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Overpressures induced by coesite-quartz transition in zircon

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ABSTRACT

More than 120 coesite and few polycrystalline quartz (coesite pseudomorph) inclusions were identified by Raman microspectroscopy in zircons of various kinds from gneissic rocks located in the Dabieshan and Sulu ultrahigh-pressure (UHP) metamorphic terranes in eastern China. The coesite inclusions have undergone, to various degrees, the coesite-quartz transition. Raman spectra of coesite and subsidiary quartz inclusions show various shifts, which are closely correlated to the extent of the transition. The coesite-pseudomorph inclusions in zircon show the highest Raman shift. Calibrations based on the experimental work of Hemley (1987) yielded inconsistent present-day overpressures (0–24 kbar) in coesite inclusions inside zircons. The availability of fluids, which resulted in the pervasive regional retrogression of the UHP gneisses during later exhumation stages, is regarded as the main factor controlling the extent of the coesite-quartz transition. This study underscores the need for the elastic model applied by previous researchers to explain the preservation of the coesite inclusions in rigid host minerals.