Prograde sulfide metamorphism and sulfide-silicate phase relations in blueschist and eclogite, New Caledonia

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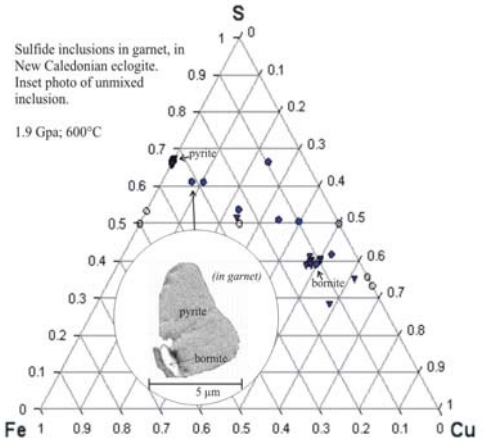
During retrogression, sulfide structure and composition are generally susceptible to reequilibration [1] and alteration by fluid ingress. In New Caledonia however, sulfide inclusions in prograde porphyroblasts (lawsonite, spessartine garnet, and almandine garnet) were armoured against external changes in fS_2 and fluid influxes during uplift.

Sulfide inclusions are present in lawsonite (1Gpa, 400°C) and omphacite (2Gpa, 600°C) [2] metamorphic zones (see Figure). Phase relations in the Cu-Fe-S system are affected by location (matrix *vs* inclusion), lithology, and metamorphic grade. Solid solution extents increase prograde, but Cu% is paticularly large distorting previous experimentally-determined solid solution fields. Prograde sulfide inclusions have not been found in the intervening 'epidote' metamorphic zone. Fluctuations in fluid fugacities during the lawsonite to epidote transition clearly affected the stability of sulfide minerals during subduction.

We propose common fS_2-fO_2 reference buffers containing magnetite are irrelevant in blueschist-eclogite terranes, and it is important to determine which specific phase equilibria are relevant during prograde fluid-solid exchanges.



References[1] Barton P.B. (1970) *MSA Reviews in Mineralogy* **1**, 1-11. [2] Fitzherbert J.A., Clarke G.L. and Powell R. (2003) *J.Petrology* **44**, 1805-1831.