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Tectonic structure and evolution of Eastern Anatolia – insights from new petrologic data and possible lateral correlations

Roland Oberhänsli (1), Amaury Pourteau (1), Osman Candan (2), Romain Bousquet (3), Mete Çetinkaplan (2), and Ersin Koralay (2)

(1) Institut für Erd- und Umweltwissenschaften, Universität Potsdam, Potsdam, Germany (pourteau@geo.uni-potsdam.de), (2) Department of Geological Engineering, Dokuz Eylül University, Izmir, Turkey, (3) Institute of Geosciences, Kiel University, Kiel, Germany

Modern Eastern Anatolia is a high-plateau region characterized by active N–S crustal shortening, mostly accommodated along strike-slip faults, and recent, abundant volcanism. Due to the extensive Cenozoic marine and Quaternary volcano-sedimentary covers, Tetyhan palaeogeography and related tectonic settings, and thence their impact on modern strain partitioning, in this region are particularly difficult to unravel, and therefore remains strongly debated. According to recent works in Armenia and northernmost Eastern Anatolia, blueschists dated to middle Cretaceous times record the accretion of the South-Armenian Block to the southern Eurasian margin, now separated by the Sevan–Akera Suture. Further south, we recently documented Late Cretaceous HP–LT metamorphism in the Bitlis Complex, which belongs to a micro-continental block isolated between the South-Armenian Block and the Arabian Platform. In order to gain further insights into Eastern Anatolia's tectonic architecture, and its continuation into the better-established Central and Western Anatolian tectonic domains, we collected petrologic data from slightly- to strongly metamorphosed sedimentary and crustal lithologies of scattered localities of SE Anatolia, west and north of the Bitlis Complex.

From our field observations, we report only low-grade metamorphic assemblages in metasedimentary rocks of the Pütürge Massif, which was commonly considered as the western equivalent of the Bitlis Massif, but obviously did, in contrast to the latter, not experienced HP–LT metamorphism. Nevertheless, glaucophane-bearing rocks were found farther west, north of Adıyaman, might represent the west continuation of the Bitlis HP Complex. From near Malatya, north of the Pütürge Massif and south of the Eastern Tauride non-metamorphosed carbonate platform, eastwards via Elazig and Bingöl, to Ağrı, between the Bitlis Massif and the South-Armenian Block, we found numerous, scattered occurrences of HT metamorphic assemblages in metasedimentary rocks, likely belonging to the South-Armenian Block. These findings outline a HT metamorphic belt continuous over ca. 500 km. Assuming that amphibolites recently reported from near Malatya are part of the same belt, we envisage that HT metamorphism might have taken place during the Late Cretaceous. No hint for a westward continuation of the HT metamorphic belt was found, but it might correlate eastwards with the Sirjan–Sanandaj magmatic belt in NW Iran. The Malatya–Ağrı HT belt might record the same back-arc rifting event as the one responsible for the genesis of oceanic material obducted as the Khoy Ophiolites in NW Iran. We take this as a strong indication that, before collision, the Bitlis Block, the South-Armenian Block and, to the west, the Anatolide–Tauride Block might have been separated micro-continents. Compiling the petrologic record points to the successive accretion of several micro-continental blocks during the middle Cretaceous to the early Eocene, and to a highly-segmented East-Anatolian lithosphere prior to the Neogene.