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SEDIMENTARY BASINS AND PETROLEUM POTENTIAL OF PUERTO RICO

D. K. Larue
University of Puerto Rico, Department of Geology, R.U.M. Mayaguez, Puerto Rico 00709-5000

R. Torrini, Jr.
Woodward-Clyde, 5055 Antioch, Overland Park, Kansas 66203 USA

ABSTRACT

The petroleum potential of Puerto Rico is poorly known, owing to a lack of exploration effort. Studies to date have concluded that pre-Eocene basement rocks on the island possess little petroleum potential, although, ironically, the only free oil and gas that has been discovered to date was found in these rocks. Of four middle Tertiary basins on Puerto Rico, the North Coast, San Juan, North Mona, and South Coast, only the San Juan and North Coast basins hold particular promise. The North Mona and South Coast basins contain apparently too little stratal thickness to allow petroleum maturation, given what is known about temperature/depth gradients on Puerto Rico. However, more seismic coverage is needed in the San Juan, South Coast, and North Mona basins. The North Coast and San Juan basins contain up to perhaps 6 km of middle Tertiary and younger strata, probably enough to allow for petroleum maturation. However, sedimentary-organic facies of these deep basinal rocks are essentially unknown because they are not observed in outcrop nor penetrated by drilling. Until these deep basinal facies are explored, the petroleum potential of Puerto Rico cannot be properly assessed.

INTRODUCTION

This work addresses the petroleum potential of Puerto Rico through a description of some of the basins onshore and offshore of the island. Meyerhoff et al. (1983) presented an earlier view of the petroleum potential of Puerto Rico which is updated here with new references, data, and interpretations.

CRETACEOUS-EARLY TERTIARY HISTORY OF PUERTO RICO

Puerto Rico (Figure 1) consists of several sequences separated by major unconformities (for example, Mattson, 1960, 1967). Basement rocks on the island of Puerto Rico include the Bermeja Complex, an Upper Jurassic to Lower Cretaceous dismembered ophiolite-like sequence in southwestern Puerto Rico, and a Lower Cretaceous island arc sequence in central Puerto Rico (Mattson and Pessagno, 1971, 1979). Joyce (1985) suggested that these different basement types are the cores of two discrete tectonostratigraphic terranes. Sedimentary rocks in the Bermeja Complex of southwestern Puerto Rico consist mostly of ribbon cherts and contain essentially no organic material. Lower Cretaceous volcanic sandstones and shales of central Puerto Rico (Mattson, 1967) contain little organic carbon and are overmature (Hayes et al., 1985).

In the Late Cretaceous, island arc volcanism on Puerto Rico resulted in the deposition of thick piles of volcanogenic strata. In southwest Puerto Rico, a complicated arc platform accumulated thick sequences of shelfal and basinal carbonates and volcanic flows (Mattson, 1960). A deep summit basin between southwest Puerto Rico and central Puerto Rico (Figure 1) filled with several kilometers of submarine fan and related facies, consisting of recycled volcanic detritus mixed with carbonate materials. In central and eastern Puerto Rico,