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Geodynamics and active faults of the pseudosubduction zone in Greater Caucasus on the basis of seismological data (within Azerbaijan)

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With this study we explain the active tectonics of the southern slope of the Greater Caucasus within Azerbaijan as the underthrusting (pseudo-subduction) of the South Caspian microplate beneath the Northern Caucasus. This underthrusting has led to the tectonic stratification of the Alpine formations into various scale allochthonous and parautochthonous plates of the southern vergence. We propose that this process took place in the time interval of the Middle Bajocian-Quarter. These plates are grouped into several napping complexes that form the modern structure of the Southern slope of the Greater Caucasus; a large linearly stretched tectonic unit (megazone) corresponding to the axial part of the Alpine marginal sea basin, the consolidated crust of which has been subjected to thinning. The alpine cover is pinched in the under-thrust zone and pushed in the southern direction with the formation of an accretionary prism, allochthonously overlapping the northern side of the Southern Caucasus microplate by a system of gentle over-thrusts. From the end of the Miocene, intensive lateral compression has caused the injection of the frontal wedge of the Arabian indentor into buffer structures. This is shown particularly well on GPS velocity vectors, indicating the convergence of about 25 mm/yr between the Southern Caucasus block and Northern Caucasus microplates. We suggest that, this is a result of the pseudosubduction regime (S-subduction). We also suggest that this process is the reason for the observed seismic activity, which is spatially confined mainly to the field of accretionary prism and adjacent to it seismically active region witin Southern Caucasus microplate.

We also carried out analysis and correlation of seismic events in this area by studying of focal mechanisms for all felt earthquakes occurred in 2012-2016. It was found that the earthquakes foci are confined mainly to the crossing nodes of different directed faults or to the planes of deep tectonic disruptions and lateral displacement of unstable contacts material complexes of varying competence. Focal mechanisms of seismic events show a variety of predominantly near-vertical fault-planes with strike-slip-normal slip vectors, but in general, the earthquakes foci are confined to the crossing faults within the “general-Caucasus” and “anti-Caucasus” tectonic belts.

Seismic events of last years indicate that, at the present stage of crustal deformation, the most seismically active structures are on the north flank of the Southern Caucasus microplate controlled by the Ganykh-Ayrichay-Alat deep thrust fault which is located at the boundary of Kakheti-Vandam-Gobustan and Ajinohur structural zones (northern flank of Middle Kura depression) in the west (North-west oriented right lateral dislocations of the Western Caspian zone). The submeridional right-lateral zone of the West-Caspian fault in eastern Azerbaijan is part of the Greater Caucasus. The results of these studies can be help to improve our basic understanding of the geodynamics and seismic activity of the Greater Caucasus and adjacent areas.