



Nature and evolution of the Middle East Neotethys: New constraints from geochemistry and age of ophiolites and metaophiolites from the Makran Accretionary Prism (SE Iran)

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Ophiolites may originate in a variety of oceanic settings such as mid-ocean ridges, intra-oceanic and continental margin volcanic arc, marginal basins, and seamounts. Ophiolites from different settings show distinctive lithological features and geochemical fingerprinting, so that they can conversely be used to identify their geodynamic setting of formation. Therefore, ophiolite geochemistry coupled with geochronological data represents an effective tool for tracking the magmatic events occurring during the life of an oceanic basin and surrounding continental margins. The northern part of the Makran Accretionary Prism in south Iran is characterized by extensive occurrence of tectonically imbricated ophiolitic, metaophiolitic, and ophiolitic *mélange* units, which represent or incorporate remnants of the Neotethys Ocean located between the Lut block and the Arabian Plate and of its northern continental margin. In this contribution we present a review of geochemistry and age data of volcanic rocks from these units with the aim of defining the nature and tectono-magmatic evolution of the Middle East sector of the Neotethys.

The North Makran ophiolitic units are from north to south (from the structural top to bottom): 1) the Ganj Complex; 2) the Northern Ophiolites including Band-e-Zeyarat/Dar Anar, Remeshk-Mokhtarabad, and Fannuj-Maskutan units; 3) the Deyader Complex; 4) the Bajgan Complex; 5) the Durkan Complex; 6) the Sorkhband-Rudan ophiolites; 7) the Coloured *Mélange*. The Deyader, Bajgan, and Durkan Complexes show variable extents of HP-LT metamorphic imprint.

The Ganj Complex consists of island arc tholeiitic (IAT) and calc-alkaline (CAB) volcanic sequences showing Turonian-Coniacian age (biostratigraphic data). This unit represents a Late Cretaceous volcanic arc that was likely forming at the southern margin of the Lut Block. Units of the Northern Ophiolites and the Bajgan metaophiolites show similar geochemistry and age. They are largely represented by mid-ocean ridge basalts (MORB) showing either normal (N-) and enriched (E-) compositions. Biostratigraphic and zircon U/Pb radiometric datings suggest Early Cretaceous and

Late Jurassic-Early Cretaceous ages for the Northern ophiolites and the Bajgan Complex, respectively. The Durkan and Deyader Complexes are both Late Cretaceous in age. The Deyader metaophiolites range in composition from N-MORB to E-MORB and comparatively more enriched plume-type MORB (P-), whereas the Durkan metaophiolites show P-MORB and very enriched alkaline affinities and have been interpreted as remnants of a seamount chain. The Coloured Mélange includes volcanic arc basalt of both Early and Late Cretaceous age, as well as Late Cretaceous enriched oceanic plateau basalts and alkaline basalts (all ages based on biostratigraphic data).

This study indicates that the North Makran ophiolites and metaophiolites represent fragments of a unique Late Jurassic – Cretaceous oceanic basin, which was increasingly affected by mantle plume activity from Early to Late Cretaceous and experienced different extents of plume-ridge interaction in different times and areas. The different ophiolitic units represent distinct portions of the oceanic basin including plume proximal and plume distal mid-ocean ridges, seamounts. From Late Cretaceous, this basin subducted below the Lut Block forming the Ganj volcanic arc.