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Neotectonic dynamics and fluid re-migration in Azerbaijan: insights from GPS and seismic profiles

Fidan Aslanzade¹, Beyler Aslanov², Rauf Aliyarov², and Ilkin Safarli³

¹French-Azerbaijani Univeristy (ASOIU), Earth Sciences, Baku, Azerbaijan (fidan.aslanzada@ufaz.az)

²Geotechnological Problems of Oil, Gas and Chemistry Institute (ASOIU)

³Azerbaijan State Oil and Industrial University

The territory of Azerbaijan lies within the Mediterranean fold belt that is characterized by intensive geodynamic activity. The tectonic processes correlate with extensive multidirectional fracture-fault complications along the borders of mobile blocks. Our research aimed to identify the block structures in Azerbaijan that have been most significantly affected by neogeodynamics (23 Ma to the present). The methodology incorporated the analysis of recent regional and local deep sections combining seismic and GPS data that document the horizontal movement rates of lithospheric plates inside the central segment of the Alpine-Himalayan fold belt. A particular focus was placed on evaluating the effects of the Arabian Plate's displacement (15.2–22.2 mm/year). The greatest intensity of geodynamic processes is noted in two primary directions: northward and northwestward. Geodynamic movements are observed in three orientations: north-south, anti-Caucasian, and general Caucasian. GPS data revealed that the horizontal displacement rate in the north-south direction has the greatest magnitude in eastern Iran and northern Oman (9.2–11.2 mm/year), in contrast to the Caucasus (4.2 mm/year). In the Caucasus region, in addition to geodynamic forces, rotational processes have been identified, attributed to the interaction between anti-Caucasian and general Caucasian tectonic forces. We believe that the multidirectional movements of the Arabian Plate generate a complicated geodynamic environment. Additional observations indicate a difference between the tectonic structure of the offshore and onshore sections of the belt. Apart from that, we reviewed the hydrocarbon potential of Miocene formations, reconstructing the evolutionary history of reservoir structures in relation to neotectonic movements and their orientations.