Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.35830

Jadeite jade from inception to retrogression: a petrological and multi-chronometric record of episodic metasomatism in a cooling subduction channel

TAYLOR DUCHARME[1], SAMUEL ANGIBOUST[1], AITOR CAMBESES[2], VERONICA PEVERELLI[3], TOM RAIMONDO[4], KENYA NÚÑEZ CAMBRA[5], IDAEL F. BLANCO-QUINTERO[6], JUAN CÁRDENAS PÁRRAGA[2] AND ANTONIO GARCIA-CASCO[2]

[1]École Normale Supérieure de Lyon
[2]University of Granada
[3]Trinity College Dublin
[4]Adelaide University
[5]Institute of Geology and Paleontology / Geological Survey of Cuba
[6]University of Alicante

The Sierra del Convento mélange in southeastern Cuba is one of a limited number of jadeite jade occurrences worldwide. This exhumed, pervasively serpentinized fossil subduction interface hosts tectonic blocks up to several tens of meters in scale that were reworked during intense metasomatism. The flat-lying mélange spans a 300 m thick vertical exposure, progressing from a block-rich lower portion toward a block free, serpentinite-dominated upper region. The mélange is underlain by a late Campanian (c. 75 Ma) paleoaccretionary system that experienced blueschist facies metamorphism and local metasomatism. Pale green jadeitite constitutes the dominant block population in the southern part of the Convento mélange, with minor metasedimentary and metamafic block populations that record variable degrees of HP metamorphism. New metre-scale zoning identified within the jadeitite bodies is consistent with that documented in other jade localities, with white jade cores surrounded by green and dark-colored jade. An outermost, pyroxene-free rind consists of weakly foliated phengite + albite ± epidote, and coexists with chloritite blackwalls developed at the margins of jade blocks. Parts of the main jade bodies exhibit prismatic radial and comb jadeite microstructures, consistent with descriptions of P-type jade, which precipitate directly into open fractures from hydrothermal fluids. However, Convento jade contains paragonite with up to 2 wt.% K_2O and jadeite-omphacite exsolution domains brecciated into jigsaw-like fragments recemented by jadeite and/or omphacite. These observations are consistent with at least part of the jade in the Sierra del Convento mélange representing near-total high-temperature metasomatic replacement of trondhjemitic protoliths, and thus to the R-type (replacement) jade paragenesis. New U-Pb zircon geochronology from the zoned white, green, and dark jade record similar ages (115-118 Ma) to pure jadeitite, blackwall, and trondjemite previously dated from the mélange, suggesting coeval development of these lithotypes in the early stages of a hot subduction channel. Comparatively younger $^{40}Ar/^{39}Ar$ and accessory phase (titanite, apatite) U-Pb dates of c. 77 Ma provide the lower bound to a prolonged history of fluid-rock interaction during the 40 Myr separating initial jadeitite formation and subsequent exhumation of the mélange during tectonic juxtaposition with the structurally underlying paleoaccretionary system.