

New Data and Interpretation on the Development of the South East Anatolian Orogenic Belt

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This paper describes the orogenic evolution of the South East Anatolian orogenic belt based on new geological, geochemical and geophysical data.

Southeast Anatolia underwent two major stages of nappe emplacements. The first one occurred during the late Cretaceous. During this period a giant ophiolite slab and some thrust slices dragged under the obducting ophiolite were emplaced on to the northern edge of the Arabian Platform. This ophiolite and the other constituent tectonic elements represent a supra subduction zone proto ophiolite which is dated to be about 90 m y old, and formed as a result of the northerly subducting of an older oceanic lithosphere (Southern branch of the Neo Tethyan ocean) which had been generated during the Late Triassic-Jurassic period. The total consumption of this older oceanic lithosphere led to a collision between the forearc of the newly developed SSZ ophiolite and the Arabian Plate. This emplacement event survived from the Turonian till the end of Early Maastrichtian period.

The collision trapped the rollback of the subducting oceanic lithosphere, and this was followed by the break. Therefore an oceanic realm remained unclosed to the north on this oceanic basin, and thus the sediment deposition in the deep sea environment continued uninterrupted till the end of middle Eocene. A new subduction began in this ocean as evidenced by the seismic tomography data. This new subduction and the associated events caused generation of a chain of geological events during the course of the orogenic development which led to the formation of the Bitlis Metamorphic Massif from the Taurus Range, the Berit metamorphic ophiolite assemblage, and a young oceanic assemblage and its younger volcanic cover succession (i.e. Elbistan ophiolite and the Göksun volcanic arc).

Initial development of the South Eastern Anatolian orogenic belt began in the north independently from the Arabian plate, where ophiolitic slices accreted to the Taurus. Later new tectonic entities began to be accreted to this progressively growing and southerly transporting nappe stack. Accretion of the new tectonic elements continued till the late Eocene period when the initial contact of this growing accretionary complex with the Arabian plate began. From that time onward the further convergence between these two major tectonic units has been accommodated mostly by the shortening of the upper plate. Three first order, East- West trending tectonic belt formed when the major nappe emplacement period ended in the late Miocene. These are from the south to the north; The Arabian Platform, the Zone of imbrication and the Nappes. The orogene began to rise after the late Miocene and it is continuing during the present.

Further convergence after the late Miocene began to be accommodated by three semi independently behaving escape zones ;

1. In the Arabian Foreland the stress partitioned is observed between alternating left lateral strike slip faults and revers fault
2. A steep angle, NE trending ,subduction Transform edge propagator fault zone ;The Kyrenia-Misis-Göksun transform Fault zone. A shallow break off of the subducting oceanic lithosphere is recorded in the seismic tomography data obtained across the Eastern Turkey. This possibly occurred around 10-15 my ago. The break off was accommodated partly along this fault zone as opposed to the Kazurin Fault zone on the eastern edge of the Arabian plate in Iran.
3. The East Anatolian Transform Fault; transferring the N-S compressional stress to a westerly escape.

All of these three escape systems appear to be continuing simultaneously as evidenced by the present seismic activities.