Petrological and Geochemical Evidences for the Origin of the Neyriz Ophiolites, SE Zagros, Iran

MOHAMMAD RAHGOSHAY[1] AND IMAN MONSEF[2]*

[1]Shahid Beheshti University, Earth Sciences Faculty, Tehran, Iran (M-Rahgoshay@sbu.ac.ir)

[2]Industrial and Mining Research Center, ZaminOmran, Shiraz, Iran,
(*Correspondance: Iman_monsef@yahoo.com)

The Late Cretaceous Neyriz ophiolites in south eastern of Zagros are a remnant of Neo-Tethyan oceanic lithosphere with nearly continuous NW-SE-trending belt. The ophiolite consists chiefly of mantle (ultramafic) and crustal (cumulates, volcanic and sub-volcanic rocks) sequences.

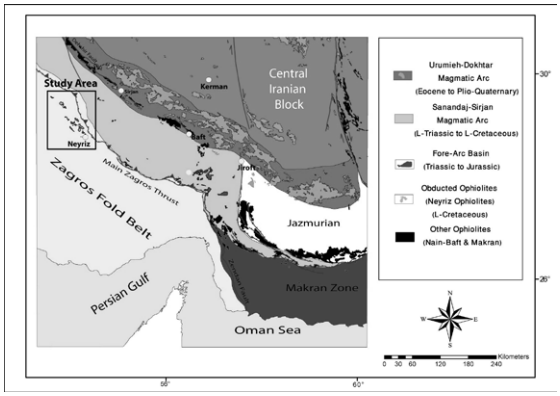

Figure1: Structural sketch map of Iran with Neyriz ophiolites

The mantle sequences consist of harzburgite, dunite, pyroxenite, gabbroic pockets, diabasic dykes and chromitite presented by mantle deformation conditions. Chromitite ore deposits with podiform and lenses structures are located in dunitic envelope of ultramafic host rocks. The chromitites are alpine type with high values of Cr#, Mg# and Fe^{+2}/Fe^{+3} ratio and low values of Al_2O_3 and TiO_2.

The crustal sequences consist of layered gabbros, isotropic gabbros, plagiogranites, sheeted dykes, and pillow lavas. Most of the mafic rocks have flat chondrite-normalized REE patterns and are strongly depleted in incompatible elements (negative Ta-Nb anomalies), similar to depleted tholeiites affinity.

The Neyriz oceanic lithosphere was probably formed within marginal basin system that was later accreted to the northern margin of the Arabian plate.

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Tracing the time-resolved magmatic evolution of the Hegau volcanic field (Southern Germany) through apatites

MEINERT RAHN[12] AND ANETTE VON DER HANDT[23]

[1]Swiss Federal Nuclear Safety Inspectorate, Brugg, Switzerland, meinert.rahn@ensi.ch

[2]Albert-Ludwigs-Universität, Freiburg, Germany

[3]University of Minnesota, Department of Earth Sciences, avdhandt@umn.edu

Major outcrops of Tertiary–Quaternary mafic alkaline volcanic rocks form the Central European Volcanic Province (CEVP). The Hegau volcanic field is found at the southern periphery of the CEVP, around 60-70 km to the east of the Upper Rhine graben. Age dating suggests a period of volcanic activity between 15 and 7 Ma [1-3]. Three main lithological units can be distinguished, i.e. from old to young: (1) tuff layers (so-called “Deckentuff”) intercalating with surrounding Miocene sediments, (2) olivine melilitites forming cones, but no lava flows, and (3) isolated phonolite peaks. Carbonatites occur subordinately in the Hegau province, mostly evidenced by calcite-apatite-magnetite aggregates, but suggesting the coexistence of silicate and carbonate melts in the source area.

We investigated apatites from Deckentuffs and phonolites, as their composition is expected to reflect whole rock compositional variation and in particular any changes between silicate and carbonate melt origin [4]. Apatites are often the only fresh remnants of the associated volcanic products; they occur in all lithological units and commonly display a complex internal growth pattern. EPMA and SIMS techniques are applied to decipher the major and trace element compositional evolution. The combination of fission track age dating with chemical composition allows a time-resolved investigation of the evolution of the Hegau volcanic field and its relation to the Kaiserstuhl volcanism.

In addition, apatites with Hegau compositional patterns can be found as thin tuff layers intercalated with sediments as much as 60 km away from the Hegau volcanic field. This suggest a more explosive volcanism which is corroborated by the occurrence of diatreme breccias in the Hegau. Multiple magmatic cycles can be discerned on the basis of apatite composition.

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