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Yarlung Zangbo Suture zone ophiolites: mantle and crustal compositions

R. Hébert (1), C. Guilmette, (1), É. Bédard (1), J. Dostal (2), C.S. Wang (3), Y.L. Li (3)

1. Département de géologie et de génie géologique, Université Laval, Québec, Canada rejean.hebert@ggl.ulaval.ca / Fax : 1 418 6563137
2. Department of Geology, St-Mary's University, Halifax, Canada
3. China University of Geosciences, Beijing, China

This paper presents the main results of a research project focused on the mantle and crustal compositions of the Yarlung Zangbo Suture Zone (YZSZ) ophiolites and related mélanges and flysch. Study area is representing a 300 km long and 30 km wide segment. The Cretaceous ophiolites are remnants of Neo-Tethys basin which was almost totally consumed in a northward oriented subduction zone and southerly transported onto the Indian plate colliding with Eurasia circa 50 Ma ago. The ophiolite massifs rest on an ophiolitic mélange, containing locally 124-127 Ma garnet-bearing and garnet-free foliated amphibolites. These amphibolites experienced high-temperature and relatively high pressure suggesting they were generated because of initiation of an intraoceanic subduction zone. Further south a Triasic flysch and a Cretaceous mélange contain igneous blocks derived from partial reworking of Indian passive margin and Tethyan ocean-floor. The amphibolites show arc tholeiitic affinities such La/Sm 0.8 and negative Ta and Nb anomalies and are geochemically similar to the ophiolitic mafic units. The mafic blocks found in the flysch and mélange zones are of intracontinental and intra-oceanic geochemical affinities respectively.

The ophiolites are made of cpx-harzburgitic mantle and thin gabbro-lacking crust. Mantle harzburgites are subdivided into two groups. Samples from the western massifs are characterized by porphyroclastic textures, aluminous spinels (Cr/(Cr+Al) : 0.13-0.21), low average TiO_2content (0.04 wt.%), depleted REE patterns (average La/Sm ratios 0.4) and derive from 7-12% melting of N-MORB-like source. Samples from the

eastern massifs are granular peridotites with Cr-rich spinels (Cr/(Cr+Al) : 0.33-0.74), very low average TiO_2content (0.008 wt. %), enriched REE patterns (average La/Sm 5.6) and could originate from 20-30 % partial melting of a depleted source further enriched by an episode of metasomatism. Crustal samples are mainly basaltic flows, diabasic and rare gabbroic intrusions. They are subdivided into two groups. The western group is made of pl-cpx-phyric arc tholeiites with depleted REE patterns (average La/Sm 0.6) and slight Ta-Nb negative anomalies. The eastern group is made up of pl-cpx-(am)-phyric arc tholeiites having fractionated REE patterns (average La/Sm 4.6) and strong Ta-Nb negative anomalies. Boninitic component increases towards the east and is prominent in Luobusa area. These results are consistent with derivation of the ophiolites from dismemberment of back-arc (western portion) and intra-oceanic arc (eastern portion) sectors of the Neo-Tethys marginal basin. A model of the complex relationships involved in the closure of Neo-Tethys will presented.

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