doi: 10.3301/ROL.2014.140

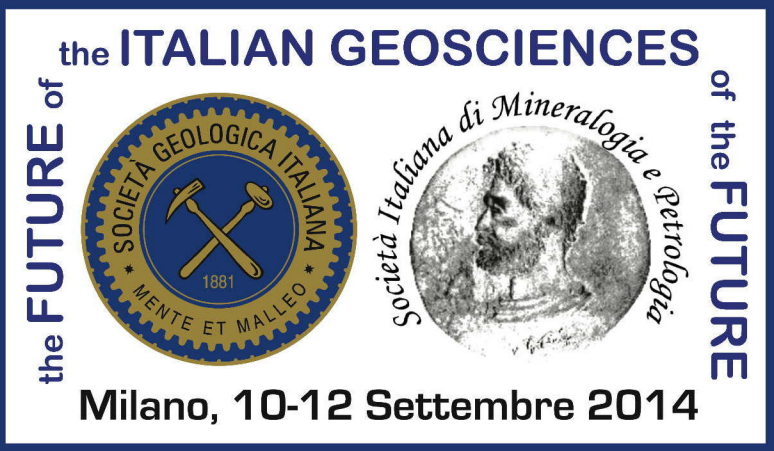
ISSN 2035-8008

RENDICONTI *Online* della *Società Geologica Italiana*

Volume 31, Supplemento n. 1 - Settembre 2014

The Future of the Italian Geosciences - The Italian Geosciences of the Future

87° Congresso della Società Geologica Italiana e
90° Congresso della Società Italiana di Mineralogia e Petrologia



Abstract Book
Milan, Italy, September 10-12, 2014

edited by: B. Cesare, E. Erba, B. Carmina, L. Fascio, F.M. Petti, A. Zuccari.

ROMA
SOCIETÀ GEOLOGICA ITALIANA
2014
www.socgeol.it

Rend. Online Soc. Geol. It., Suppl. n. 1 al Vol. 31 (2014) CONGRESSO SGI-SIMP 2014

Ghostlike boninitic magmatism in the Cretaceous southern Neo-Tethys. New evidence from the Zagros ophiolites (Iran)

Saccani E.*[1] & Allahyari K.[2]

1. Dipartimento di Fisica e Scienze della Terra, Università di Ferrara. 2. Faculty of Earth Science, Shahid Beheshti University, Tehran, Iran.

Corresponding email: sac@unife.it

Keywords: Ophiolite, Zagros belt, Iran.

Ophiolites cropping out along the Main Zagros Thrust Zone (MZTZ) represent portions of the southern Neo-Tethys Ocean, which existed between the Arabian and Eurasian continental margins. Several authors suggested that an intra-oceanic supra-subduction zone setting (SSZ) developed in this ocean during the Late Cretaceous. However, in contrast to many other ophiolites (e.g., Albanide-Hellenide), volcanic rocks, which typically characterize SSZ settings (i.e., island arc tholeiites and boninites) are lacking. Nonetheless, the volumetrically most abundant rock-type in the MZTZ ophiolites consists of very depleted mantle harzburgites, which have chemical features that are typical for residual mantle after boninitic-type melts extraction. Therefore, though boninitic lava flows are lacking in the MZTZ ophiolites, the occurrence of boninitic magmatism at a regional scale can be envisaged. In this contribution, we review the available data on the Kermanshah and Sarve-Abad ophiolites (SW Iran) in search for evidence for the existence of boninitic magmatism in the southern Neo-Tethys.

The Kermanshah ophiolites include SSZ sequences largely consisting of depleted mantle harzburgites, which display a significant depletion in incompatible elements and rare earth element (REE), coupled with a marked LREE enrichment with respect to MREE. REE modeling shows that they may represent a residual mantle after 25 – 30% removal of boninitic-type melts. The mineral chemistry of Cr-spinels also supports this conclusion.

The Sarve-Abad ophiolites include cumulitic lherzolites bearing minor dunite and chromitite lenses in places. The crystallization order in ultramafic cumulates is: olivine ± Cr spinel + clinopyroxene ± orthopyroxene, which is typical for boninitic melts. The mineral chemistry of Cr-spinel, pyroxenes, and olivine is compatible with a genesis from a boninitic-type melt. Indeed, the calculated TiO_2 and Al_2O_3 compositions and Mg# in the parental melt that was in equilibrium with these minerals are consistent with boninitic-type compositions. Whole-rock geochemistry show low incompatible element content and a general enrichment in Th with respect to Ta and Nb. Chondrite-normalized REE patterns are consistent with boninitic-type parental melts. REE petrogenetic modeling indicates that the Sarve-Abad ultramafic cumulates may have formed by small degrees (5-15%) of fractional crystallization from typical boninitic melts.

In conclusion, several lines of evidence indicate that episodes of boninitic magmatism occurred within the southern Neo-Tethys Ocean during the Late Cretaceous. Some hypotheses explaining the lacking of boninitic lavas or dykes in the MZTZ ophiolites can be postulated (e.g., short lived intra-oceanic subduction, transition from intra-oceanic to continental subduction). However, further investigations should be made for testing their tectono-magmatic and geodynamic consistence.