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Metamorphic Evolution and Tectonic Implications of Garnet–Bearing Mica Schist in Sumdo High Pressure Belt from Eastern Lhasa Block, Tibet

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The garnet–bearing mica–quartz schist of the Sumdo high pressure metamorphic beltfrom the Lhasa block is mainly composed of garnet, muscovite, albite, quartz and minor chlorite, rutile and sphene. Garnet displays obvious zonation where Xpy[=Mg/(Mg+Fe+Mn+Ca)] increases from the core to the mantle, and then decreases in the rim;

Xsps[=Mn/(Mg+Fe+Mn+Ca)] declines gradually from the core to mantle, suggesting that garnet composition profiles from core to mantle preserve the prograde growth zoning and can be partially reset during retrogression. The model system NCKMnFMASHO is chosen to calculate P–T and P–M(H_2O) pseudosections, Garnet isoplethcthermobarometry involves plotting compositional isopleths of garnet as contours on a P–T pseudosection. Contours of saturated H_2O content arecombined, givingestimated peak P–T conditions of ca. 27 kbar, 523–580℃. The composition profiles of garnet from the core to the mantle and contouring of the saturated H_2O contentindicate that prograde metamorphic evolution represents a cold subduction stage with heating as pressure increases, while the rocks experienced blueschist–facies to eclogite–facies metamorphism. P–M(H_2O) pseudosection and isopleths of saturated H_2O content are appropriate forassessing the evolution of mineral assemblages in terms of changes in water content during decompression. Theseshow that the garnet–bearing mica quartz schist goes through an early isothermal decompression and a cooling decompressional evolution in the late stage, that amphibolite–facies to epidote–amphibolite–facies metamorphism occurs in the early stage and that amphibolite–facies metamorphism overprint takes place during the later–stage decompression. The isothermal decompression of the garnet–bearing mica quartz schist probably represents a fast tectonic exhumation.Albiteis predicted to replace early jadeite in this stage. In–situ LA–ICP–MS U–Pb zircon dating yielded the metamorphic age of ca.230 Ma of the garnet–bearing mica–quartz schist, interpreted as dating the amphibolite–facies metamorphism during the exhumation stage of the orogeny between south and north Lhasa block. On the basis ofthe field relationship, the P–T path and the ages between garnet–bearing mica quartz schist and eclogite, we can concludethat the garnet–bearing mica quartz schist and eclogitehave sharedsimilar subduction and exhumation processes.

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