D-21: Is vein graphite of Sri Lanka related to granulite-facies metamorphism ?

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The occurrence of vein graphite of Sri lanka in a granulite terrain has led previous workers to relate vein graphite mineralization to regional granulite-facies metamorphism. To test the validity of this, a detailed study of the vein graphite of the Kahatagaha-Kolongaha Graphite Mines (KKGM) was undertaken. Microscopic and petrographic investigations of altered and unaltered rocks from KKGM showed that the metamorphic minerals formed at the peak of the granulite-facies metamorphism (PGFM) ($P \approx 7\text{-}7.5$ kbar, $T = 800\text{-}850\,^{\circ}C$) had been altered by the vein graphite mineralization. The new minerals formed at the wall rock alteration zones around graphite veins were antiperthite, chlorites, sphene, Cl-F-apatite, orthoclase, Cl-rich dark brown biotite, Cl-rich hornblende, Cl-scapolite and some unknown Ti-bearing minerals. Formation of antiperthite, which is related to the graphite mineralization, from metamorphic plagioclase at wall rock alteration zones was not restricted to any particular rock type; it was also found in altered basic rocks.

With cooling accompanying uplift, after the PGFM, some garnet in contact with either quartz or clinopyroxene became unstable, forming decompression reactions around it:

garnet + clinopyroxene ---> orthopyroxene + plagioclase + iron ore

garnet + quartz ---> orthopyroxene + plagioclase

These reactions occurred at P≈ 5-6.5 kbar and T≈ 650°C after the formation of large upright D_5-folds which post-date PGFM. Products of these corona and symplectite forming reactions had completely or partly been altered by the vein graphite mineralization. Plagioclase of these reactions had been converted to antiperthite as well. Thus vein graphite mineralization post-dates the decompression reactions which in turn post-dates D_5-folds and PGFM. Therefore, the vein graphite mineralization was not related to the granulite facies metamorphism.

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