6.- Zoned Cr-spinel and "ferritchromit" alteration in forearc serpentinites from the northern Dominican Republic

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Serpentinites in northern Dominican Republic belong to the northern Caribbean peridotite belt, which extends from Cuba to Puerto Rico and was formed during the subduction of oceanic lithosphere under the Caribbean Plate between the late Cretaceous and mid-Eocene. These serpentinites have two origins: abyssal peridotite and forearc mantle wedge peridotite (Saumur et al., 2010). This study concerns Cr-spinel from forearc serpentinites cropping out near the Septentrional Fault Zone (SFZ). These serpentinites represent mantle peridotites that were hydrated at the base of mantle wedge during subduction. In response to the mid-Eocene oblique collision of the Caribbean Plate with the Bahamas Platform, these forearc serpentinites protruded into the upper crust along the SFZ (Saumur et al., 2010).

Cr-spinel is one of few preserved primary minerals in the extensively hydrated SFZ serpentinites (over 8 %H2O). Most Cr-spinel grains are concentrically zoned. Indeed, cores retain primary compositions, but rims are gradually altered to ferritchromit where Al(3+) and Mg(2+) are replaced by Fe(3+) (+minor Cr(3+)) and by Fe(2+), respectively. MgO and Al2O3 released from Cr-spinel formed chlorite which partly surrounds spinel grains. Local Cr-spinel grains are strongly fractured and are completely altered to ferritchromit.

Ferritchromit with chlorite haloes has been documented in serpentinites that have undergone amphibolite facies metamorphism or higher. However, our samples do not show the evidence of amphibolite facies metamorphism, since the serpentine species in our samples is dominantly pseudomorphic lizardite, which has the upper stability of 250-300 °C. Furthermore, ferritchromit in our samples contains high Al and Mg compared to other reported occurrences, and chlorite rims do not completely envelope spinel grains. The evidence suggests that our ferritchromit represents an early alteration phase of Cr-spinel, either because they have undergone metamorphism at low temperatures or high temperature metamorphism for only a short period. Potential sources of the heat are either the hot mantle interior during their upwards protrusion along the SFZ, or late contact metamorphism related to the Rio Boba Gabbro. Our results show that the compositions of Cr-spinel grains may be partly to completely altered during low grade metamorphism and one must be cautious when using them as petrological indicators.