A phase equilibria approach to the blueschist–eclogite–glaucophanite facies

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Mineral equilibria influential to the formation of blueschist, eclogite and glaucophanite are poorly resolved with regards to modern thermodynamic datasets. Phase equilibria modelling of examples of blueschist–eclogite–glaucophanite from northern New Caledonia present petrological details important to defining the metamorphic facies (Chapman & Clarke, 2021). Updated activity–composition models for phase equilibria modelling of amphiboles enables the resolution of the blueschist–eclogite–amphibolite facies triple junction in terms the stability of omphacite, garnet and the sodic–calcic amphibole solvus (Rebay *et al.*, 2010). The specifics of the facies transition are influenced by extensive variables of water content and redox budget (Clarke et al., 2006). Lower water activities displace the stability of *sensu stricto* eclogite to lower-*P*, well outside of the *P*–*T* conditions of commonly preserved natural eclogites. Greater extensive oxygen favours the stabilisation of glaucophanite, expanding the stability of clinozoisite, glaucophane–riebeckite, chloritoid, talc and aegirine-rich omphacite at the expense of garnet. The *P*–*T* formation conditions of glaucophanite overlap with many of the conditions established for the blueschist and eclogite facies.

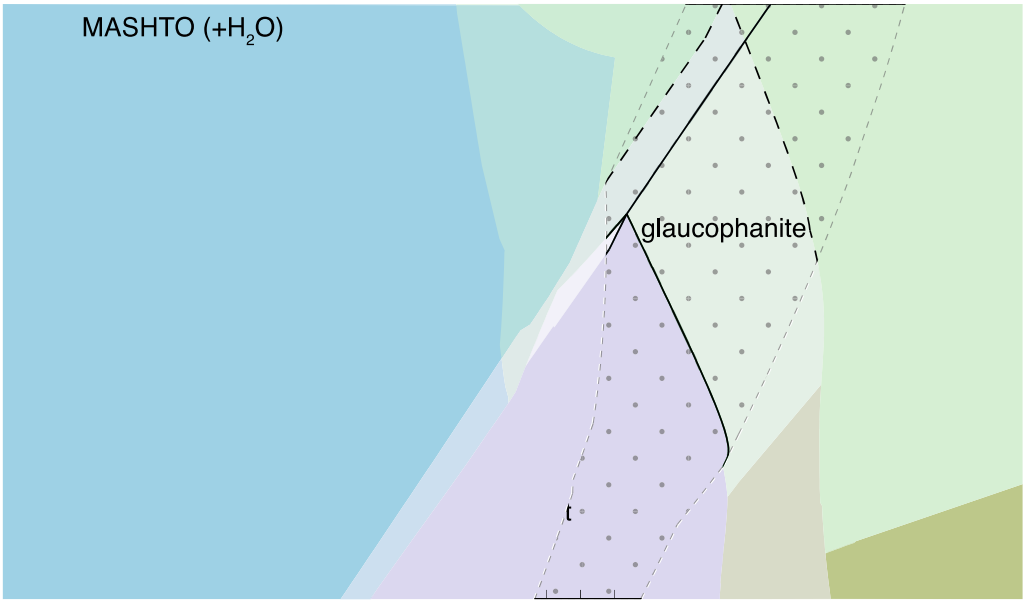

Figure 1 –Redox changes in phase equilibria relevant to the facies triple junction

Chapman, T., Clarke, G. L., 2021. Cryptic evidence for the former presence of lawsonite in blueschist and eclogite. *Journal of Metamorphic Geology* 39, 343-362.

Clarke, G. L., Powell, R., Fitzherbert, J. A., 2006. The lawsonite paradox: a comparison of field evidence and mineral equilibria modelling. *Journal of Metamorphic Geology* 24, 715-725.

Rebay, G., Powell, R., Diener, J. F. A., 2010. Calculated phase equilibria for a MORB composition in a *P*–*T* range, 450–650°C and 18–28 kbar: that stability of eclogite. *Journal of Metamorphic Geology* 28, 635-645.