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Jadeitites and related HP-rocks from the Rio San Juan Complex, Dominican Republic: Petrological characterization and archaeological implications

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Serpentinite mélanges in the Rio San Juan Complex (RSJC) host HP metamorphic tectonic blocks such as blueschist, eclogite, orthogneiss, marble, metapelite, etc., as well as a variety of quartz-free and quartz-bearing jadeitites and jadeite-rich rocks. These different rock types reveal a broad diversity of PT paths that are closely interrelated. In the early stages of subduction-zone evolution, PT paths are both clockwise and anticlockwise with low ('warm') P/T gradients. The maximum PT conditions derived are about 800°C/2.5 GPa (a Lu-Hf-isochron age on eclogite yields 103.9 Ma). Omphacite-bearing blueschists document a continuous cooling and steepening of the PT gradient; the recorded peak metamorphic conditions are 500–550°C/1.6–1.8 GPa at 80.3 Ma (Rb-Sr on Phe–Amp–WR). Very steep ('cold') P/T gradients are derived for jadeite blueschists; Rb-Sr ages (Phe–Amp–WR) of 62.1 Ma and Ar-Ar ages of 71.9 Ma date the peak metamorphic conditions of 360–380°C at about 1.7 GPa [1].

Jadeitites are known from only about 20 localities worldwide, and are thought to either crystallize directly from HP aqueous fluids or to form by metasomatic replacement of a suitable protolith, such as, for example, tonalite, trondhjemite or plagiogranite. Most jadeite-rich rocks from the Rio San Juan Complex occur as loose blocks or as boulders in riverbeds; however, quartz-bearing jadeitites also form concordant layers or discordant veins in jadeite–lawsonite blueschist and omphacite–garnet blueschist country rocks [2,3]. These rock associations are extremely rare and allow contact relationships between jadeite and host rock to be studied. The principal types of jadeite-bearing rocks observed in the RSJC can be categorized as (1) jadeitites *s.str.* (quartz-free, albite-bearing, >90 vol% jadeite), which have so far been found only as loose blocks/boulders in the mélange, and (2) jadeitites *s.str.* (quartz-bearing) and jadeite quartzites (JQ) which grade into jadeite–lawsonite quartzites (JLQ) and even lawsonite quartzites (LQ); in addition, omphacite veins have been found in blueschists [2]. Current archaeological excavations at the Playa Grande region, ~30 km E of the RSJC, indicate the occurrence of an unusually large number of axes among lithic artefacts attributed to the Taíno culture. The artefacts are made of various lithologies, but a disproportionately large number are fashioned from jadeite-rich rocks. Evidence shows this extremely hard and tough rock was locally worked into tools. In the past, Guatemala was thought to represent the major source of lithic jadeite-rich artefacts found on many of the Caribbean islands, representing one of the most widely distributed lithic tools in the region [4]; however, new findings demonstrate that the Sierra del Convento region [5] in Cuba as well as the RSJC of the Dominican Republic [2,3] also have to be considered as possible sources. Our recent petrological studies on the artefacts from Playa Grande using thin-section, electron-microprobe, and geochemical methods indicate that a local origin from the RSJC appears likely for most of the jade artefacts; however, RSJC equivalents have not (yet) been found for some artefact lithologies, such as those that contain jadeite

plus lawsonite as major constituents. Thus a different origin from other Mesoamerican and Caribbean areas cannot be ruled out.

References:

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