

Jadeitite as a monitor of subduction-zone fluids: The Rio San Juan Serpentinite Complex (Dominican Republic)

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The Rio San Juan Complex (RSJC) of the northern Dominican Republic consists of subduction-related mafic schists which were cut by diapir-like serpentinite melanges. These mélanges contain knockers of various metamorphic rock types such as blueschist, eclogite, lawsonite blueschist, jadeitite, cymrite-bearing rock, and orthogneiss. Comprehensive petrological studies demonstrate a broad diversity of PTt-paths which, however, are closely related. The mélanges may represent deep-seated roots of “serpentinite mud” volcanoes and seamounts, as observed on the sea floor within trenches of several present-day subduction zones.

In the early stages of development of the subduction zone, the PTt-paths typically are anticlockwise with shallow (“hot”) P/T-gradients. Maximum PT-conditions derived from eclogites are 750°C/24 kbar; the related Lu-Hf-age is 103.9 Ma (Grt-Ep-Amp-Omp-WR). Continuous cooling and steepening of the subduction zone PT-gradient is documented by omphacite blueschists, which experienced peak metamorphic conditions of 500-550°C/16-18 kbar at 80.3 Ma (Rb-Sr on Phe-Amp-WR). Jadeite-blueschists typically are constrained to very steep “cold” P/T-gradients; Rb-Sr-ages (Phe-Amp-WR) of 62.1 Ma date the peak metamorphic conditions of about 380°C/18 kbar (see also Krebs et al., 2007).

Most jadeitites found in the RSJC are loose boulders, as is common in most localities in the world, but two types have been observed directly associated with lawsonite-blueschist knockers. One type forms clearly discordant veins, whereas the second type is characterized by concordant and intimate, gradational interlayering with the surrounding blueschist. The jadeitites are fine-grained, whitish-green, and contain jadeite as the main constituent; the amount of jadeite may exceed 90 vol.%. Phengite, omphacite, epidote, Na-amphibole, plagioclase, and quartz occur in minor amounts. Lawsonite, pumpellyite, and stilpnomelane have locally also been observed; titanite and rutile are accessories. The petrographic character of the jadeitites suggests that they are analogous in both mineralogy and fabric to jadeitites described from the serpentinites of the Motagua Fault Zone in Guatemala (Harlow and Sorensen, 2005). The unique feature of the RSJC occurrence is that the interaction of circulating high-pressure, jadeitite-forming fluids with serpentinites and blueschists in a subduction-zone channel can be studied in detail.

References

Harlow, G E and Sorensen, S S (2005) Jade (nephrite and jadeitite) and serpentinite: metasomatic connections. *Int Geol Rev* 47:113-146

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