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Plagioclase compositions from metabasalts, southeastern Llano Uplift: plagioclase unmixing during amphibolite-grade metamorphism

JAMES R. GARRISON, JR.

Department of Geological Sciences, The University of Texas
Austin, Texas 78712

Abstract

The Precambrian metamorphic rocks of the southeastern Llano Uplift include syntectonic basalt dikes intruded throughout the orogeny and metamorphosed under high temperatures and low pressures. Plagioclase phenocrysts from basalt dikes intruded early in the orogeny recrystallized and reacted to uniform compositions ($An_{32.0}Ab_{67.5}Or_{0.5}$ to $An_{44.4}Ab_{55.0}Or_{0.6}$) in equilibrium with amphibole. Zoned plagioclase phenocrysts in basalt dikes intruded during the closing stages of metamorphism reequilibrated to metamorphic compositions only to a depth of 30 microns into the grains. Compositions in the interiors of such phenocrysts fall within ranges of high-temperature unmixing. These crystal interiors did not equilibrate with grain exteriors, and they contain compositional domains 6–30 microns in width ranging from $An_{42.8}Ab_{57.0}Or_{0.2}$ to $An_{91.2}Ab_{7.1}Or_{1.7}$. Such compositional domains appear to reflect an approach to metastable equilibrium by unmixing into Bøggild and Huttenlocher intergrowths.