LIU Bin, MA Changqian, ZHANG Xin, GUO Pan, ZHANG Hang and XIONG Fuhao, 2015. Geochronology and Geochemistry of the Triassic Mafic Complexes from the western Garzê-Litang Ophiolitic Mélange and Implications for the Melt Evolution of a Continental Margin. *Acta Geologica Sinica* (English Edition), 89(supp. 2): 50-51.

Geochronology and Geochemistry of the Triassic Mafic Complexes from the Western Garzê-Litang Ophiolitic Mélange and Implications for the Melt Evolution of a Continental Margin

LIU Bin [1,2], MA Changqian[1,2*], ZHANG Xin[2], GUO Pan[2], ZHANG Hang[2] and XIONG Fuhao[2]

1 *State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan 430074, China*
2 *Faculty of Earth Sciences, China University of Geosciences, Wuhan 430074, China*

There is a general consensus that most ophiolites on the earth formed above a subduction zone and they often display a characteristic, sequential evolution of MORB to island arc tholeiities (IAT) to bonnites (Dilek et al., 2010, 2009; Pearce et al., 2003). However, ophiolites occurred in a continental margin are very rare and usually have more complicated, irregular components, such as N-MORB, enriched-type MORB (E-MORB), Plume-type MORB (P-MORB) and OIB (Manatschale and Muntener, 2009; Dilek et al., 2010; Saccani et al., 2014, 2013). And their origin and interaction between multiple mantle sources on a continental margin are rarely studied. The Middle Triassic Chayong and Xiewu mafic complex developed in the western Garzê-Litang ophiolitic mélange could provide an opportunity to study the melt evolution of a continental margin.

The Chayong mafic complex mainly consists of cumulate gabbros and pillow basalts crosscut by some dolerite dykes, while the Xiewu mafic complex are mainly composed of pillow basalts and some hornblende gabbros. Zircon LA-ICP-MS U-Pb dating results yielded two weighted mean $^{206}Pb/^{238}U$ ages of 234±3 Ma and 236±2 Ma, which could be interpreted as the crystallization ages of Chayong pillow basalts and Xiewu hornblende gabbros. Pyroxenes from the Chayong gabbros have relatively high Ca, Al, Ti and Mg and belong to diopside in composition, following the rift-cumulate trend. Samples from the Chayong mafic rocks belong to the tholeiitic basalt series in composition. In the MORB-normalized trace element spider diagrams, they are characterized by enrichment of Th and LREE, weak depletion of Nb, Ta, Zr, Hf and Ti, comparable to E-MORB. All the rock types (pillow basalts, gabbros and dolerites included)have relatively high εNd(t) (+2.7-+3.6, +3.1-+3.4 and +1.7, respectively) and low Isr (0.705-0.708, 0.705 and 0.706, respectively). The Xiewu pillow basalts belong to the tholeiitic basalt series in composition and they have low REE. In the MORB-normalized trace element spider diagrams, they display enrichment of LREE, Th, Nb and Ta, weak depletion of P, Zr and Hf, similar to E-MORB. However, the Xiewu gabbros belong to alkaline basalt series in composition and they have OIB-like composition, which display enrichment of LREE, Th, Nb, Ta and Ti and depletion of P relative to MORB. All the two rock types have relatively low εNd(t) (+0.9-+1.0 and +0.2-+0.6, respectively) and high Isr (0.710 -0.711 and 0.709, respectively).

Based on mineralogical, geochemical and Sr-Nd isotopic compositions, we suggest that the Chayong mafic complex and Xiewu pillow basalts could be derived from a depleted mantle enriched by plume-type components, while the Xiewu gabbros might be originated from a depleted mantle enriched by crustal materiels. In addition, the Chayong mafic complex were generated by about 10%-30% partial melting of a spinel-garnet Iherzolite mantle source and fractional crystallization of olivine, clinopyroxene and plagioclase might have occurred during the magma evolution. The Xiewu pillow basalt were formed by about 20%-30% partial melting of a spinel Iherzolite mantle source and only some fractional crystallization of olivine were occurred, whereas the Xiewu gabbros were generated by 5%-10% partial melting of a spinel-garnet Iherzolite mantle source and it had undergone fractional crystallization of olivine, clinopyroxene and plagioclase. Combining with regional data, we proposed that the Chayong and Xiewu mafic rocks could have formed in a continental margin rift environment, which might be related to Middle Triassic spreading of the western Garzê-Litang Ocean basin.

* Corresponding author. E-mail: cqma@cug.edu.cn

References

Dilek Y, Furnes H. 2009.Structure and geochemistry of Tethyan ophiolites and their petrogenesis in subduction rollback systems. Lithos,113(1-2): 1-20.

Dilek Y, Furnes H. 2011. Ophiolite genesis and global tectonics: Geochemical and tectonic fingerprinting of ancient oceanic lithosphere. Geological Society of America Bulletin, 123(3-4): 387.

Manatschal G, M U Ntener O. 2009.A type sequence across an ancient magma-poor ocean--continent transition: the example of the western Alpine Tethys ophiolites. Tectonophysics, 473 (1): 4-19.

Pearce, J.A. 2003.Supra-subduction zone ophiolites: the search for modern analogues. In: Dilek Y, Newcomb S (eds) Ophiolite concept and the evolution of geological thought. Geological Society of America Special Paper, 373:269-293.

Saccani E, Azimzadeh Z, Dilek Y, et al. 2013.Geochronology and petrology of the Early Carboniferous Misho Mafic Complex (NW Iran), and implications for the melt evolution of Paleo-Tethyan rifting in Western Cimmeria. Lithos, 162: 264-278.

Saccani E, Allahyari K, Rahimzadeh B. 2014.Petrology and geochemistry of mafic magmatic rocks from the Sarve-Abad ophiolites (Kurdistan region, Iran): Evidence for interaction between MORB-type asthenosphere and OIB-type components in the southern Neo-Tethys Ocean. Tectonophysics, In Press.