



The Caucasian-Anatolian Geotraverse: sequential terrane accretion and incremental intraplate deformation in the hinterland of the Arabia-Eurasia suture zone.

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We present the main results of a multidisciplinary study assessing geological, geophysical and geomorphological signals induced by lithosphere and/or deep mantle dynamics on the morphotectonic evolution along a ca. 700 km-long traverse stretching from the Greater Caucasus, across the Lesser Caucasus and eastern Anatolia, into the Arabia-Eurasia suture zone and the northernmost Arabian platform. The results define a complex history punctuated by sequential terrane accretion and incremental deformation culminating in the Arabia-Eurasia collision and the coeval deformation of a wide swath of the European hinterland.

The inversion of the prominent positive linear anomalies of the regional gravity field defines discrete crustal density inhomogeneities, which can be interpreted as related to specific tectonic events, thus placing cogent constraints on the accretionary history and the overall anatomy of the eastern Anatolian-Caucasian lithospheric agglomerate. Three linear belts of intracrustal increased density mark the presence of suture zones along (i) the Greater Caucasus, (ii) the Lesser Caucasus, and (iii) a previously unidentified parallel belt ca. 80 km south of the Lesser Caucasus. The latter gravity anomaly delineates the southwestern margin of the South Armenian Block, a lithospheric element (microplate) whose existence has long been a matter of debate.

In the Caucasian domain intraplate deformation was triggered by far-field propagation of plate-margin collisional stress which focused preferentially along rheologically weak zones such as the

Greater Caucasus and the adjacent Adjara-Trialeti fold-and-thrust belt of Georgia, two intraplate orogens produced by structural inversion of parallel continental rift zones located on the Eurasian plate. The integration of multiple thermochronometric techniques and peak-temperature determinations shows that structural inversion was punctuated by two incremental steps starting in the Late Cretaceous and the mid-Miocene. The two episodes of intraplate structural inversion, exhumation, and sediment generation are chronologically and physically correlated with the docking of (i) the South Armenian microplate and the Anatolide-Tauride-Armenian terrane (Late Cretaceous - Paleocene) and (ii) Arabia (Miocene hard collision) against the southern Eurasian plate margin.

As to the Lesser Caucasus of Armenia and Azerbaijan, the thermochronologic record of the Late Cretaceous cooling/exhumation event is still present only in a relatively small area of the upper plate of the Amasia-Sevan-Akera (ASA) suture zone where later exhumation has been thermochronologically insignificant. More commonly, rapid cooling/exhumation, which occurred in the Early-Middle Miocene in both the lower and upper plates of the ASA suture zone, has overprinted and obscured previous thermochronologic signatures. Miocene contractional reactivation of the ASA suture zone occurred contemporaneously with the main phase of shortening and exhumation along the Bitlis suture zone marking the Arabia-Eurasia hard collision.

The elevation of marine deposits across the eastern Anatolian Plateau indicates a post-collisional surface uplift of ~2,000 m. This uplift occurred in two steps: (i) at 10–11 Ma with the opening of a slab window and the concomitant arrival of a mantle flow from Arabia, both processes supporting dynamically the topography, and (ii) at ~5 Ma with the continued inflow coupled with the isostatic response to the ongoing crustal shortening.