

LATE CRETACEOUS EXTENSIONAL TECTONICS AND ASSOCIATED IGNEOUS ACTIVITY ON THE NORTHERN MARGIN OF THE GULF OF MEXICO BASIN; R. L. Bowen, D. A. Sundeen, Boxes 8152 & 8196, University of Southern Mississippi, Dept. of Geology, Hattiesburg, MS, 39406

Major, dominantly compressional, orogenic episodes (Taconic, Acadian, Alleghenian) affected eastern North America during the Paleozoic. During the Mesozoic, in contrast, this same region was principally affected by epeirogenic and extensional tectonism; one episode of comparatively more intense tectonic activity involving extensive faulting, uplift, sedimentation, intrusion and effusion produced the Newark Series of deposits and fault block phenomena. This event, termed the Palisades Disturbance, took place during the Late Triassic - Earliest Jurassic. In the present study, the authors document a comparable, although smaller in area affected, extensional tectonic-igneous event occurring during the Late Cretaceous (Early Gulfian; Cenomanian-Santonian) along the southern margin of the cratonic platform from Arkansas to Georgia (1).

Following extensive evaporite deposition (Louann Salt), in the later Jurassic and Early Cretaceous, petroliferous sands, mudstones and carbonates, with some evaporites, accumulated in the northern Gulf of Mexico area. Generally mature sedimentologically, these strata mostly thicken, while becoming finer grained, from the northern basin border southward towards the Gulf. As a package, they contrast markedly with the Late Cretaceous (Gulfian) units overlying them.

From the beginning of Gulfian time (ca 98 m.y.; early Cenomanian), warping, uplift, and igneous activity on an impressive scale affected the southern margin of the cratonic platform and the northern margin of the contemporaneous depositional basin. Deposits of the basal Upper Cretaceous Tuscaloosa Group, unconformably overlying a varied suite of rocks from Tennessee to the Carolinas around the southern Appalachians, rich in gravels (locally cobbly to bouldery) in the outcrop, record a major pulse of uplift of the southern Appalachians; some calculations suggest summits may have reached 3-4 km elevations at that time. These strata, non-marine and approximately 200 m thick in outcrop, thicken to >1 km southwesterly from the Appalachians while becoming a mixed sequence of continental and marine sands and mudstones. The sediments are largely immature and rich in volcanoclastics in the Mississippi Embayment region. Moreover, this interval of sedimentation coincides in time with the northward extension of the Mississippi Embayment into southern Illinois from a Lower Cretaceous border in southern Arkansas. This new depositional sag was a consequence of mild uplift in the Ouachita-Ozark region to the west and in the Appalachian Plateau region to the east.

Crustal extension, documented by warping and uplift along the eastern and western edges of the Mississippi Embayment and

the rapidly subsiding Gulf depocenter, also generated (or was generated by) fractures down into the mantle through which, synchronously, many irruptions rose (2). Kimberlite was injected into western Arkansas, while many alkalic dikes (lamprophyres) along with several carbonatite and nepheline syenite stocks invaded the Arkansas Ouachitas. South and east of these exposed hypabyssal rocks, petroleum exploration has disclosed numerous occurrences of igneous rocks within the sedimentary rocks of the Mississippi Embayment region overlapping parts of Arkansas, Louisiana, and Mississippi (3,4,5). Volcanic extrusive, hypabyssal, and volcanoclastic sediments occur in most wells which penetrate Cretaceous and older strata in this region. Twelve K-Ar isotope ages (72 to 91 m.y.) have been determined from selected cores and cuttings of igneous rocks from wells drilled in five counties in central-western Mississippi (4,5,6,7). Volcanic complexes, of at least 25 km diameter, such as the Jackson Dome, Sharkey Uplift, Midnight Volcano, and the Monroe Platform, have been defined in the process of oil and gas exploration; moreover, large gravity and magnetic anomalies suggest that comparable complexes occur beneath northwestern Mississippi and southeastern Arkansas in the vicinity of the Desha Basin (8).

The major effects of the extensional and thermal disturbance we here define are limited to the Lower Upper Cretaceous (Cenomanian - Turonian; 97 - 88 m.y.), although volcanism persisted at least to the end of the Campanian (73 m.y.) as reefoid deposits developed around the Jackson Volcano and others which rose through the Selma - Austin chalk seas.

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