

Tectonic and Geodynamic evolution of Eastern Iran

The Arkot Dağ Mélange Central Turkey: evidences for the geodynamic evolution of the Intra-Pontide suture zone

Luca Pandolfi^{1,2}, M.Cemal Göncüoğlu³, Michele Marroni^{1,2}, Alessandro Ellero², Giuseppe Ottria², Rita Catanzariti², U. Kagan Tekin⁴, Kaan Sayit^{3,5}

¹*Dipartimento di Scienze della Terra, Università di Pisa, Italy*

²*Istituto di Geoscienze e Georisorse, CNR, Pisa, Italy*

³*Department of Geological Engineering, Middle East Technical University, Ankara, Turkey*

⁴*Department of Geological Engineering, Hacettepe University, Ankara, Turkey*

⁵*Department of Geological Sciences, San Diego State University, San Diego, USA*

Abstract

The geological setting of Turkey can be described as an assemblage of continental terranes separated by ophiolite-bearing suture zones that mark the areas where the PaleoTethyan and NeoTethyan oceanic basins were destroyed. In northern Turkey, one of the most important suture zones is represented by the Intra-Pontide one consisting of an east-west trending belt of deformed and/or metamorphic units located at the boundary between the Istanbul-Zonguldak terrane to the north and the Sakarya terrane to the south. These units can be regarded as issued from the Intra-Pontide domain, whose geodynamic history is still a matter of debate. Along the Akpınar-Araç-Bayramoren geotraverse, located in central Turkey, an ophiolite-bearing mélange, known as the Arkot Dağ Mélange, is well-exposed along the Intra-Pontide suture zone. The Arkot Dağ Mélange can be described as an Upper Santonian chaotic sedimentary deposit consisting of an up to 1000-m-thick succession of slide-blocks of different sizes and lithologies enclosed in a sedimentary matrix consisting of shales, coarse-grained arenites, pebbly mudstones and pebbly sandstones. The slide-blocks, from a few meters to hectometers in size, are represented by metamorphic rocks (mainly micaschists and gneisses), by ophiolites (peridotites, gabbros, IAT and BAB basalts and cherts) and by sedimentary rocks (cherts, neritic and pelagic limestone, marly limestone and ophiolite-bearing turbidites). The youngest age among the slide-blocks has been provided by the ophiolite-bearing turbidites where a late Coniacian nannofossil assemblage has been found. The cherts have provided a wide range of ages from the Middle Triassic to Late Cretaceous, whereas the fossils found in the limestone indicate Late Jurassic to Early Cretaceous ages. The matrix of the Arkot Dağ Mélange, even if unaffected by metamorphism, shows deformations represented by multiple meters-thick cataclastic shear zones at the boundaries of the mélange slices or inside them. According to its features, the source area of the Arkot Dağ Mélange was most likely a stack of continental and oceanic thrust sheets emplaced in the Late Cretaceous onto a continental margin. The data collected from the different slide-blocks suggest that the Intra-Pontide domain was characterised by an oceanic basin that opened at the latest in the Early Jurassic. The opening of the Intra-Pontide oceanic basin was followed by the development of a subduction zone with a subsequent opening of suprasubduction oceanic basin in the Middle Jurassic – Early Cretaceous. The convergence in this suprasubduction oceanic basin started at the Early/Late Cretaceous boundary by an obduction process, whereas its final closure can be regarded as Late Paleocene.