

**AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003**

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Source Rock Potential of Coal and Carbonaceous Shales of Petroleum Systems in the Eastern Venezuela Basin

Although more than 10% of the petroliferous basins of the world are dominated by non-marine source rocks, the processes and critical factors that control hydrocarbon generation and expulsion in coals and associated carbonaceous shales are not completely understood. Numerous studies, however, suggested that terrestrial organic matter have the capacity to generate and expel commercial quantities of liquids. The origin of oil and gas in the Eastern Venezuela Basin (EVB) is no less controversial than in any other coal-dominated basin. The existence of petroleum source rocks other than the traditional Upper Cretaceous, marine, Querecual Formation has been suggested since the forties but has not been completely verified. This study documents the characteristics of the carbonaceous rocks in EVB. 118 Tertiary samples from 18 outcrop locations and 38 cores from 31 wells were geochemically characterized. The locations spanned the Mountain Front of the La Costa Mountain range and the Serranía Oriental area. Rocks were subjected to a full suite of analyses, including organic microscopy, to assess the organic facies and extent of thermal maturity. Rocks can be classified in three groups: One enriched in vitrinite, one in amorphous OM and a third characteristically exinitic. RockEval Pyrolysis confirmed that last group belongs to the classical type II-III, whereas the other two groups fit into type II kerogen, perhaps caused by enrichment in lipids. Gas Chromatography shows a clear oil-type signature for hydrocarbons generated after hydrous pyrolysis. Our study confirmed the existence of an Oficina (!) Petroleum System in the Eastern Venezuela Basin.