The garnet–bearing mica–quartz schist of the Sumdo high pressure metamorphic belt from the Lhasa block is mainly composed of garnet, muscovite, albite, quartz and minor chlorite, rutile and sphene. Garnet displays obvious zonation where $X_{\text{py}} = \frac{\text{Mg}}{(\text{Mg+Fe+Mn+Ca})}$ increases from the core to the mantle, and then decreases in the rim; $X_{\text{sps}} = \frac{\text{Mn}}{(\text{Mg+Fe+Mn+Ca})}$ 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(H2O) pseudosections. Garnet isopleth thermobarometry involves plotting compositional isopleths of garnet as contours on a P–T pseudosection. Contours of saturated H2O content are combined, giving estimated 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 H2O content are appropriate for assessing the evolution of mineral assemblages in terms of changes in water content during decompression. The isothermal decompression of the garnet–bearing mica quartz schist probably represents a fast tectonic exhumation. Albite is 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 of the field relationship, the P–T path and the ages between garnet–bearing mica quartz schist and eclogite, we can conclude that the garnet–bearing mica quartz schist and eclogite have shared similar subduction and exhumation processes.

Acknowledgements

This research was funded by grants from the Ministry of Science and Technology of China(2014DFR21270), China Geological Survey (12120115026801, 12120115027201, 201511022) and the Fund from the State Key Laboratory of Continental Tectonics and Dynamics (Z1301-a20).

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