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TRANSCAUCASUS: Record of 200 My plume activity

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Transcaucasus - the westernmost part of the southern Caucasus, represents an area where the Tethys Ocean was closed in the Late Cenozoic because of Eurasian and Africa-Arabian plate convergence. The lithosphere of the region represents a collage of Tethyan, Eurasian, and Gondwanan terranes. During the Late Proterozoic–Early Cenozoic a system of island arc and back-arc basins existed within the convergence zone. Geological and palaeogeographical data supported by paleomagnetic studies indicate the presence of several tectonic units in the regions that have distinctive geological histories.

The region comprises a 30-55 km thick continental crust with significant lateral variations in thickness of the overlying sediments (0-25 km). The travel times velocity anomalies of the P- and S-waves are interpreted as high-velocity bodies down to about 100 km depth, where the mantle lithosphere is thin or even missing.

The Mesozoic-Cenozoic magmatic assemblages reflect a diversity of paleogeographic -paleotectonic environments. They are indicative of a west Pacific-type oceanic basin setting under which the mature continental North Transcaucasian arc developed with zones of rifting and alkaline basaltic volcanism on the active margins of the oceanic domain.

Within-plate magmatic activity in the North Transcaucasus is represented by volcanic and plutonic complexes, including Late Triassic to Early Jurassic subaerial alkali basalts and alkali gabbro; the Late Bathonian-Late Jurassic high titanium alkali basalts and minor trachytes with coal-bearing shales and evaporites intercalations; Albian alkali basalts alternating with redeposited volcaniclastics and shallow marine carbonates.

The Late Cretaceous volcanics are associated with intraplate-type titanium rich alkali basalts and basanites with minor trachytes and phonolites, while the Eocene volcanics are associated with highly potassic to ultrapotassic basalts and basanites. The Late Miocene-Pleistocene volcanism is represented by alkaline basalt-trachytes as well.

The Great Caucasus, a NW–SE-directed mountain range, extends westwards along the pre-Caucasian strip of the Eastern Black Sea and is bounded to the south by the Transcaucasian Massif. The shoreline of the Eastern Black Sea Basin cuts off the Colchis intermontane trough

formed over the rigid Georgian Block, the Achara–Trialeti trough and the Artvin–Bolnisi rigid block.

Onshore and offshore data confirm that the subaerial structures have immediate submarine prolongations. Deep drilling conducted within the onshore zone of the Transcaucasus, in the immediate vicinity of the shoreline, revealed that the volcanic formations below the modern sea level extend further into the Eastern Black Sea basin.

Recent data on structure and evolution of the Transcaucasus and adjacent area provide new constraints on the geological history of the lithosphere of the region, particularly on the Eastern Black Sea basin located in the collision zone between Eurasian and Africa-Arabian lithosphere plates, proximal to ancient sutures.