INTERNATIONAL MEETING

Potentially Petroliferous Shelf and Slope Basins Offshore East Central Vietnam

by Joel S. Watkins, Texas A&M University

International Meeting – Monday, May 16, 1994
Social Period, 5:30 p.m., Dinner and Meeting, 6:30 p.m.
Post Oak Doubletree Inn

Complex tectonic evolution in Southeast Asia has produced five basins evident in seismic data collected offshore Vietnam between 10°N and 16°N. These basins belong to three different tectonic families formed at different times and in at least two different stress regimes. From north to south, the basins are the South Hainan, Tam Ky, Quangda, East Mekong, and Northeast ConSon basins.

The South Hainan basin lies on the South China block north of the Red River suture and belongs to a family of basins that formed by stretching of the crust of the southern margin of China during the Paleocene and Eocene. This family includes the Productive Pearl River Mouth basin among others. Basin formation culminated with Oligocene north-south seafloor spreading in the South China Sea. Basement structure consists of east-west trending half-graben. Postrift faulting is minimal.

The other four basins lie on the Indochina block southwest of the Red River suture. West and south of the South Hainan basin, the north-south trending Tam Ky and Quangda basins formed through a combination of north-south right-lateral strikeslip and northwest-southeast extension of probable Eocene-Oligocene age. The Tam Ky basin was formed predominately by strikeslip movement with only modest east-west extension, whereas east-west extension predominates in the Quangda basin. Formation of these basins was largely complete by the time of Early Miocene northwest-southeast seafloor spreading in the South China Sea. The level of post-rift faulting is modest but greater than that in the South Hainan basin.

The northeast-southwest trending East Mekong and Northeast ConSon basins appear to be early-rift stage basins associated with the southwestward migration of seafloor spreading during the Middle-to-Late Miocene. Basin formation probably ended with the cessation of spreading at 15.5 Ma. Fault intensity diminished after spreading ceased, but did not entirely die out, as evidenced by faults offseting the present-day seafloor.

Quangda and Tam Ky trends parallel older north-south fault and fracture trends onshore eastern Vietnam, and East Mekong and Northeast ConSon trends parallel well developed older northeast-southwest fault and fracture trends onshore in southern Vietnam. These relationships suggest that these four basins developed along preexisting zones of lithospheric weakness, possibly in a common stress field. South Hainan basin faulting requires a different stress field.

Drilled basins north, south and west of these basins are underlain by lacustrine sediments containing significant amounts of organic carbon, thermal gradients are high, and amplitude anomalies are evident in the seismic data. These facts suggest that accumulations of hydrocarbons may exist in these basins.

The above basin descriptions are based in part on a Ph.D. dissertation by Sugiarta Wirasantosa, formerly of the Department of Oceanography at Texas A&M University.

Joel S. Watkins – Biographical Sketch

Joel Watkins has had a varied career in geology and geophysics. Following his Ph.D. at the University of Texas at Austin in 1961, he joined the U.S. Geological Survey as a regional geophysicist. This led via a devious path to ground-water seismic refraction and later to lunar explosion seismic studies, for which Watkins received a NASA medal for exceptional scientific achievement for his work on Apollo missions 14, 16 and 17.

With the end of the manned space program, Watkins directed his vision from outer space to inner space, joining Maurice Ewing and others at the Galveston Geophysics Laboratory of the University of Texas (the predecessor of the University of Texas Institute for Geophysics) in 1973. He organized the first university multifold seismic effort, and spent over 12 months at sea collecting data, mainly along the margins of the Gulf, Caribbean, Central America and southwestern Mexico, and the east coast of the U.S. between 1973 and 1977.

He jumped ship to Gulf Oil in 1977, taking the position of Director, Frontier Basin Studies. He held a number of positions in Gulf including Exploration Manager in 1982-83, and Vice-President for Exploration Research in 1983-85. After taking early retirement in 1985, he joined Texas A&M where he headed the Department of Geophysics from 1988-93.

His research interests are in continental margin structure, stratigraphy and petroleum accumulation. He has authored or coauthored over 120 articles and books on continental margins, lunar geophysics and regional structure.