

Xin Li, Liang Liu, Xiaoying Liao, Yongsheng Gai, Guojian Geng, Tong Li, and Tuo Ma, 2023, Late orogenic high-temperature overprint in (ultra)high-pressure ([U]HP) metamorphic rocks of the North Qinling Orogen, Central China: Insights into the geodynamics of the exhumation of (U)HP metamorphic rocks: GSA Bulletin, <https://doi.org/10.1130/B37070.1>.

Supplemental Material

Table S1: Selected microprobe analyses of garnet, amphibole, biotite, plagioclase, and phengite for samples QL2105, QL2106, and QL2107.

Table S2: Zircon U-Pb isotopic and age data as well as trace element compositions of zircons of samples QL2105, QL2106, and QL2107.

Figure S1: P/T–H₂O/O diagrams for samples QL2105 and QL2106.

Figure S2: P–T diagram calculated with an effective bulk-rock composition for sample QL2106.

Figure S3: Representative Raman spectra of mineral inclusions in zircons with different ages from samples QL2105 and QL2106.

Text S1: Analytical methods of whole-rock major element analyses, mineral chemistry measurements, zircon U-Pb dating, and trace element measurements.

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Text S1: Analytical Methods

Whole-rock major element analyses were carried out using X-ray fluorescence spectrometry (RIX2100X sequential spectrometer) on fused Li-borate glass beads at the State Key Laboratory of Continental Dynamics, Northwest University, China. The standards used were BCR-2 and GBW0715, and the analytical accuracy was ~2%. Loss on ignition was determined by putting 1g sample powder in the furnace at 1000 °C for 12 h before being cooled in a desiccator and reweighed.

Mineral chemistry and backscattered electron (BSE) imaging was determined by an electron microprobe (JXA-8100) at the state Key Laboratory of Continental Dynamics, Northwest University, China. The electron microprobe was operated at a acceleration voltages of 15 kV and 10 nA probe current with a beam diameter of 1 μm except for mica (5μm). Natural silicate standards provided by SPI Company were employed for calibration.

Zircon grains were separated by standard heavy liquid and magnetic separation followed by hand-picking under a binocular microscope. Selected grains were mounted in an epoxy resin, polished down to expose the grain center, photographed in transmitted and reflected light, and imaged by cathodoluminescence (CL). Zircon U–Pb dating analyses were conducted by LA-ICP-MS at the state Key Laboratory of Continental Dynamics, Northwest University, China. Detailed operating conditions for the laser ablation system and the LA-ICP-MS instrument and data reduction are

the same as [Yuan et al. \(2008\)](#). The zircons were analyzed by the ablation of a single spot with 24 μm width and 20-40 μm depth. $^{207}\text{Pb}/^{206}\text{Pb}$, $^{206}\text{Pb}/^{238}\text{U}$, $^{205}\text{Pb}/^{235}\text{U}$ and $^{208}\text{Pb}/^{232}\text{Th}$ ratios were calculated using the ICPMSDataCal program ([Liu, 2011](#)), and then corrected using the 91500 as external standard ([Wiedenbeck et al., 2004](#)). Element concentrations of U, Th, and Pb were calibrated using ^{29}Si as an internal calibrant and NIST610 as an external reference standard. Uncertainties of individual analysis are reported as 1σ .

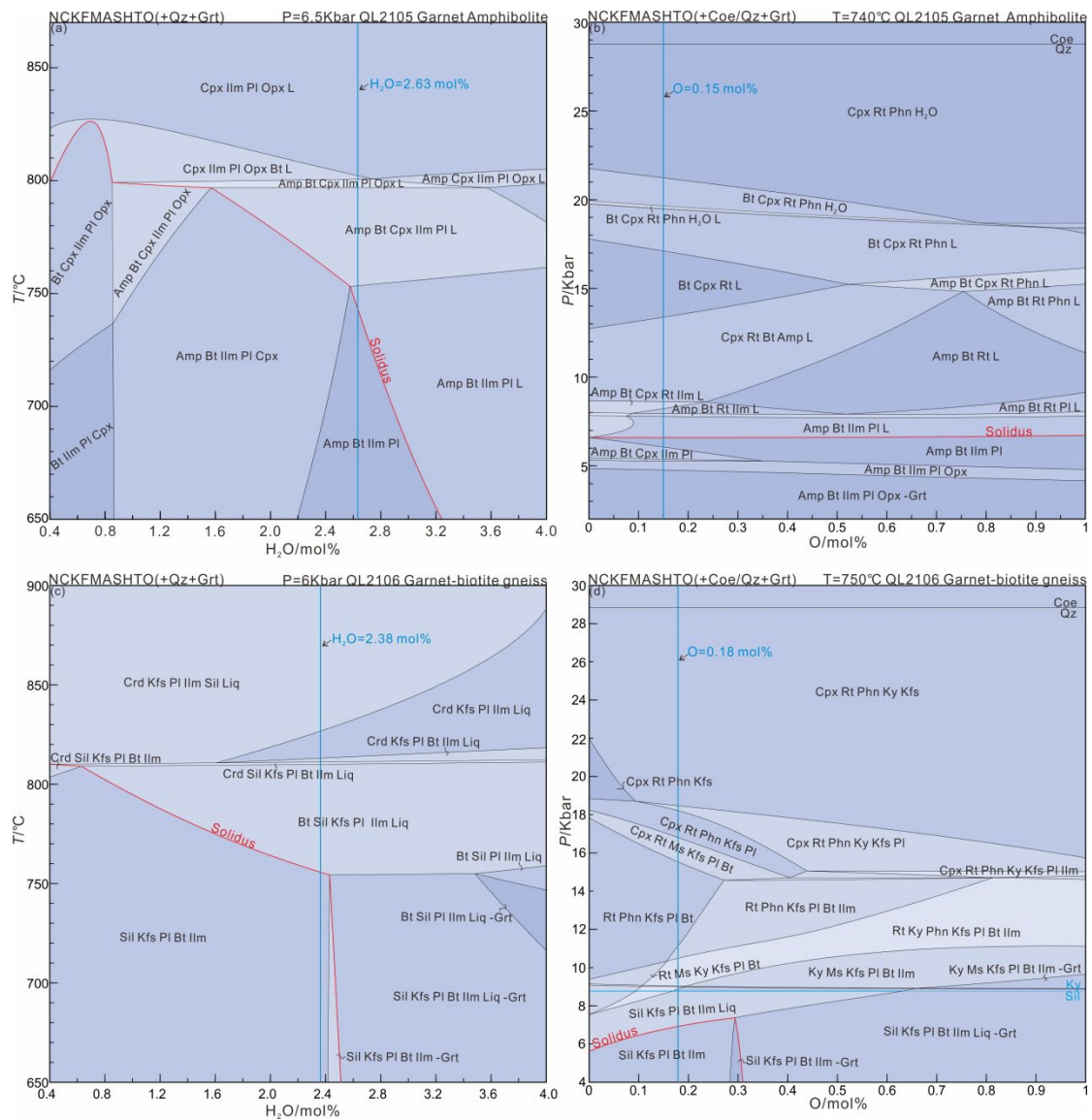


Figure S1 (a) T-H₂O diagram for sample QL2105 at a fixed pressure of 6.5 kbar in the system NCKFMASHTO. (b) P-O diagram for sample QL2105 at a fixed temperature of 740 °C in the

system NCKFMASHTO. (c) T–H₂O diagram for sample QL2106 at a fixed pressure of 6 kbar in the system NCKFMASHTO. (d) P–O diagram for sample QL2106 at a fixed temperature of 750 °C in the system NCKFMASHTO. The H₂O/O contents applied are determined by the standard of ensuring that the final-phase mineral assemblages were stable just above the solidus.

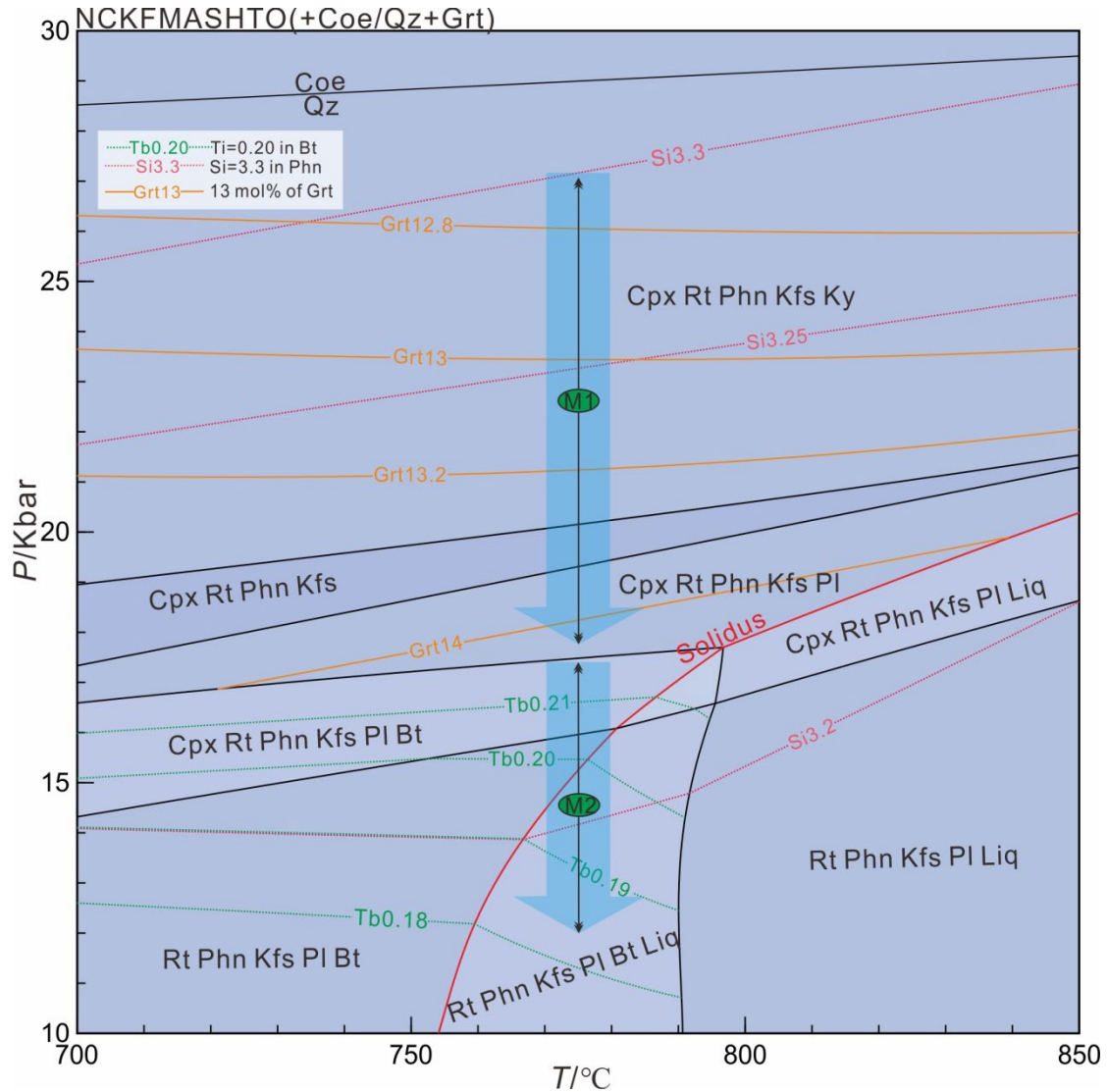


Figure S2 P–T pseudosection with proposed P–T path (the shaded arrow) for garnet–biotite gneiss QL2106, which is calculated with an effective bulk-rock composition (H₂O=3.38, SiO₂=73.34, Al₂O₃=8.92, CaO=1.29, MgO=2.44, FeO=4.97, K₂O=2.05, Na₂O=2.29, TiO₂=1.15, O=0.16) determined by adding 15 mol.% melt (calculated at 13 kbar/775 °C from Figure 10A) to the measured bulk-rock composition.

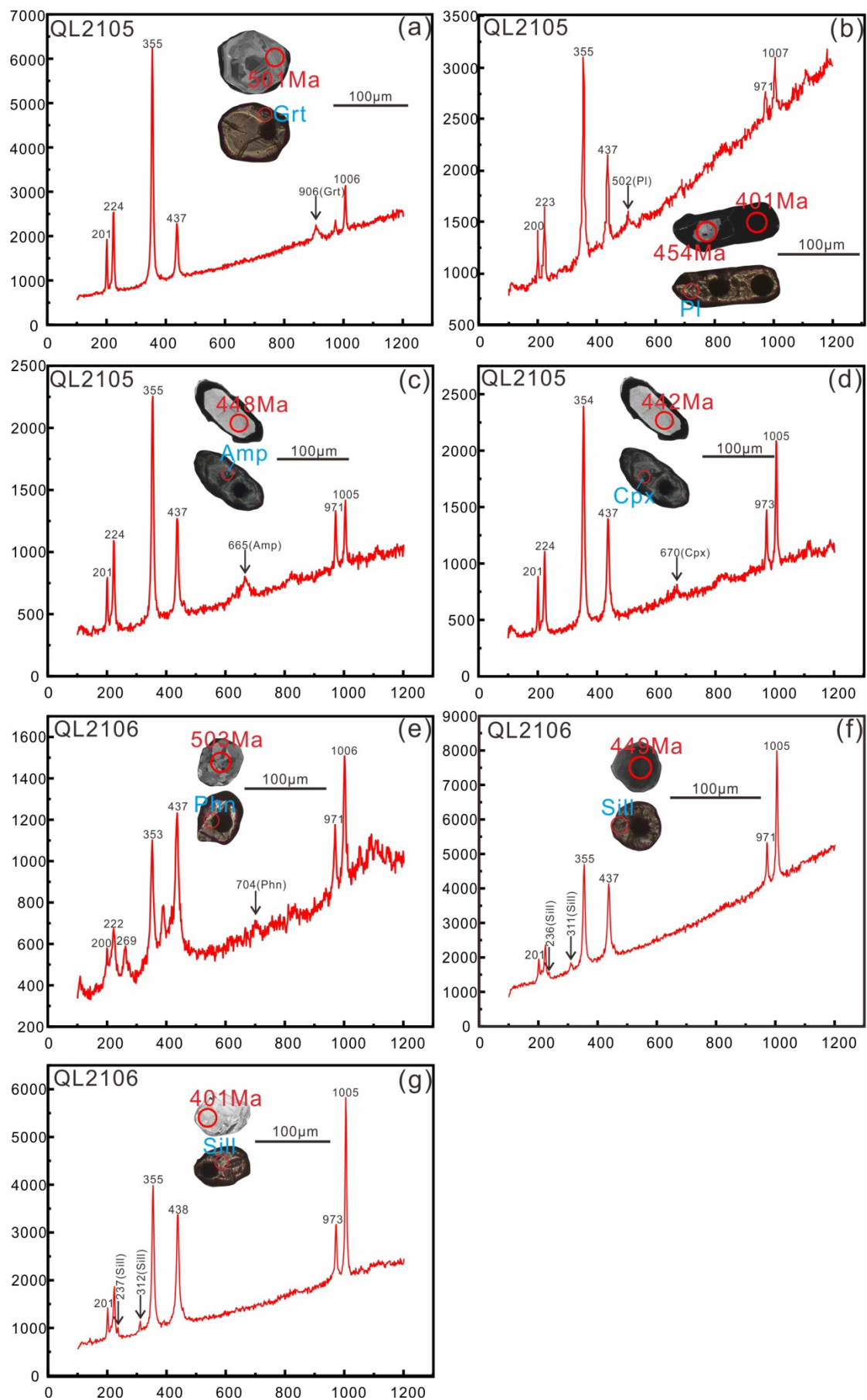


Figure S3 Representative Raman spectra of mineral inclusions in zircons with different ages from

samples QL2105 and QL2106.

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