

Metamorphism and geochemical characteristics of a metamorphic sole, Xigaze ophiolite, Tibet

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Within the Xigaze ophiolitic mélange of the central Yalung Zangpo Suture Zone, garnet amphibolites of a metamorphic sole were found. The current study focuses on geochemistry and mineral chemistry and tries to figure out the resulting P-T conditions the rocks experienced. Based on different mineral assemblages identified, four metamorphic stages were distinguished as Am1+ Pl1 + Ep1 + Ttn (M1); Grt-c + Cpx-e + Ep2 + Pl2 + Rt (M2); Grt-r + Ep3/Czo3 + Cpx-l + Am3 + Pl3 + Ttn (M3) and Prh + Ab + Czo + Chl + Cal (M4), respectively. Peak metamorphic conditions derived are 830-870°C / 18.0-20.0 kbar. Major element studies demonstrate that the rocks are low-K tholeiitic. The chondrite-normalized rare earth elements (REEs) and primitive mantle-normalized multi-element patterns are similar to N-MORB, with a depletion in light REEs, but a significant enrichment of large ion lithophile elements (LILEs, as Rb, Ba, U) and a partly depletion in high field strength elements (HFSEs, as Nb, Ti, Zr and Hf). Further geochemical studies indicate that the investigated rocks have affinities with N-MORB and arc-related components, and are sourced from a Supra Subduction Zone (SSZ) environment. Age studies indicate that an intra-oceanic subduction as well as garnet amphiboles occurred short after the formation of Xigaze ophiolite.

Acknowledgement: The current study was supported by the Natural Science Foundation of China (41572044).