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Features of the Caucasian segment of the Alpine-Himalayan-Indonesian Convergence Zone

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The Caucasus Mountain System is a part of the Cenozoic Alpine-Himalayan-Indonesian Convergence Zone (AHICZ) which lasted throughout Eurasia from Western Mediterranean to Western Pacific. This belt has been formed after closure of the Mesozoic Tethys and is marked by mountains building processes, appearance of riftogenic structures, numerous late Cenozoic basaltic plateaus, and chain of often within-continental andesite-latite volcanic arcs, which trace suture zones of the continental plates collision.

Caucasus Mountains are located in eastern part of the proper Alpine Zone in zone of Arabian-Eurasian syntaxis and appeared as a result of submeridional pressure which generated by oncoming moving of these plates. The Great Caucasus is represent the south border of the Eurasian plate, uplifted along the Main Caucasian Fault (Thrust). The latter is a part of super-regional deep-seated fault ranged from the Kopetdag through Caspian Sea, Caucasus and Crimea; very likely, that its further continuation is Tornquist-Teisseyre Zone. This superfault separates areas of Alpine convergence from Eurasian plate sensu stricto.

The Caucasus occurred between Black and Caspian seas with passive margins and oceanic crust, covered by sediments of 10-15 km thick. Depressions of the seas form large “downfall”, or caldrons which cut off pre-Pliocene structures of Caucasus and Kopetdag. These seas are, probably, small remnants of the Tethys which gradually shallowing in the Miocene (Zonenshain, Le Pichon, 1986). New essential deepening of the Black Sea and South-Caspian deep began in the Pliocene- Quaternary; it occurred simultaneously with uprising of Crimea and Caucasus, which were not marked in relief before (Grachev, 2000).

Large positive isostatic anomaly beneath the Trans-Caucasian Transverse Uplift (TCTU) of the Great Caucasus and Lesser Caucasus, which stretch out to Arabian plate, occurred between “subsides” Black and especially Caspian seas with neutral to negative isostatic anomalies (Artemiev, 1973; Artemieva et al., 2006). We suggest that the positive anomaly considers with ascending of a mantle plume and .negative anomalies – with descending mantle flows on each its side (Sharkov, 2011).

The main feature of this segment of the AHICZ is a presence of two late Cenozoic andesite-latite volcanic arcs: Anatolian-Caucasian and Caucasian-Elbursian, which jointed in area of TCTU. Such type of volcanism is also traced to the south practically through the whole zone of the syntaxis till to Van Lake area in Turkey. These volcanics are close to subduction-related magmas on their petrological and geochemical features, however, there are no clear evidences of the present-day subduction in the area of Neogene-Quaternary volcanism: crustal-level earthquakes predominated here (Gugunava, 1981; Sandvol et al., 2003). It suggests that such type of magmatism appeared as a result of interaction of a mantle plume head with continental crust under condition of continental plates collision (Lebedev et al., 2011).

So, the Caucasus is an area of the present-day active interaction of deep-seated mantle processes with shallow lithosphere under conditions of the largest modern convergence zone.