TSUNAMI GENERATION AND SUBSEQUENT AQUEOUS RESURGE AT A 5-KM DIAMETER MARINE IMPACT STRUCTURE, WETUMPKA, ALABAMA USA.

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Introduction: Wetumpka impact structure, a roughly 5-km Late Cretaceous marine-target crater, is situated in central Alabama near the fall line between the Appalachian piedmont and the coastal plain [1, 2]. At the time of impact, 84.4 +/- 1.4 m.y. ago [3], the target was a shallow continental shelf with c. 100 m of mainly unconsolidated Upper Cretaceous coarse clastic sediments covering a weathered schist-gneiss basement complex. An overlying marine water layer, a few 10s m in depth, was swept away from the area by the impact. This seawater soon returned as a debris flow-like resurge [4, 5, 6]. The main aqueous deposit from this resurge is a calcareous marl that was derived in part from the target Mooreville Chalk of the adjacent continental shelf. This resurge marl contains impact ejecta and marine components (glauconite and fossils) not typical of the target site relative to the paleoshore [4, 5, 6]. Marl resurge deposits in and near the crater vary widely in thickness from several 10s m to only a few cm [7].

Discussion: The present location of resurge marl deposits in low-lying parts of a hummocky crater interior shows that the resurge occurred well after the slumping of the unconsolidated target sediments and that it filled low spots in the crater floor [6]. CT scans of drill core show that there are multiple graded layers within one 25-m thick deposit of the resurge chalk [4]. This finding suggests multiple complex aspects to the resurge flow (or flows?) [5, 6]. Previous 2D numerical simulations show that the ejection of the water layer followed the crater ejecta curtain on the seafloor (i.e., no "outer crater" formed in the water layer [8]). However, it is possible that outwards tsunami could have been generated by the emplacement of the ejecta layer and it may have taken several minutes before water returned to the crater site [8]. The southern sector of the rim was unstable, possibly due to high content of unconsolidated target sediments, and collapsed early on to allow the debris/laden resurge flow to come into the crater [6, 7].

References: [1] King Jr. D. T. et al. (2002) EPSL 202, 541-549. [2] King Jr. D. T. (2006) MAPS 41, 1625-1631. [3] Wartho J.-A. et al. (2012) MAPS, 47, 1243-1255. [4] Markin J. K. et al. (2011) LPS XLII, Abstract #2379. [5] Markin J. K. and King Jr. D. T. (2012) GCAGS Trans. 62, 265-272. [6] King D.T. Jr. and Ormö J. (2012) GSA Spec. Paper 483, 287-300. [7] King Jr. D. T. et al. (2013) GSA Ann. Mtg. Abst. 226-2. [8] King Jr. D. T. et al. (2014) LPSC XLV, Abstract #2139.