Evidence for a Tsunamigenic Impact in the New York Metropolitan Area Approximately 2300 Years Ago

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Oceanic impacts are a growing source of concern for the scientific community. Though the Earth is ~70 percent covered with water, and logic would therefore dictate that ~70 percent of impacts occur in the oceans, scientific investigations have focused on continental events. This is in part due to the difficulties inherent in examining submarine impact structures. Oceanic impacts lack many of the known features of continental events; however, oceanic impacts, unlike their continental counterparts, produce catastrophic tsunami events that may be used to identify them. Recent discoveries point to a tsunami event that may have affected sediments both in the Hudson River and offshore Long Island approximately 2300 years ago (Goodbred et al. 2006). We have found impact ejecta in cores from the Hudson River and surrounding areas containing a layer that is circa 2300 B.P. Samples were taken from the layer in sediment cores CD01-01, CD01-02, SD30, VM32-2 from the Hudson River, as well as cores GSB102, GSB104, and SH10 from the Great South Bay and Sandy Hook areas. Individual ejecta grains were identified through an examination of the tsunami layer samples with optical and electron microscopy, as well compositional analysis via energy dispersive X-ray spectroscopy. Carbon and aluminum silicate impact spherules were found in the samples. Also present in the samples were shock-metamorphosed phases of feldspar, ilmenite, and olivine exhibiting planar deformation features and shock lamellae consistent with studies of known impact ejecta. The impact ejecta layer contains some probable but currently unconfirmed shocked quartz, suggesting that the source crater lies outside the Hudson River. We have also found no crater candidate within the Hudson River. TEM studies of the carbon spherules revealed the presence of associated hexagonal nanodiamonds, also known as lonsdaleite, which are uniquely related to shock formation. The sharp resolution of the layer in the Hudson cores suggests that the sediment containing the impact ejecta was deposited in a tsunami-like event, rather than by reworking from an older impact event. In addition, carbon impact spherules in the layer are lighter than water suggesting that they could only be incorporated as part of an event that caused massive, abrupt deposition. Thus, all layers that contain the carbon spherules cannot be lag deposits and thus cannot represent reworking by strong currents of storm or flood origin. Because there are significant uncertainties in radiometric ages, we do not yet have unequivocal evidence for a relationship between the tsunami deposits on Long Island and those in the Hudson River. However, we have established approximate layer thicknesses for all of the above cores, and their magnitude – often more than two meters thick – indicates a catastrophic event resulting in the rapid deposition of massive amounts of sediment throughout the Hudson River and surrounding areas. We can say that the New York area lacks the extreme seismic and volcanic activity that might produce a regional tsunami event, leaving a hypervelocity bolide impact as the most likely source for the tsunami event and its associated impact ejecta and tsunami deposit layers. As oceanic impacts pose a serious threat to coastal communities around the world, it is necessary

to understand both their frequency and effects. If impact ejecta are present in a circa 2300 BP layer of tsunamigenic origin throughout the New York-New Jersey area, we will need to re-evaluate the magnitude of tsunami hazard in this area. Citations Goodbred, S., Krentz, S. LoCicero, P., Nitsche, F., Carbotte, S., and A. Slagle. Evidence for a newly discovered 2300-year-old tsunami deposit from Long Island, New York. Eos Trans. AGU 87(53), Fall Meet. Suppl., Abstract OS43C-0681

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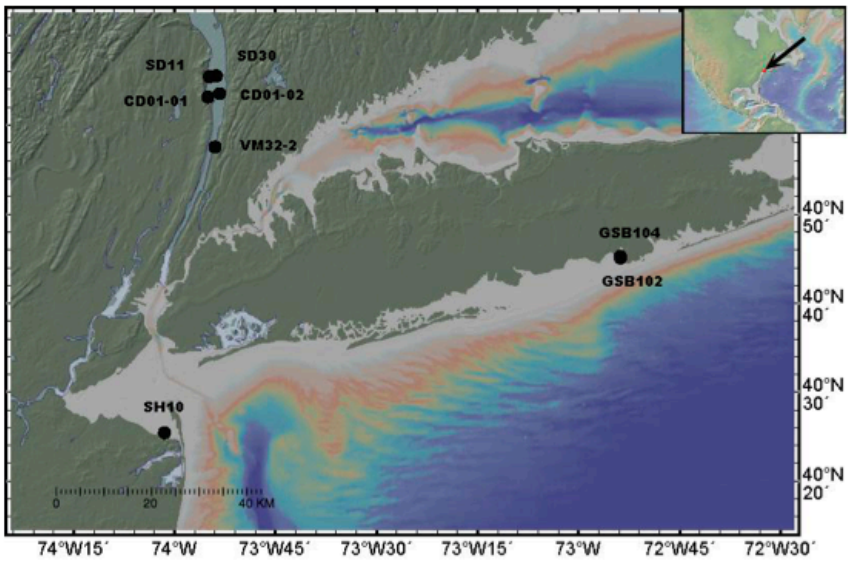

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