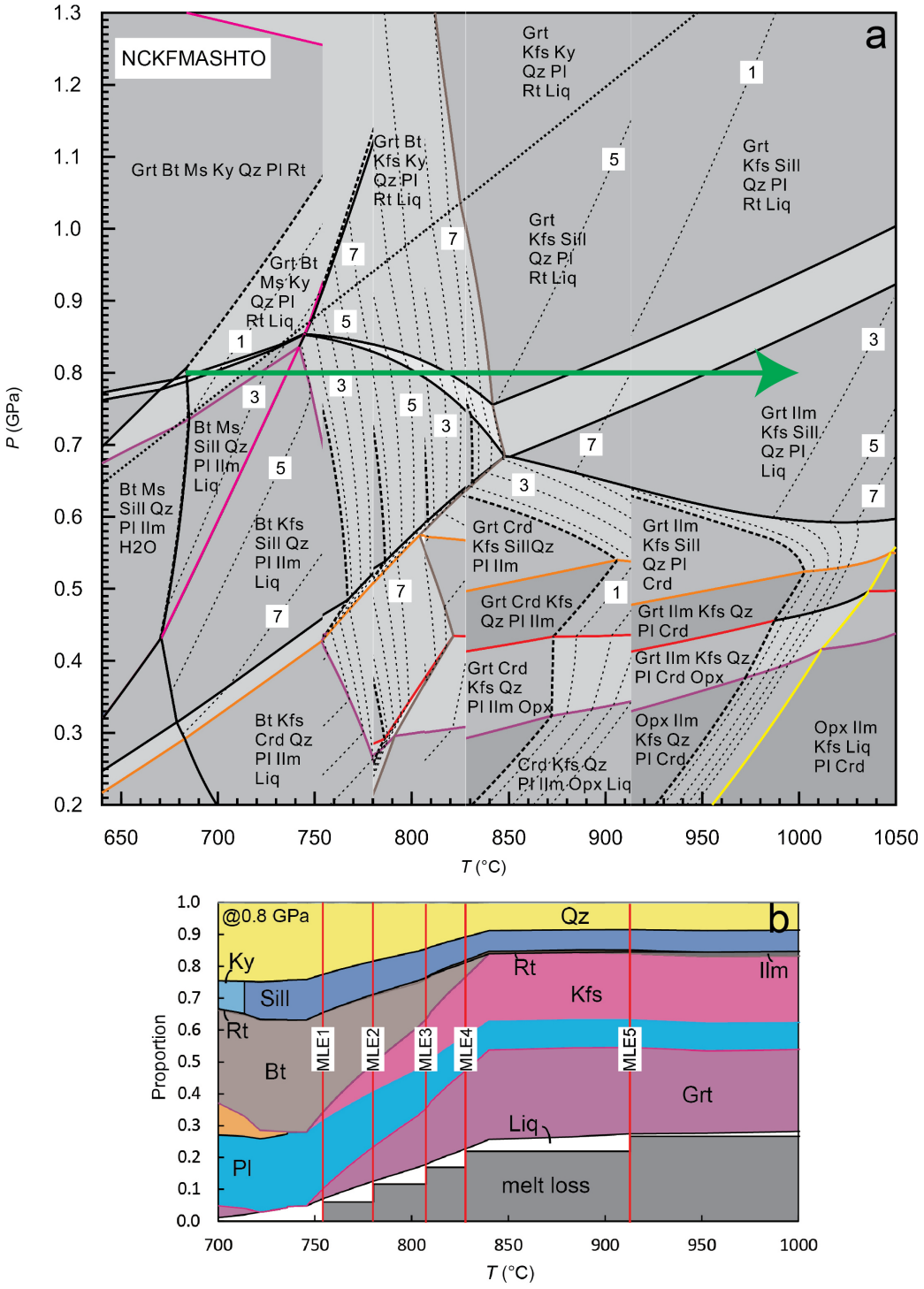

FIGURE S1. (**a**) *P-T* mosaic pseudosection panels of metapelite at open system along isobaric heating at 0.8 GPa, contoured with isopleth of mol% melt (black dash line and number within square symbols). (**b**) Mineral proportion evolution against temperature.

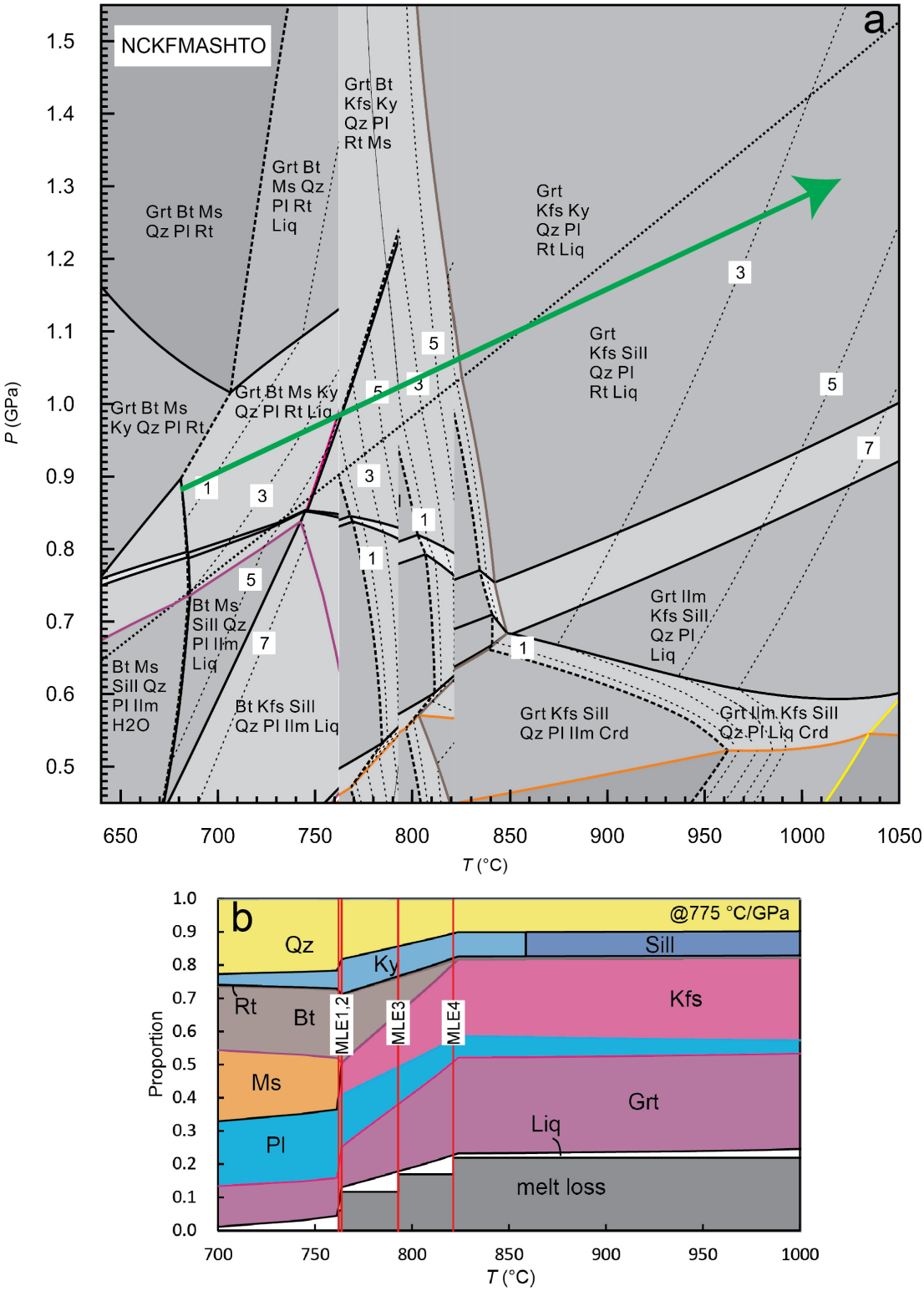

FIGURE S2. (**a**) *P-T* mosaic pseudosection panels for a metapelite experiencing open-system metamorphism along a 775 °C/GPa geotherm, contoured with isopleth of mol% melt. (**b**) Mineral proportion evolution against temperature.

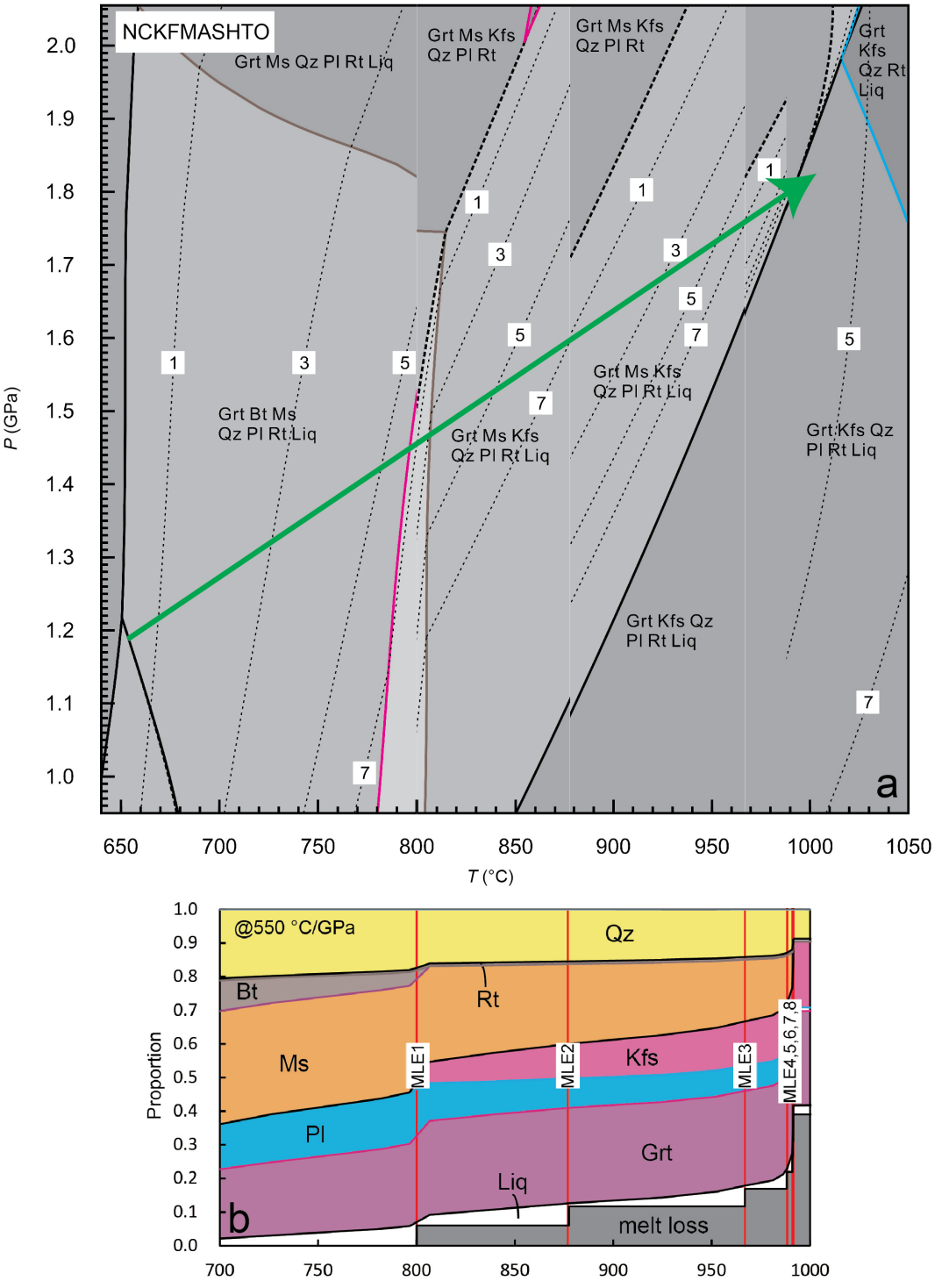

FIGURE S3. (**a**) *P-T* mosaic pseudosection panels for a metapelite experiencing open-system metamorphism along a 550 °C/GPa geotherm, contoured with isopleth of mol% melt. (**b**) Mineral proportion evolution against temperature.

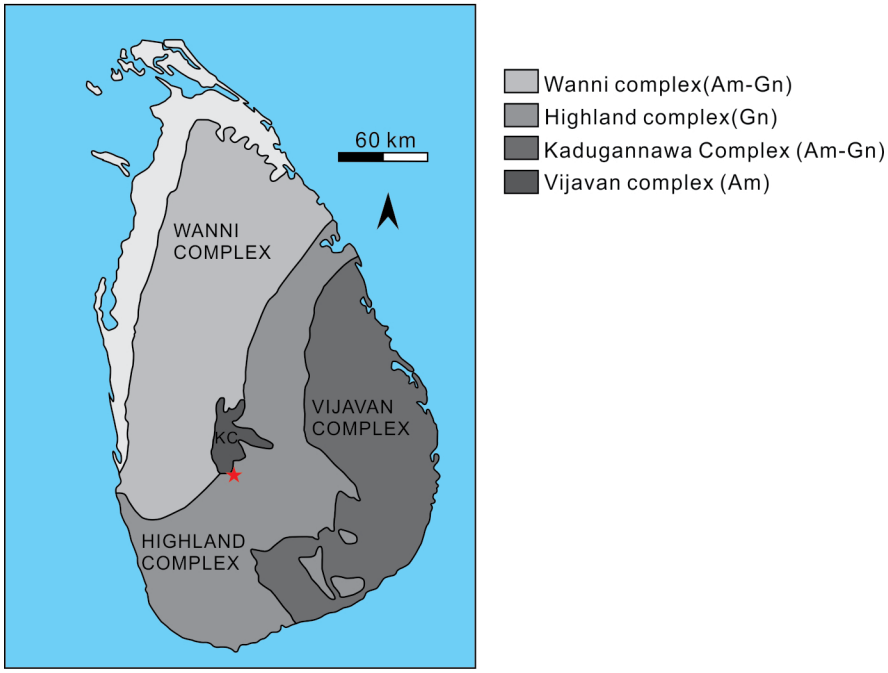

FIGURE S4. Tectonic subdivision of Sri Lanka metamorphic basement modified after Cooray (1994). Sample locations of studied UHT metamorphic rocks are shown as red star. Am = amphibolite facies; Gn = granulite facies.

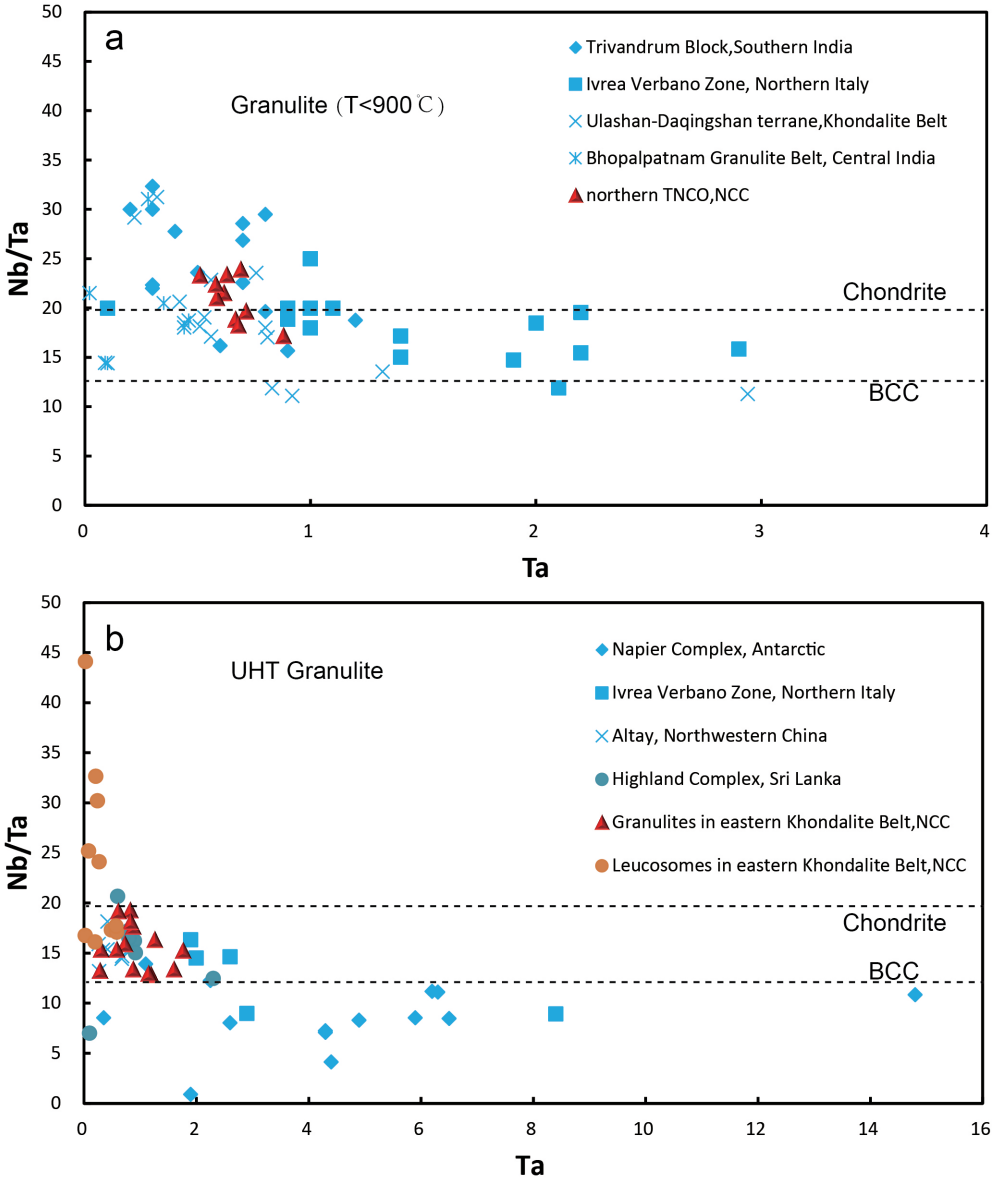

FIGURE S5. Bulk-rock composition plots of Nb/Ta vs Ta contents of granulite samples from the study area and other granulite terranes worldwide. Geochemical data summarized from: Trivandrum Block, South India (Nandakumar and Harley 2019); Ivrea Verbano Zone, north Italy (Ewing et al. 2014); Ulashan-Daqingshan terrane, Khondalite Belt (Cai 2014); Bhopalpatnam granulite belt, central India (Vansutre et al. 2013); Napier complex, Antarctic (Grew et al. 2006); Altay, northwestern China (Yang et al. 2015); and the Highland complex, Sri Lanka (Table S3). Nb/Ta values of 12.4 in bulk continental crust (BCC) and 19.9 in chondrite are from Rudnick and Gao (2014) and Münker et al. (2003), respectively.