



Geodynamic significance of the Shanderman eclogites (NW Alborz, Iran)

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The Shanderman Metamorphic Complex, exposed along the Caspian foothills of the Talesh Mountain, western Alborz, Iran, consists of metamorphic rocks, mainly garnet-staurolite-micaschists and minor metabasites, quartzites, phyllites and rare calc-schists. Within the large metabasites bodies well-preserved relics of eclogitic facies phase assemblages have been found. A magmatic event with emplacement of intermediate to mafic intrusives at middle crustal depth postdates the eclogitic metamorphism. The whole complex is crosscut by high-angle and vertical WNW-ESE and NNW-SSE trending shear zones. Along such shear zone rocks are deeply fractured and altered, showing a pervasive serpentinization of the mafic and ultramafic cumulates often associated to the intrusive bodies.

The presence of serpentinites associated to mafic intrusives and metasediments induced previous authors (Sengor, 1984; Alavi, 1996) to consider the Shanderman Complex as the western prosecution of the Paleothetys suture zone, represented by the Virani and Binalood complexes near the town of Mashad (NE, Iran).

Our new petrographic, radiometric and geochemical data help to better define the nature and the geodynamic significance of the Shanderman Complex.

The paragonite eclogites preserved within garnet amphibolite bodies recorded peak pressure conditions of 1.5-2.3 GPa at temperature of 575-615°C. Paragonitic with micas in equilibrium with the HP assemblage have been separated and dated with the

Ar/Ar method: a Pennsylvanian age (320 MA) results from the analyses. Whole rock geochemical data from the eclogites and the mafic to intermediate intrusives indicate a continental to transitional affinity for both, not consistent with the interpretation of the Shanderman Complex as a fragment of the Paleothetys oceanic crust.

Our new data suggest that the SC was equilibrated in HP conditions during an orogenic event which predates of more than 100 Ma the Eo-Cimmerian orogeny. Several indications of an important late Palaeozoic orogenic activity occur in the Transcaucasian region north of the Iran-Azerbaijan border along the southern part of the Lesser Caucasus (Sengor,1990) during Carboniferous times. Medium and high grade gneisses and eclogites outcropping in this region have been dated between 285 and 338 Ma (Abesadze et al., 1982; Philippot et al., 2001; Kazmin, 2006; Saintot et al., 2006). Such metamorphic events have been related by these authors to the accretion of the Makera-Pontian/Transcaucasian microplate, detached from Gondwana at the beginning of the Palaeozoic, to the southern margin of the Schythian Platform, taking to the closure of the Protothetys Ocean. Subduction was activated along the southern margin of the Makera-Pontian-Transcaucasian microplate, becoming the active southern Eurasian margin. According to a different paleogeographic reconstruction, fitting a Pangea-B type plate configuration (Angiolini et al., 2007) the metamorphic basement of the Shanderman Complex could be a fragment of the Variscan belt s.l. Dextral shearing active during the Permian and taking to a Pangea-A plate configuration may have contributed to displace eastward the whole Eurasian region taking it in front of the Iranian microplate by the beginning of the Triassic. The Shanderman Complex can thus represent an allocthonous nappe coming from the southern margin of this microplate. The nappe was displaced southward and exhumed during the Eo-Cimmerian orogenesis. Its present position was acquired during the late Tertiary to the Neogene, when dextral shearing was active along N-S to NNE-SSW trending faults which formed the lateral ramps of the SW-vergent fronts of the main thrust sheets present in the Iranian side of the Talesh Mountains. This event, which is responsible for the sinuous shape of the Talesh Mountains, produced a southward displacement of the crystalline nappe stack now exposed along the Caspian foothills.