

seismic sequences to be distinguished in the tongue. Correlation of reflectors with well data allows ages, ranging from middle Miocene to Holocene, to be assigned to the seismic sequences.

Sedimentary processes responsible for deposition of each sequence are determined on the basis of external geometry, internal reflection configuration, and where possible, core data. Primary deposits consist of proximal and distal turbidites, and hemipelagites and pelagites. Sediments may be later modified by creep or slumping and sliding. This seismic stratigraphic study allows the depositional history of the Veracruz tongue to be elucidated and aids in the dating of folding and salt movement at the edges of the tongue.

Detailed interpretation of seismic waveforms indicates that gas accumulations are present in the study area. Future seismic stratigraphic studies will allow quantitative evaluation of hydrocarbon potential of the Veracruz tongue and the adjacent foldbelt.

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Miocene Reef at Baixo, Porto Santo (Eastern Atlantic)

In the eastern Atlantic Ocean, living hermatypic scleractinian corals which contain zooxanthellae are found only on the Cape Verde archipelago and the volcanic islands in the Gulf of Guinea. In the same region, the islands of Madeira and Porto Santo, with its outliers Baixo and Cima, yield similar hermatypic scleractinian corals of Miocene age. Porto Santo is almost entirely volcanic, but coral reefs were established there in the Miocene. Recent study has revealed interesting facts regarding the reef's paleoecology and stratigraphy.

The environment of the Porto Santo reefs in Miocene time appears to be similar to that of reefs which colonized the submarine slopes of Krakatoa (West Java) seven years after its great eruption. In that example, the corals suffered much from tephra deposition on the sea floor. The Baixo locality, however, is situated at the outermost fringe of the Porto Santo volcano. It is conceivable that this spot was less affected by tephra deposition than other localities, so that the Baixo coral fauna is far more diverse than any other Porto Santo locality. So far, nine hermatypic and nine ahermatypic coral genera have been found in this fossil reef. Two hermatypes have branching colonies (*Pocillopora* and *Stylophora*), one is ramose or massive (*Porites*), and the other six (*Acanthastrea*, *Montastrea*, and the *Haliastrea* group) are massive reef constructors. *Pocillopora*, originally described as a tabulate coral by Mayer in 1864, is the most important coral of the Baixo reef. The presence of these reef-building corals in the eastern Atlantic in the Miocene also sheds new light on the evolution and paleozoogeography of the Tethyan coral fauna, especially after the Tethys Ocean was severed by tectonic movement in the late Miocene.

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Hydrocarbon Habitat in Main Producing Areas, Saudi Arabia

Current hydrocarbon production in Saudi Arabia is from reservoirs of Cretaceous and Jurassic age. Geochemical studies of the sediments and oils suggest that the hydrocarbons were derived from two separate source-rock provinces. Oil produc-

tion from the large fields in the southern part of the area is from Jurassic carbonate reservoirs. Most of these oils were derived from thermally mature, thinly laminated, organic-rich carbonate rocks of Jurassic age (Callovian-Kimmeridgian). These source rocks were deposited in an intra-shelf basin which is limited to the southern part of the main producing areas. Extensive vertical migration of oils in these sediments is prevented by superjacent evaporite seals deposited during Late Jurassic.

Fields in the westernmost and northern producing areas appear to have derived their hydrocarbons from a source-rock province to the north. Production from Cretaceous clastic and carbonate reservoirs is limited to the northeastern part of the producing areas. This distribution may be explained by limitation of thermally mature Cretaceous source rocks to the northeastern areas or by the lack of subjacent evaporite seals to separate these reservoirs from Jurassic source rocks.

Thermal maturation studies indicate that the hydrocarbons in Mesozoic reservoirs migrated into the present traps during the early Tertiary.

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Rift Basins in Western Margin of India with Special Reference to Kutch Basin and its Hydrocarbon Prospects

The western continental margin of India can be classed as a divergent or passive margin. The western continental shelf is an extensive carbonate bank (Bombay offshore basin) passing into clastic sediments to the north and south. Three craton-margin embayed basins, Kutch, Cambay, and Narmada, in the northern part of the shelf, are filled with predominantly clastic sediments. These basins occupy grabens bounded by faults diverging seaward. The grabens were formed by three rift systems along major Precambrian tectonic trends. The rifting developed sequentially from north to south around the Saurashtra horst. Kutch basin was formed in the Early Jurassic, followed by Cambay basin in Early Cretaceous and Narmada basin in Late Cretaceous. It appears that these rifting events occurred at successive stages during the northward migration of the Indian plate after its break from Gondwanaland in Late Triassic or Early Jurassic. It is inferred that these rift basins opened up successively as a result of the drift of the Indian craton anticlockwise.

Bombay offshore and Cambay are two major oil producing basins in the western margin. These basins are characterized by high geothermal gradients attributed to the shallowness of the mantle in this region.

Oil has not been found in Kutch basin. This is mainly a Mesozoic onshore basin. The basin depocenter shifted offshore in the northwestern part of the continental shelf where the shelf is wider. The onshore-offshore prospects of this basin are discussed considering global tectonics and basin history.

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Geophysical Logs and Marine Zones as Useful Coal-Exploration Tools in Southern West Virginia

The coal resources study currently in progress at the West Virginia Geological and Economic Survey using gamma-ray logs, density logs, core logs, and marine zones aids in regional correlation problems in the stratigraphically complex, coal-