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PROBABILITY OF MARINE INVASION INTO THE CHICXULUB CRATER AND CONSEQUENT GENERATION OF LARGE TSUNAMIS

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A great number of Cretaceous/Tertiary (K/T) boundary tsunami deposits around the Gulf of Mexico have been reported (e. g., Smit, 1999). However, the origin, propagation process and magnitude of tsunamis have been poorly understood. Although Matsui et al. (2002) suggested that the movement of water rushing into and receding from the Chicxulub crater have a potential to generate the largest tsunamis, no strong evidence to support this mechanism has been presented. In this study, samples from the YAX-1 site drilled by the Chicxulub Scientific Drilling Program (CSDP), were investigated to test the probability of the marine invasion into the crater and consequent generation of tsunamis. The impactite in the YAX-1 occurred between 794.60 (?) m and 894.94 m depth and is divided into two lithologic units: impact melt rock unit (822.86 m to 894.94 m) and suevite unit (794.60 (?) m to 822.86 m). The impact melt rock unit is mainly composed of infinite form of melt fragments with small amount of basement and carbonate rock fragments. The suevite unit overlies the impact melt breccia unit with irregular contact. The suevite unit is composed of fragments of rocks and minerals together with melt in a clastic matrix. Poorly-sorted, grain-supported fabric and intraclast-like nature suggest lower part of the suevite unit was re-deposited as a debris flow from the crater rim. On the other hand, normal grading, relatively well-sorting and ŞK/T boundary cocktail (Bralower et al., 1998)Ť nature of nannofossil assemblage in the upper part of the suevite unit suggest that this part was deposited from a dense sediment suspended cloud. Furthermore, compositional oscillations repeated by >5 times are observed in this part, similar compositional oscillations are observed in the K/T boundary deep-sea tsunami deposit in Cuba (Goto et al., 2002).

The uppermost several tens centimeter of the suevite unit is composed of medium to coarse, greenish sandstone with parallel lamination, suggesting the influence of strong current during its deposition. The boundary cocktail nature of nannofossil assemblage, compositional oscillations and existence of parallel lamination in the upper part of the suevite unit is suggestive of the marine invasion into the crater cavity and potential generation of tsunamis. Further research is needed to confirm the timing of marine invasion, based on identification of iridium anomaly and the first appearance of Danian fossils.