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Plates Tectonic Evolution and Formation of Oil and Gas Provinces

Some of the world's largest oil and gas basins such as the Persian Gulf may form by migration of hydrocarbons from Recent and old zones of underthrusting of lithosphere plates (subduction zones). Estimated potential reserves of this basin approach 100 billion tons, that is approximately one-third of the total resources of the world.

Throughout Paleozoic, Mesozoic, and the beginning of Cenozoic era the northeastern edge of the Arabian Peninsula was a passive continental margin of the Atlantic type. Thick bodies of clastic marine sediments accumulated on the continental slope at the foot of this margin. Throughout the Mesozoic, the continental slope of Arabia was situated near an equatorial zone of high biological productivity, which made the concentration of organic matter in the Mesozoic deposits of this region relatively high. But the organic matter and hydrocarbons of these sediments remained dispersed and at that time there were no large accumulations of oil and gas.

With the beginning of closure of the Tethys Ocean the northward drift of the African-Arabian plate led to a gradual convergence of the continental margin of Arabia with the Zagros arc.

Hydrocarbons generated in these zones via thermolysis of organic matter locked in sediments overridden by island arcs that thrust over the passive continental margins. This mechanism of generation and migration of HC is an extremely productive one. It explains enormous productivity of the process of oil and gas formation in subduction zones, compensating for the hydrocarbon losses during their migration into the pericratonic foredeeps.