



Active deformation of the northern front of the Eastern Great Caucasus

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The Arabia-Eurasia collision involved a mosaic of island arcs and microcontinents. Their accretion to the complex paleogeographic margin of Neotethys was marked by numerous collisional events. The Greater Caucasus constitute the northernmost tectonic element of this tectonic collage, developed as a back arc extensional zone now inverted, which relationships to the onset of Arabia-Eurasia continental collision and/or to the reorganization of the Arabia-Eurasia plate boundary at ~ 5 Ma remain controversial.

Structurally, the Greater Caucasus are a former continental back arc rift, now the locus of ongoing continental shortening. Modern geodetic observations suggest that in the west, the strain north of the Armenian Plateau is accommodated almost exclusively along the margins of the Greater Caucasus. This differs from regions further east where strain accommodation is distributed across both the Lesser and Greater Caucasus, and within the Greater Caucasus range, with a unique southward vergence.

We question here the amount and mechanisms by which the Eastern Greater Caucasus accommodate part of the Arabia-Eurasia convergence. Morphostructural analysis of the folded late Pleistocene marine terrace along the northern slope of the Eastern Greater Caucasus evidences an on going tectonic activity in the area where GPS measurements record no motion. Most of the recent foreland deformation is accommodated by south-vergent folds and thrust, i. e. opposite to the vergence of the Caucasus frontal northern thrust. A progressive unconformity in the folded beds shows that it was already active during the late Pliocene. Cosmogenic dating of the terrace and kinematic restoration of the remnant terrace, linked to the subsurface geology allows for the estimation of a shortening rate ranging from a few mm/yr to 1 cm/yr over the last 5 Myr along the greater Caucasus northern front. Thus more than one third of the shortening between the Kura block / Lesser Caucasus domain and the Stable Eurasia is at present accommodated along the Northern Caucasus Front. The Eastern Greater Caucasus therefore behave as a rigid block.

We interpret this distribution of shortening, by revisiting the structural interpretation of the Eastern Greater Caucasus. Shortening caused the inversion of the Jurassic basins rifted in a back arc setting along the Scythian platform. It is now distributed along two major crustal ramps. The main one is dipping north and corresponds to the Greater Caucasus southern thrust front, which emerges in the Kura basin, and the second one is the northern boundary of the Greater Caucasus, which formerly corresponds to the Greater Caucasus north boundary. Following early initiation of shortening during Pliocene, the Greater Caucasus rift was rapidly isolated as a rigid block passively inverted between these two major crustal structures.