INTERNATIONAL EXPLORATIONISTS

HGS INTERNATIONAL GROUP
DINNER MEETING—JANUARY 20, 1992
Post Oak Doubletree Inn
Social hour, 5:30 p.m., Dinner, 6:30 p.m.
Technical Presentation, 7:30 p.m.

C. H. BRADLEY—Biographical Sketch

Chris Bradley is currently a geological advisor with Conoco Inc. Worldwide Exploration Services, Houston, Texas. He received his B.S. in geology in 1976 from the University of Connecticut and his M.S. in geology from the University of Southwestern Louisiana in 1978. Prior to joining Conoco in 1979, he was an exploration geologist for Samedan Oil Corporation in Lafayette, Louisiana.

He has conducted and supervised integrated exploration projects throughout the U.S. Gulf Coast, and in Indonesia and Africa. Since 1989 he has been involved with Conoco's West African exploration program focusing on the pre-salt plays in Gabon. His current interests include the tectonic and sedimentary evolution of continental rifting and integrated basin/maturation modeling.

EARLY CRETACEOUS PALEOGEOGRAPHY OF GABON/NORTHEASTERN BRAZIL - A TECTONO-STRATIGRAPHIC MODEL BASED ON PROPAGATING RIFTS

Regional gravity and seismic data, the region's present-day structural and stratigraphic configuration, and comparison with other rift systems worldwide led to the development of a rift model for Gabon and northeastern Brazil that involves two propagating megafracture systems that interacted in a very complex fashion. In both regions, the distribution of pre-salt Early Cretaceous reservoirs and source rocks was controlled by the rift phase in progress at the time of deposition. A series of regional paleogeographic reconstructions depict the development of the rift stratigraphy, and illustrate how the dual rift model explains the geometry and subsidence history of both the Reconcavo/Tucano/Jatoba rift system, which was the first branch of the northward-propagating fracture system, and the Sergipe-Alagoas/Interior Basin/N'Komi rift system, which was the first branch of the southward-propagating fracture system.

Evidence suggests that during latest Jurassic through Early Cretaceous (Valanginian) time, the Sergipe-Alagoas Basin of northeast Brazil and the Gabon Interior Basin were linked by a transfer zone that formed opposing asymmetric half-grabens. During this time, the northern part of the present-day Interior Basin was located on the southwestward dipping ramp margin of a series of en-echelon, Sergipe-Alagoas Basin related half-grabens. The central part of the basin consisted of the transfer/accommodation zone, while the southern part was positioned in a half-graben ramping to the northeast. This configuration is supported by the marked change in regional structural styles seen seismically across the region. Measured N'Dombo sandstone paleocurrent directions and mapped sandstone geometries support the model illustrating early ramp side and axial drainage in the expected orientations throughout the Interior Basin.

Beginning as early as Hauterivian time, the locus of extension and deposition began to step westward in northern Gabon with the development of the Axial Fault in the southern portion of the Interior Basin, and the N'Toum Fault in the northern portion of the basin. During Barremian-Aptian time, the southern Interior Basin portion of the southward-propagating fracture system was largely abandoned as active faulting and extension shifted further inboard, to the west of the Lambarene Horst. A similar but opposite progression occurred in Brazil, as active deposition and rifting moved to the east, ending first in the Jatoba/Tucano/Reconcavo rift system, and finally in the Sergipe-Alagoas Basin. By Aptian time, crustal attenuation was complete and the final stages of continental breakup were underway with the emplacement of proto-oceanic crust. Transtension occurred in northern Gabon and in its Brazilian counterpart, the Sergipe-Alagoas Basin, as South America moved obliquely away from Africa.

The paleogeographic reconstructions served as a geologically reasonable and consistent structural/stratigraphic framework on which individual basin interpretations were built. They helped to guide the interpretation of basin-wide isopachs, which were created for potential reservoirs, source rocks and seals using all available well, outcrop and seismic control. This approach enabled a better understanding of the area's complex structural and stratigraphic rift evolution, and helped provide reasonably accurate stratigraphic predictions in relatively undrilled areas.