

## **Coexisting retrograde jadeite and omphacite in a jadeite-bearing lawsonite eclogite from the Motagua Fault Zone, Guatemala**

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### **ABSTRACT**

Coexisting jadeite and omphacite were found as retrograde minerals in a jadeite-bearing lawsonite-eclogite from the Motagua Fault Zone, Guatemala. The lawsonite-eclogite is characterized by the occurrence of garnet porphyroblasts up to 2.5 cm in size, and the eclogite-facies parageneses, almandine-rich garnet + impure jadeite + lawsonite + rutile + quartz; garnet contains inclusions of impure jadeite, phengite, ferroglaucophane, chlorite, lawsonite, rutile, ilmenite, and quartz. Textural relations and parageneses and compositions of minerals indicate that the lawsonite-eclogite experienced two stages of metamorphism: prograde eclogite-facies stage ( $M_1$ ) and retrograde stage ( $M_2$ ). The impure jadeite (Jd-I) of the  $M_1$  eclogite-facies occurs in both the matrix and as inclusions in garnet, and contains considerable amounts of augite and aegirine components ( $Jd_{61.75}Aug_{16.24}Ae_{0.18}$ ). It is partly recrystallized to retrograde  $M_2$  jadeite (Jd-II) ( $Jd_{74.87}Aug_{9.16}Ae_{0.11}$ ) and omphacite ( $Jd_{42.50}Aug_{36.46}Ae_{7.16}$ ); some of these two sodic pyroxenes may have crystallized from fluids. Both  $M_2$  jadeite and omphacite show textural equilibrium and are believed to have grown concurrently. Based on the observed compositions and the phase relations of sodic pyroxenes from Carpenter (1980), the  $M_1$  impure jadeite (Jd-I) may have had a disordered  $C2/c$  symmetry at  $T = ca. 450\text{ }^\circ\text{C}$  and  $P = ca. 1.8\text{--}2.4\text{ GPa}$ , and was subsequently crystallized into jadeite (Jd-II) plus ordered  $P2/n$  omphacite during retrogression with infiltration of fluids at  $T < ca. 300\text{ }^\circ\text{C}$  and  $P = ca. 0.7\text{ GPa}$  ( $M_2$ ). The extreme low- $T$  conditions during retrogression may have prevented reaction between eclogitic jadeite and adjacent minerals. Instead, eclogitic impure jadeite (plus fluid) has recrystallized into the retrograde jadeite + omphacite pair with a wide compositional gap.