

Jadeitite and eclogite occurrences along the Motagua Suture Zone, Guatemala

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One of the world's major jadeitite occurrences — a source of jade from antiquity to the present — is in serpentinite bodies along the Motagua Suture Zone (MSZ), now the Caribbean-North American plate boundary zone in Guatemala. Recent exploration has revealed larger quantities of jadeitite than previously described. Moreover, these are hosted in sheared serpentinite that contains abundant eclogite, garnet amphibolite, glaucophane eclogite, blueschist, and unusual jadeite-pumpellyite and lawsonite-omphacite-quartz assemblages. While previously described sources occur just north of the Motagua River in a 15 km long band, new jadeitite discoveries extend 10 km farther north in the Sierra de las Minas, 15 km farther west near Morazán, 16 km farther east near Río Hondo, and ~20 km south from Carrizal Grande to La Ceiba. The total area is an order of magnitude greater than previously recognized.

The eclogites contain garnet, omphacite, titanite-mantled rutile, zircon, and pyrite, with variable quantities of secondary (?) phengite, glaucophane, lawsonite, albite, zoisite, phlogopite and chlorite. They probably formed at depths ≥ 50 km (>13 kbar, $T < 550$ °C). The presence of eclogite, lawsonite-omphacite-quartz and jadeite-pumpellyite rocks suggests a sampling trend downward along a steep P/T slope (~ 2 - 3 MPa/deg) to low T (~ 200 °C). Jadeitites near the MSZ formed at shallower depths ($P=5$ to 12 kbar) and definitely at lower T than eclogites: 200 to 450 °C (Harlow, 1994). Textures of jadeitites and albitites show abundant evidence that these rocks crystallized directly from a hydrous fluid. One jadeitite contains garnet with a spessartine-rich composition compared to that of eclogite or garnet amphibolite. Amphiboles in jadeitites and omphacite metabasites near the MFZ are taramite verging to pargasite and edenite to actinolite in associated amphibolite. In contrast, to the south, amphibole in eclogites is glaucophane (with late stage actinolite) and jadeitites lack amphibole but have significant phengite or pumpellyite. Retrogression in the south involved either Na metasomatism and/or concurrent P/T decrease whereas calcic amphibole in the central zone indicates either desilicification and/or a P decrease. The different tectonic slices seem to record various deep-seated metasomatic systems that operated from eclogite facies to shallower P-T conditions in one or more relict subduction zones.

Our first Ar-Ar phengite datum for an albitite yields 78 ± 1 Ma which is close to the oldest metamorphic ages in the MSZ. Because albitites form at or just above the closure temperature for mica, relatively fast exhumation is required to preserve these HP assemblages.

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