

Plagioclase Variation

A systematic variation of plagioclase composition occurs from south to north in the Bronson Hill terrane amphibolites (Fig. 14). The variation may be due to the subsolidus relationships of the plagioclase feldspar system (Fig. 15). Plagioclases that crystallize at lower temperatures will have a more limited compositional variation than those crystallized at a higher temperature. The wide variation in plagioclase composition in the southern and northern sections of the field area suggests higher temperatures than central and northern Connecticut, where An values are more restricted.

Estimates of metamorphic grade made in the field correspond to the plagioclase-composition theory. Anaflexis is present in some outcrops of the Bronson Hill terrane in the southern-most section of Connecticut. The pegmatite district of Connecticut is located in southern and central Connecticut, indicating a lower temperature regime. In the northern section of Connecticut, quartz veins are found in outcrops and indicate the lowest temperatures within the portion of that terrane studied.

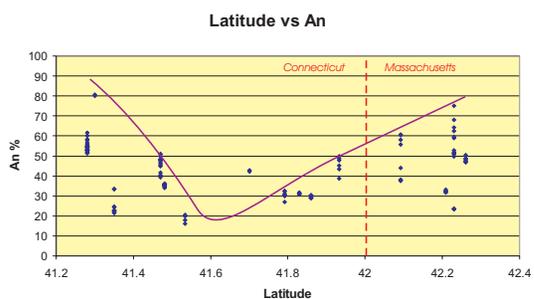


Figure 14. Plot of anorthite-value versus latitude based on electron microprobe analyses.

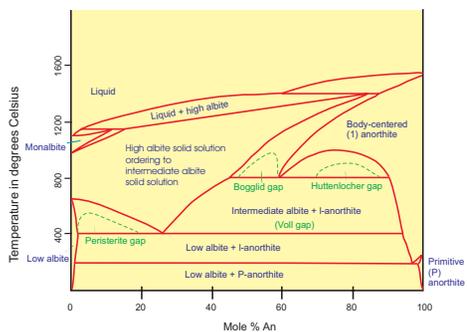


Figure 15. Subsolidus phase relations of the plagioclase feldspar solid solution. Based on Spear (1995) and Carpenter (1994).

Final Thoughts

The apparent disequilibrium of many of the amphibole-plagioclase pairs used for thermometry calculations is a cause for concern. The Holland and Blundy (1994) equations provide a first-order check on equilibrium based on the relationship between the two thermometers, but no apparent compositional or textural difference was found between pairs that did and did not work. In the thin sections analyzed, quartz and plagioclase embayed one another and elongate crystals of both tended to be parallel in the direction of the dominant foliation. This would indicate texturally that quartz and plagioclase were active during similar periods of time during the metamorphic history of the rocks. The ratio of plagioclase to quartz is normally 1:1, though it can range from 1:10 to 10:1. The different results from the two thermometers for all the hornblende-plagioclase pairs indicates that silica was undersaturated according to Holland and Blundy (1994). This may be another sign of disequilibrium.

Wintsch and Yi (2000) proposed that amphibole within the Glastonbury gneiss had retained its igneous composition through two subsequent metamorphic events although it was a foliation-forming mineral. The plagioclase within the analyzed samples has metamorphic zoning and deformation twinning, which is indicative of the feldspar undergoing a change during metamorphism. This may be the reason for the disequilibrium in the samples.

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