

High-pressure metamorphism during the Llano orogeny inferred from Proterozoic eclogite remnants

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ABSTRACT

Mineral chemistries and textures in mafic garnet-pyroxene rock within the Lost Creek Gneiss in the Purdy Hill quadrangle, Mason County, Texas, record three distinct *P-T* events, two of them at pressures higher than any previously documented for these Grenville-age rocks. The earliest metamorphic episode produced an eclogitic assemblage of pyrope-rich almandine + sodian augite + orthopyroxene + pargasitic amphibole. Some orthopyroxene cores record pressures greater than 15 kbar even for the most conservative estimated temperature of 500 °C. Garnet and orthopyroxene rims and matrix clinopyroxene and amphibole record a second event at ~750 °C and 8 kbar. Symplectites of clinopyroxene + plagioclase and coronas around garnet of plagioclase + amphibole + magnetite formed in response to reheating and hydration associated with postkinematic intrusion at the amphibolite facies conditions (600–650 °C, 3.5–5 kbar) commonly recorded in the region. Recognition of early high-pressure metamorphic episodes markedly strengthens the correlation between these rocks and other Grenville-age exposures along the continental margin and provides petrologic support for models invoking Proterozoic subduction accompanying the Llano orogeny.