

Tectonic Model for Closure of Tethys Ocean and Development of Caucasus Mountains, Republic of Georgia, with Possible Maintenance of Hydrocarbon Reservoirs

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The northward drift of the African plate, including the Arabian sub-plate, and the closing of the Tethys ocean continues to the present. The Greater and Lesser Caucasus Mountains of the Republic of Georgia are remnants of the first of several separate subduction episodes as the African/Arabian plate migrated northward. At present, flat subduction is proceeding under the landmass of western Turkey, Iraq, and Iran and extends no farther northward than the present abundance of earthquakes.

The advancing plate may have had an extensive forearc. Once this forearc came into definite contact with Eurasia in the form of the Russian craton, the northernmost portion of the forearc became “wedged” against the craton and broke off from the rest of the forearc. These broken portions began to subduct and became the Caucasus Mountains. Continuing plate compression resulted in the development of the Zagros Mountains along with salt extrusion. Present subduction occurs beneath the Persian Gulf and extends northwesterly as the Euphrates fault zone across Iraq.

Regional compression is evidenced by the ever shrinking size of the Gulf and compressive folds across the Zagros. The advancing African/Arabian Plate traveled through warm tropical waters, conducive to creation of coral reefs and limey muds as well as abundant organics. These organics may be reservoired within the limestones and upon suitable burial, due to further deposition and/or subduction, converted into hydrocarbons and subsequently re-reservoired. Given that the entirety of the Caucasus Mountains have not been subducted to great depths, these limestones may contain hydrocarbons from before collision with Eurasia, developed during the phase of the Tethys closing, as well as heating from partial subduction against Eurasia. The Caucasus Mountains may, therefore, be a promising target for petroleum exploration.