In Situ Tektite Glass and Upper Eocene Impact Stratigraphy of the Southeastern United States

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Harris et al. [1] report the occurrence of shocked quartz grains at the base of the Twiggs Clay Member of the upper Eocene Dry Branch Formation in east-central Georgia. They conclude that the grains are ejecta from the ca. 35.5 Ma Chesapeake Bay impact and that the horizon represents the likely stratum from which the Georgia tektites (georgiaites) have been reworked. During subsequent investigations [2, 3], we have identified the first *in situ* specimens of impact glass in the ejecta layer. They are clear to yellowish-brown vesicular tektite fragments 0.3 to 1.2 mm long. Although their major element compositions (wt%: SiO_2=63.8, Al_2O_3=15.4, TiO_2=1.1, FeO=4.6, MgO=2.0, CaO=4.4 Na_2O=5.7, K_2O=2.9) are similar to low-silica microtektites from both the southern Caribbean and DSDP Site 612 (New Jersey slope), refractory element ratios suggest that they melted from the same target materials as other relatively proximal glasses (i.e., DSDP Site 612 and georgiaites). Plotting $[\ln(MgO/SiO_2)]/TiO_2$ vs. $[\ln(SiO_2/Al_2O_3)]/TiO_2$ distinguishes that group from more distal (northern Gulf of Mexico) and most distal (bediasites and Barbados) glasses in the North American strewn field. The differences probably reflect the vertical variability in sedimentary cover sequences near ground zero.

The identification and correlation of the Chesapeake Bay ejecta horizon in the Southeastern US provides a convenient benchmark for stratigraphic studies in addition to providing important clues to impact processes—shock metamorphism, melt production and distribution, and regional environmental effects— in a major marine impact. We are investigating possible glasses and shock-deformed minerals in upper Eocene strata from Alabama to North Carolina that may record the Chesapeake Bay event and/or other impacts associated with a protracted comet [4] or asteroid [5] shower during the late Eocene.

[1] Harris R. S. et al. (2004) *Geology, 32*, 717-720; [2] Harris, R.S. et al. (2007) The Late Eocene Earth: Hothouse, Icehouse, and Impacts— Abstracts with Program and Field Trip Guide (GSA Penrose Conference), 32-33; [3] Harris, R.S. et al. (2009) *Lunar Planet. Sci. Conf., XL*, #2502; [4] Farley, K. A. et al. (1998) *Science, 280*, 1250-1253; [5] Tagle, R. and Claeys, P. (2004) *Science, 305*, 492.</P> span <>