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Petrography and geochemistry evidence for supra-subduction ophiolites in Makran, SE Iran

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Ophiolites archive tectonic and chemical processes from crystallization of the oceanic lithosphere to accretion during obduction and/or continental collision. The variety of ophiolites has shown that they form in various geotectonic settings and experience complex petrological and geochemical histories during their evolution.
We present new results on the structure, petrography, geochemistry and geochronology of the Remeshk/Mokhtaramabad and Fannuj/Maskutan ophiolitic complexes in Makran (Southeast Iran), which have been very scarcely studied before this work.
A detailed map and cross sections illustrate temporal and structural relationships between the different lithologies. The extensive ultramafic complexes comprise a lower, harzburgite-dominated unit with few lherzolites overlain by dunites. Pyroxene-bearing peridotites show typical features of tectonized mantle deformed at sub-solidus conditions. The olivine chemistry (xMg = 0.90-0.92, NiO content of 0.4-0.47wt%) indicates that the ultramafic rocks represent an ophiolitic upper mantle. Most dunites are characterized by cumulate textures in olivine and a slightly lower xMg = 0.87-0.89 and NiO content of 0.25-0.35wt%. Dunites are locally impregnated by plagioclase-rich melts with minor amounts of clinopyroxene. They were intruded by gabbroic dykes marking the transition zone between mantle and crust. The gabbroic sequence displays increasingly differentiated rocks originated from the same magma source in the following order: troctolite - olivine gabbro – gabbro - anorthositic dykes - diabase. These rocks were later intruded by plagiogranites and hornblende-gabbros.
Petrography and geochemistry show oceanic features of a shallow environment for some lithologies; other lithologies indicate a supra-subduction environment, in particular the late-Cretaceous calc-alkaline pillow lavas that yield a clear arc signal. Advanced trace element analyses and geochronology will constrain the evolution of the Tethys-related, Makran ophiolites.