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Metamorphism in the Carolina Slate Belt: topaz composition and its implications: reply

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The temperature of crystallization for Hillsborough topaz determined by Rosenberg (1972, 1980) is too high to fit the large body of field and petrologic data on the metamorphic history of the Carolina slate belt, which shows a maximum thermal regime of upper greenschist facies (Sykes and Moody, 1978). The discrepancy between the experimental data and the field petrologic observations lies in the nature of the experiments done by Rosenberg (1972). The temperature of crystallization was derived from synthesis experiments on the assemblage topaz, quartz, and mullite or pyrophyllite from oxide mixes. Synthesis experiments are well known to give higher temperatures of stability than equilibrium phase-boundary determinations (Johannes, 1968; Moody, 1976). The few higher temperature (>600°C) reversals (Fig. 7, Rosenberg, 1972) do not give enough constraint on the *slope* of the curve to use that curve to extrapolate to lower temperatures. The synthetic mullite-bearing assemblages with topaz may have the proper bulk composition for comparison with the assemblage topaz–andalusite observed at Hillsborough (Sykes and Moody, 1978), but the crystallization temperature determined from those experiments (Rosenberg, 1972) will not be valid for the andalusite–topaz assemblage for the same reasons as noted above. Therefore, this re-examination of the experimental data on topaz stability indicates that it is not applicable to setting a thermal limit to the metamorphic regime in the Carolina Slate Belt.

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