EVIDENCE FOR AN EXPOSED CENTRAL UPLIFT IN THE WETUMPKA IMPACT STRUCTURE, ALABAMA, USA

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Summary: Measuring approximately 5 km in diameter, the Late Cretaceous Wetumpka impact structure is large enough to have formed a central uplift [1]. Essentially the same gravity data have been used to argue that the crater may have a shallowly buried central peak [2] or no uplift at all [3]. We have studied the shock deformation of rocks exposed on and around a topographically high area near the center of the crater. We conclude that the rocks at the core of this central uplift record pervasive low-level shock (3 to ≤ 10 GPa) and must have been displaced upward from beneath the transient crater floor. The resulting peak may have partially collapsed due to the rheology of the rocks involved.

Stratigraphy of a Central Uplift: The core of the proposed peak presently is a rubble pile of crystalline basement rocks including a large volume of quartz pegmatite. The quartz contains small shatter cones and so-called *feather features*. These are low-level shock indicators almost always associated with central uplifts [e.g., 4, 5] or deeply eroded structures [e.g., 6]. The peak is surrounded by a jumbled megabreccia composed of large blocks of schist, gneiss, and Upper Cretaceous sands. In some places, the blocks are separated by altered suevites, which contain moderately shocked granules of the quartz pegmatite exposed in the peak. The peak is capped by a patchy unit of welded red breccias, similar to *tierra cocidas* [7]. Most clasts in these rocks are highly shocked, exhibiting high densities of planar deformation features (PDFs), extensive toasting, mosaicism, and/or recrystallization after diaplectic phases. We suggest that this unit represents relatively late-stage fallback of material ejected from close to ground-zero.

Absence of Central Gravity High: The absence of a central positive gravity anomaly [3] might be explained by the observation that the central uplift is largely composed of highly-fractured pegmatitic quartz surrounded by basement-derived megablocks and altered melts. The observed negative anomaly may be larger than it would be otherwise due to this arrangement.

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