Source Rock Development in Sag Basins: West African Example and Modern Analogs

by Steven G. Henry, EarthView Associates, Inc.

The syn–rift Organic Bucomazi is the source rock associated with the majority of oil accumulations in central West Africa. A new pre–salt source rock, the Falcao Deepwater, is younger and exists in thermal subsidence sag basins west of the Atlantic hinge. This source rock is different, geometrically and geochemically, from the older Organic Bucomazi. Unlike the syn–rift Organic Bucomazi, the Falcao Deepwater is not offset by the rift faulting and is sub-parallel to the base of salt rather than to the rotated basement blocks.

The pre–salt Falcao Deepwater source rock was discovered in the Falcao–1 well drilled in the offshore Kwanza Basin, Angola. It is laterally extensive with over 200 meters of 3 to 6% TOC (values may go as high as 9.5%). At a depth range of 3,700 to 4,150 meters, the source was at peak maturity (R_o1.3) and flowed 26.7°API oil to the surface from fractures in the source interval. The Falcao Deepwater source rock has the ability to charge deep water prospects where the organic Bucomazi is overmature and the post–salt section is immature.

Sag basin geometry and facies distribution (clastic shorelines, carbonate mounds, and source rock basins) are illustrated on speculative seismic data and will be shown on data provided by Geco–Prakla. Modern rifts (the East African Gregory Rift in Kenya and the southern Rio Grande Rift in New Mexico) display many of the characteristics underlying these ancient sag basins. Field studies in these modern rifts will be shown to illustrate the scale and depositional environments preceding the deposition of the Falcao Deepwater source rock.

Biographical Sketch

Steven G. Henry, PhD, is a Geophysical Advisor for EarthView Associates, Inc., in Houston, Texas. He presented this talk at the 1994 AAPG Annual Convention and for his work received the George C. Matson Memorial Award. Steve received B.S.E. (1973), B.S. (1973), M.S. (1978), and Ph.D. (1981) degrees from the University of Michigan. While at the university he published articles of tectonics, seismology, heat flow, and paleomagnetics.

Dr. Henry joined Conoco in 1981 and spent five years in seismic processing and seven years in international exploration. He joined EarthView Associates in 1993 where he coordinates the training services and provides geophysical consulting. He also leads a field trip to the southern Rio Grande Rift. His current research is developing guidelines on how to link faults for improved subsurface mapping.

Steven G. Henry