



## Strike-slip and extrusion tectonics of the Greater Caucasus-Kopetdagh region

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In the Paleogene-Early Miocene, the areas of the modern Greater Caucasus and Kopetdagh were occupied by marginal seas (parts of the Paratethys intracontinental sea) inheriting the Cretaceous back-arc basins. In the Early Miocene, a collisional compression of the seas began at the time when the Arabian plate detached from Africa to move northward. The compression proceeded in a good accordance with the Arabia movement that was manifested in a general synchronicity of the Late Alpine orogenies in the Caucasus and Kopetdagh with the rifting and spreading phases in the Aden Gulf and the Red Sea. The earliest orogeny was the Styrian one of the terminal Early Miocene. It corresponds to the initial stage of the rift opening and was mostly pronounced in the east, in Kopetdagh and East Iran, where a recent structure has been formed by the initial Middle Miocene. In the Greater Caucasus, the Styrian deformations occurred in its central part only (i.e. in front of the Arabian plate northern tip) where the main Caucasian thrusts and conjugate asymmetrical megaanticline of the Central Caucasus were formed. An essential feature of the earliest, Styrian, structure of the whole Caucasus-Kopetdagh region was a series of regional right-lateral strike-slip faults. In the Kopetdagh, the strike-slips have no submeridional but northwestern direction although they occurred in the northern continuation of the submeridional right-lateral strike-slip faults framing the Lut block. In the Caucasus, they became even sublatitudinal, in parallel with the North Anatolian fault, thus constituting a single domain with the latter. So, the right-lateral strike-slip faults of East Iran, Kopetdagh, and the Caucasus compose an extensive arc convex to the north and appeared probably as a result of the right-lateral shear caused by the known counterclockwise rotation of the Arabian lithospheric plate. The Middle Miocene was characterized by a tectonic pause both in the Red Sea-Aden rift system and in the Caucasus-Kopetdagh chain. Tectonic movements restarted in the end of the Sarmatian (Late Miocene) simultaneously with the northward propagation of the Levantine fault and some changes in direction of the Arabian plate movement. A folding of the Attic and Rhodanian phases, which were the main ones in the Greater Caucasus, extended over the whole orogen, especially to the east. A pressure from the moving Arabian indenter was mainly directed to the Alborz region, from where strike-slips of different kinematics extended symmetrically: NW-SE up to sublatitudinal right-lateral faults in the Caucasus and NE-SW left-lateral faults in the East Alborz and West Kopetdagh. The S-E extension between the Caucasian and Kopetdaghian blocks was compensated by a formation of the South Caspian meridional graben whereas the compression in front of a northern tip of each block advanced northward brought about a formation of the corresponding Caucasian and Kopetdaghian syntaxes. Each of the syntaxes has a  $\lambda$ -like pattern in plan. In the south, it represents a northwardly convex orogenic arc framing the corresponding block that moved to the north, that are the Lesser Caucasian arc and the Khorassan, or South Kopetdaghian, arc (arrangement of strike-slip faults of different kinematics and paleomagnetic data suggest that the both arcs extended to the north). In the north, at the margin of the Scythian-Turanian young platform, there is a straight orogenic chain of the NW-SE strike composed by the Great Caucasian orogen and the Forward anticlinal chain of the Northern Kopetdagh. Both frontal chains experienced a transverse compression as well as a noticeable longitudinal lengthening and a dextral transpression. The Forward anticlinal chain of the Northern Kopetdagh was elongated in the course of domino-like rotation of a series of rigid slices bordered by right-lateral strike-slip faults whereas the Great Caucasian orogen was elongated by a ductile deformation of rhomb- and lense-shaped blocks limited by right- and left-lateral strike-slips. In the terminal Pliocene-Quaternary, the collision deformations of the Rhodanian and Valakhian orogenies caused a lateral escape of rock masses from the Caucasian and Kopetdaghian syntaxes to the South Caspian depression that played a role of a peculiar "geodynamic shelter" for the extruded masses.

Thus, the strike-slip-related structural pattern of the Caucasus-Kopetdagh region was formed in accordance with the kinematics of the Arabian plate movement. Effects of the plate pressure are manifested in a neotectonic structural pattern of a platform area to the north of the Caucasus and Kopetdagh.