested a seismically identified, sub-Jurassic origin, (2) occlusion of pore spaces by several later generations of dolomite, and (3) occlusion of pore spaces by authigranit.

The complex rifting and subsidence history of the Sirte basin serves as an instructive case study of the tectonic evolution of an intracratonic extensional basin. The Sirte basin formed by collapse of the Sirte arch in the mid-Cretaceous. Marine sediments accumulated following initial crustal arching and rifting as the basin was flooded from the north. Upper Cretaceous strata lie unconformably on igneous and metamorphic rocks of the Precambrian basement complex, Cambrian-Ordovician Gargar Group, or the pre-Cretaceous continental Nubian Sandstone. The most rapid subsidence and accumulation of basinal strata occurred in the early Cenozoic; however, the basin has been relatively stable since the Oligocene. The basin is floored by a north-west-southeast–trending mosaic of narrow horsts and grabens, an important structural characteristic that distinguishes it from the adjacent intracratonic Kufra, Murzuk, and Ghadamis basins.

The details of basin subsidence, sediment accumulation rates, and facies variations have been reconstructed for the northern Sirte basin from a suite of approximately 100 well logs and numerous seismic lines. Subsidence-rate maps for short time intervals from the mid-Cretaceous through the Eocene show a continual shifting of the loci of maximum and minimum subsidence. The nonsteady character of basin subsidence may reflect a periodicity of movement on the major basement-rooted growth faults bounding the underlying horsts and grabens.

Carboniferous shales from the Ouachita Mountains have been studied to determine mineralogy and thermal maturities, the latter ascertained by means of vitrinite reflectance and bitumen/organic carbon ratios. The less than 2 μm fractions of these shales indicate 2 major clay-mineral components, illite and chlorite, and 2 minor varieties, expandable clays and pyrophyllite. Expandable clays are found at low thermal maturities and pyrophyllite at high maturity. Scanning electron micrographs show differences in clay morphology and texture, which are influenced by the degree of thermal maturity.

The less than 2 μm fraction of shales from the Ouachita Mountains have been studied to determine mineralogy and thermal maturity. The latter is ascertained by means of vitrinite reflectance and bitumen/organic carbon ratios. The less than 2 μm fractions of these shales indicate 2 major clay-mineral components, illite and chlorite, and 2 minor varieties, expandable clays and pyrophyllite. Expandable clays are found at low thermal maturities and pyrophyllite at high maturity. Scanning electron micrographs show differences in clay morphology and texture, which are influenced by the degree of thermal maturity.

A plot of vitrinite reflectance of various shales from the Ouachita Mountains shows that the Kubler's crystallinity index is greatly correlated with vitrinite reflectance. The log of the sharpness ratio increases with increasing mean vitrinite reflectance. These relationships suggest that illite crystallinity is controlled by the same geologic agents that control vitrinite reflectance, namely temperature and time.

The less than 2 μm fraction of shales from the Ouachita Mountains show a maximum analogous to a hydrocarbon window. These statistically significant correlations provide a useful means of estimating thermal maturity of these shales where they contain insufficient amounts of vitrinite for thermal maturity evaluation.

Continuous Fracture Probability Determination as Applied to Monterey Formation

Most open-hole logs can be used for fracture detection. Each petrophysical measurement responds to fractures in a different way, and much literature exists describing the effects of fractures on tool responses. Most fracture detection programs use either one or two logs or many fracture indicators, but make no attempt to tie them together. Since fracture systems appear to provide nearly all the permeability for production in the Monterey Formation, fracture analysis is essential throughout the well. A program has been written to give a continuous output of fracture probability using all available fracture indicators. Each indicator will give an individual probability of fracturing. These probabilities are then weighted and combined to give a composite fracture probability.