same time, however, economic and political pressures have induced concern and there is now a much increased emphasis on jurisdiction to divide the offshore areas between the 132 coastal nations. Negotiations affect research operations at sea and, in consequence, marine scientists have been made aware of offshore problems as highlighted by the Law of the Sea Treaty (UNCLOS III) and complications arising from the legal versus scientific definitions of continental shelves and margins. Most scientists, however, are not familiar with juridical considerations in the delimitations of offshore state boundaries.

As to prevailing trends, many jurists contend that existing state practice and decisional law pertaining to maritime delimitation problems are presently adequate to provide a legal framework for negotiation and third-party adjudications. It also has been suggested that in delimiting maritime boundaries primacy must be accorded to geographic factors, and that support be given to the equidistance-proportionality method as a means of giving effect to geographic factors. But what about geology?

The first major offshore boundary case of international scope where plate tectonics has constituted a significant argument is the one recently brought before the International Court of Justice by Libya and Tunisia concerning the delimitation of their continental shelves. Of the two parties, Libya placed the greatest emphasis on this concept as a means to determine natural prolongation of its land territory into and under the sea. Tunisia contested Libya's use of the whole of the African continental landmass as a reference unit; in Tunisia's view, considerations of geography, geomorphology, and bathymetry are at least as relevant as are those of geology. In its landmark judgement (February 1982)—which almost certainly will have far-reaching consequences in future such boundary delimitation cases—the court pronounced that "It is the outcome, not the evolution in the long-distant past, which is of importance," and that it is the present-day configuration of the coasts and sea bed which are the main factors to be considered, not geology.

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Flexure of Anadarko Basin

The Anadarko basin in Oklahoma has long been a major oil and gas producing region and contains the deepest wells drilled in North America. The region has had a long sedimentary-tectonic history reaching back to the Proterozoic and was the site of an early Paleozoic basin. The present shape of the Anadarko basin, however, was developed in late Paleozoic times as a result of the uplift of the Wichita Mountains. COCORP seismic reflection profiles show at least 8 to 9 km (5 to 5.6 mi) of overthrusting northward, and the Anadarko basin was developed as a result of flexural bending of the lithosphere due to this shortening. Downwarping of the basin can be observed to extend for over 300 km (185 mi) northward, indicating a high flexural rigidity (Te > 40 km [25 mi]). However, nearer the Wichita front, the basin steepens rapidly as the post-Mississippian sediments thicken to over 20,000 ft (6,100 m). The shape of the bending is such that it cannot be explained by the use of a constant rigidity elastic plate model. We have modeled the post-Mississippian development of the Anadarko basin as the result of flexure of an elastic-plastic plate due to vertical and horizontal loading caused by the Wichita Mountains. Implications of these results for the development of the Anadarko basin and the mechanical properties of continental lithosphere will be discussed.

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Mid-Cenozoic Tectonic Timing, Trans-Pecos Texas

This work attempts to establish the age and chronologic sequence of mid-Cenozoic tectonic events in Trans-Pecos Texas through the use of radiometric dates, and new or revised structural, lithostratigraphic, and vertebrate biostratigraphic information. Late Mesozoic to early Cenozoic Laramide faulting, folding, and jointing superimposed on older trends, established the fabric governing younger structures. Late Oligocene events, occurring about 28 to 26 m.y.B.P., include right-lateral divergent wrench faulting, local compression, and the last episodes of silicic intrusion-extrusion. The major period of basin-and-range faulting began about 19 m.y.B.P., accompanied by late and mafic minor intrusion. This paper follows the sequence of tectonic events established by Muehlberger in 1980 and DeCamp in 1981 for Trans-Pecos Texas.

A widespread low relief surface was cut across Laramide structures as deformation decreased in the Eocene. Integrated, perennial streams flowing southeastward began extensive laterally continuous aggradation in the area south and southwest of the stable Diablo uplift. Mainly fine, volcaniclastic sediments accumulated on surfaces of continued low relief. Initially, sediment sources were distant but became progressively more local. Episodic ignimbrites and flows covered large areas with increasing frequency. Eocene climate in Trans-Pecos Texas was humid and subtropical, but an irregular trend toward increasing dryness was evident by 31 m.y.B.P.

Sedimentary bodies younger than middle Oligocene have little lateral continuity. Deposited under semiarid conditions, as destructional volcanic sediment aprons, alluvial fans, or bolson fills, these units show progressive divergence from depositional styles of early Tertiary sediments. Early Arikareean (early late Oligocene) right-lateral divergent wrench faulting interrupted long-established drainage patterns. The faulting, dated by intrusions and biostratigraphy at about 28 to 26 m.y.B.P., closed the interval of laterally continuous, and preceded that of discontinuous, deposition. The irregular Terlingua monocline, long considered a Laramide structure, is re-interpreted as another example of Trans-Pecos Texas linear east-west tectonic elements discussed by Dickerson in 1981. The structure is a large monocline cut by a set of en echelon–left normal faults and smaller monoclines, modified by compression. Formation of the large monocline involved rocks as young as late Eocene–early Oligocene. The Terlingua monocline provides clear evidence of the sequence of events and some indication of timing. Later Arikareean sediments lie on uneven eroded older rocks, disturbed by early stages of this wrench faulting. About 23 m.y.B.P. downfaulted basins began to retain bolson/alluvial fan sediments. Deposition may have resulted from progressive deformation of the change to mafic volcanism. Increasing aridity may also have been a factor.

Basin-and-range faulting affected Trans-Pecos Texas during the Hemingfordian (early Miocene), and continues. This tectonism faulted the later Arikareean-Hemingfordian alluvium by reactivating old faults and creating new ones. Basin-and-range faulting shifted, deepened, and more completely restricted basins of deposition by forming a series of northwest oriented grabens which received great thicknesses of later Miocene and younger alluvium. (See Figure on page 615).

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Stromatoporoid Biostratigraphy—A Case History