LATE CENOZOIC TECTONICS OFTHE SOUTH CASPIAN REGION

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Late Cenozoic deformation and sedimentation in the South Caspian region are controlled by the Arabia-Eurasia collision. Plate convergence causes thrust and strike-slip deformation in the mountain ranges surrounding the South Caspian Basin – namely the Greater Caucasus, Talesh, Albroz and Kopet Dagh. Deformation in the Greater Caucasus and Kopet Dagh propagates laterally as well as towards the respective forelands, producing young and active folds in the Apsheron Sill across the northern margin of the South Caspian Basin.

Analysis of the seismotectonic data in the circum-Caspian region is complicated by the unreliability of the routinely-published earthquake focal mechanisms and locations. Over the last 5 years a major effort has been underway at Cambridge to improve this situation by determining accurate mechanisms and focal depths from teleseismic body waves, and accurate local velocity structures from receiver function analysis. We now have a good idea of crustal and sediment thickness variations in Azerbaijan and Turkmenistan and of focal depths in all areas. Earthquakes on the Apsheron Sill reach depths of almost 100 km, with a variety of mechanisms, including normal faulting. Low-angle thrusting dominates the Talesh and Greater Caucasus. Higher-angle faulting is accompanied by left-lateral strike-slip in the Albroz, whereas the Kopet Dagh shows a great variety of normal, thrust and strike-slip mechanisms.The propagation characteristics of Pn, Sn and Lg across the South Caspian Basin confirm the apparently oceanic character of its basement.

In the northwest of the South Caspian Basin and adjacent onshore regions of Azerbaijan clastic sediments of the Pliocene Productive Series are deformed into large scale folds: these are respectively the main hydrocarbon reservoir rocks and trap structures of the region. The main folds are internally deformed by a hierarchy of smaller scale structures, from thrusts and strike-slip faults with displacements in the order of hundreds of meters, to veins, joints and granulation seams. Exposed analogues for sub-surface folds show the role of sub-seismic resolution faults in controlling hydrocarbon migration through reservoir sandstones.