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Late Cretaceous blueschists and ophiolites in Thrace (Turkey): geodynamic implications

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Best evidence for the location and periods of activity of palaeo-subduction zones are provided by the tectonic setting and age of blueschists and eclogites, especially those associated with ophiolites. Eclogites and ultra-high pressure rocks are widely reported from the crystalline rocks of the Rhodope Massif. However, their tectonic setting and their age are controversial with radiometric ages scattered between Jurassic and Eocene. A newly discovered blueschist sliver in the southern Turkish Thrace close to the Rhodope Massif provides robust data for a Late Cretaceous high pressure metamorphism, and hence for Late Cretaceous subduction in the region.

The blueschist facies rocks in Thrace occur as a tectonic sliver, 9 km long and 1 km wide, bounded by the strands of the North Anatolian Fault. Two types of blueschist-facies rock assemblages occur in the sliver: (i) A serpentinite body with numerous diabase dykes showing an incipient blueschist-facies metamorphism (ii) a well-foliated and thoroughly recrystallized unit consisting of metabasite, marble and metachert. The blueschists are associated with serpentinite, pelagic limestone, radiolarian chert and greywacke and are unconformably overlain by Upper Eocene shallow marine limestones. Field relations in combination with the bore hole data suggest that the tectonic sliver forms a positive flower structure within the Miocene clastic rocks in a transpressional strike-slip setting, and represents an uplifted part of the pre-Eocene basement of southern Thrace.

The blueschists are represented by lawsonite-glaucophane bearing assemblages equilibrated at 270-320 °C and min. 8 kbar. The metadiabase dykes in the serpentinite, on the other hand, are represented by pumpellyite-glaucophane-lawsonite-assemblages that most probably equilibrated below 290 °C and at 7.5 kbar. Timing of the blueschist-facies metamorphism is constrained to ca. 86 Ma (Coniacian /Santonian) by Rb-Sr phengite-whole rock and incremental 40Ar-39Ar phengite dating on blueschists.

The Thrace blueschists represent an oceanic subduction-accretion complex of Late Cretaceous age, and indicate Late Cretaceous subduction-accretion adjacent and south of the Rhodope Massif. They formed during the closure of an oceanic lithosphere between the Rhodope-Strandja massifs in the north and the Sakarya Zone in the south. Their presence indicates continued Late Cretaceous accretionary growth in the northern Aegean.