

THE WOODBURY STRUCTURE: REMAINS OF A LATE PROTEROZOIC (?) PEAK-RING IMPACT CRATER IN WEST-CENTRAL GEORGIA, USA

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Introduction: “The Woodbury structure” has been used to refer to a 7-km wide circular depression (32.92°N; 84.54°W) within the Pine Mountain terrane of west-central Georgia [1]. Quartzite breccias collected inside the basin contain evidence of altered pseudotachylites, coesite, and possible planar deformation features (PDFs) in quartz and zircon [1, 2]. Based on those observations, we have proposed that the structure resulted from an impact sometime between the Late Proterozoic and Alleghanian tectonism.

Our “Charnockite Problem”: Several exposures of charnockitic melt occur outside the basin rim. Relict plagioclase grains in these rocks exhibit alternate-twin deformation fabrics generally considered diagnostic of shock metamorphism [3]. Subsequent petrography has revealed the rare presence of quartz grains containing typical PDFs (Fig. 1) and ballen-like textures. Preliminary geochemical analyses and identification of sedimentary carbonate clasts also suggest that these charnockites crystallized from shallow melts rather than deep-seated granulites.

Implications: If these charnockites represent the remains of impact melt pools, the “Woodbury structure” likely is the eroded inner peak ring of a much larger crater (perhaps as large as 40 km across). We are investigating the age of the impact and the relationship of the crater to the complex regional tectonic framework, but we presently believe that a Late Proterozoic date (≤ 1.1 Ga) is most reasonable.

References: [1] Albin E. F. et al. 2006. Abstract #2375. 37th Lunar & Planetary Science Conference. [2] Albin E. F. et al. 2008. Abstract #2506. 39th Lunar & Planetary Science Conference. [3] Albin E. F. et al. 2009. Abstract #2544. 40th Lunar & Planetary Science Conference.

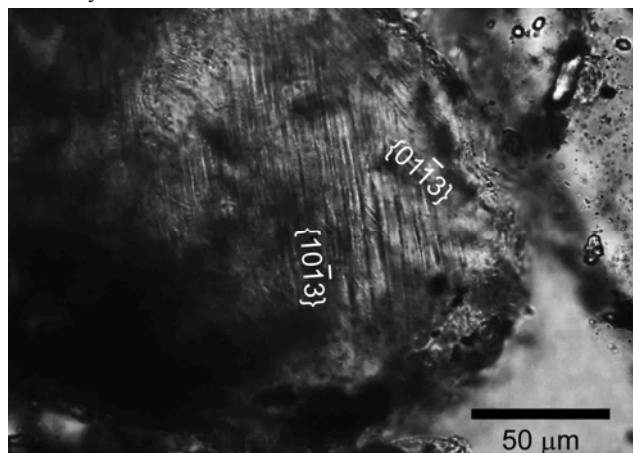


Figure 1. Photomicrograph (PPL) of quartz containing multiple sets of PDFs. Prominent planes correspond to $\{10\bar{1}3\}$.