A revisit to the Yorii jadeite-quartz rock, the Kanto Mountains, Japan: Implications from zircon

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Jadeitite is a rare rock type within serpentinite mélange formed in subduction zones. Two formation mechanisms have been proposed: the wholesale metasomatic replacement and the vein precipitation. These two mechanisms imply contrasting chemical cycling paths for elements such as Al, Na, Zr and Hf in subduction zones, which in turn should result from different physiochemical conditions. Correct deciphering jadeitite formation mechanism would therefore be important to provide valuable information on subduction-zone processes/environments related to jadeitite.

The jadeite-quartz rock (or jadeitite) from the Yorii area, the Kanto Mountains, Japan occurs in serpentinite mélange subjected to metamorphism related to the Sanbagawa event. This rock was previously suggested to have formed through "vein precipitation" process contemporaneous with the Jurassic accretionary event. Mineral inclusions in zircons from this jadeite-quartz rock were re-examined in this study. The results clearly showed that these zircons contain mineral inclusions of both primary (igneous) and secondary (metasomatic) origin. The former are not present in matrix of the jadeite-quartz rock and the latter are pseudo-inclusions. These zircons are thus inherited or incompletely recrystallized ones. The geochemical characteristics of these zircons, including Th/U ratio and Ce anomaly, are also in accord with this conclusion. The jadeite-quartz rock should therefore have formed through "wholesale metasomatic replacement" process at an age younger than 141 Ma from a protolith of probable igneous origin aged at 162.2 ± 0.6 Ma.

Tentative criteria were proposed to categorize zircons in jadeitite into inherited and metasomatic ones. The results may be used to infer the formation mechanism of the hosting jadeitite.