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Petrological and geochronological studies on the eclogite and its country rock schists in the Sumdo area, Tibet, China



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Petrological and geochronological investigations have been performed on the eclogite and its country rock garnet-bearing mica–quartz schist in the Sumdo area from eastern part of the Tibet Plateau. The eclogites in the Sumdo area have a normal assemblage involving garnet, omphacite, phengite and epidote, with rutile. Phase equilibrium calculations have been applied to this eclogite in the Sumdo area with The THERMOCALC software. Using a P–T pseudosection of the eclogite sample done in the NCKMnFMASHTO system the peak metamorphic condition of 610°C, 32 kbar has been determined. Zircon geochronological studies show that the protolith of the eclogite in the Sumdo area may have been formed around 280 Ma and experienced UHP metamorphism at ca 250 Ma. Based on this study, the eclogites in the Sumdo area probably experienced Permian to Triassic UHP metamorphism, which may provide new evidence of the existence of the suture zone in the Lhasa block [1].

The country rock garnet-bearing mica–quartz schist is mainly composed of garnet, muscovite, albite, quartz and limited chlorite, rutile and sphene. Garnet isopleth thermobarometry involves plotting compositional isopleths of garnet as contours on a P–T pseudosection, contours of saturated H₂O content are combined, obtaining estimated peak P–T conditions of ~27 kbar, 523–580°C. The compositional profiles of garnet from the core to the mantle and contouring of the H₂O content indicate that the prograde metamorphic evolution represents a cold subduction stage with heating as pressure increased, while the rocks experienced blueschist facies to eclogite facies metamorphism. P–M(H₂O) pseudosection and isopleths of saturated H₂O content are appropriate to assess the evolution of mineral assemblages in terms of changes in water content during decompression, which shows that the garnet-bearing mica–quartz schist went through an early isothermal decompression and a cooling-with-decompression evolution in the late stage. In-situ LA-ICP-MS U-Pb zircon dating yielded a metamorphic age of ca 230 Ma for the garnet-bearing mica–quartz schist, interpreted to date the amphibolite facies metamorphism during the exhumation stage of the orogen between the south and north Lhasa block [2]

Based on the field relationships, P-T path and the ages between garnet-bearing mica–quartz schist and eclogite, a reasonable conclusion is proposed that the garnet-bearing mica–quartz schist and the eclogite have experienced the same HP metamorphism associated with similar subduction and exhumation process.

References:

[1] Huang et al. (2015) *Geol in China* 42:1559-1571.

[2] Chen et al. (2015) *Geol in China* 42:1572-1587.

