Geophysical Research Abstracts
Vol. 15, EGU2013-13612, 2013
EGU General Assembly 2013

Rapid forearc spreading between 130-120 Ma: evidence from geochronology and geochemistry of the Xigaze ophiolite, southern Tibet

Jingen Dai (1), Chengshan Wang (1), Ali Polat (2), Madhava Warrier Santosh (3), and Yukui Ge (1)

(1) State Key Laboratory of Biogeology and Environmental Geology, School of Earth Sciences and Resources, Research Center for Tibetan Plateau Geology, China University of Geosciences-Beijing, Beijing 100083, China, (2) Department of Earth and Environmental Sciences, University of Windsor, Windsor, ON, Canada N9B 3P4, (3) Division of Interdisciplinary Science, Faculty of Science, Kochi University, Akebono-cho, Kochi 780-8520, Japan

The Xigaze ophiolite crops out along the central Yarlung-Zangbo Suture Zone (YZSZ, Tibet), which also includes the Gangdese arc and the Xigaze forearc basin. Here we report new geochronological and geochemical data from this ophiolite. The Xigaze ophiolite is dominated by mantle peridotites with low CaO and $Al2O_3$ contents, and U-shaped REE patterns. The petrological and geochemical characteristics of these peridotites indicate that they represent residues after moderate- to high-degrees of partial melting (15-24%) and that they were metasomatized by LREE-enriched boninitic melts in a mantle wedge beneath a forearc tectonic setting. The mafic rocks of the Xigaze ophiolite are particularly thin and can be divided into two groups based on their whole-rock compositions: (1) MORB-like, and (2) boninitic rocks. Both groups display negative Nb and Ta anomalies on MORB-normalized diagrams, consistent with the metasomatism of their mantle source by slab-derived fluids. LA-ICPMS zircon U-Pb data from five representative samples indicate formation ages of 124-127 Ma. The zircons are also characterized by positive εHf(t) values varying from +7.5 to +17.3. These observations, combined with the geological and geochronological characteristics of the central-western Yarlung-Zangbo ophiolites (YZO), the Gangdese arc and the Xigaze forearc basin, suggest that the central-western YZO might have formed in the forearc setting where rapid crustal accretion was caused by slab rollback during subduction initiation at 130-120 Ma. Subsequently, the rollback of the subducting slab slowed down and stabilized, and the zone of melting migrated to below the Gangdese arc, producing voluminous late Cretaceous granitoids with depleted mantle-type Hf isotopic characteristics. Our new model provides a good example for the generation of the forearc-type ophiolites.