Lithology of the impactite in and around the Chicxulub crater

Kazuhisa Goto[1]; Takafumi Matsui[2]; Shinya Yamamoto[3]

[1] DCRC, Tohoku Univ.; [2] Grad. Sch. of Frontier Sci., Univ. of Tokyo; [3] Natural Sci. & Technology, Kanazawa Univ.

We investigated the lithology and sedimentary process of the impactite in and around the Chicxulub crater using the YAX-1, UNAM5, and UNAM 7 cores, approximately 60, 105, and 126 km away from the center of the crater.

Based on the lithology, the sedimentary sequence of the impactite at YAX-1 is divided into 6 units; units 6 to 1 in ascending order (Dressler et al., 2003). Unit 6 overlies the underlying limestone with irregular erosional surface, and is 10.02 m thick, and is composed of a very coarse suevite with abundant carbonate and silicate melt fragments. Unit 5 overlies unit 6 with gradational contact, and is 23.86 m thick, and is composed of coarse suevitic melt agglomerate with monomictly brecciated melt bodies. Unit 4 overlies unit 5 with sharp contact, and is 15.26 m thick, and is composed of very coarse and heterogeneous melt agglomerate with fine-grained and homogeneous brownish matrix. Unit 3 overlies unit 4 with gradational contact, and is 22.94 m thick and is composed of coarse suevitic melt agglomerate with fine-grained and homogeneous brownish matrix. Unit 2 overlies unit 3 with irregular erosional surface, and is 14.84 m thick and is composed of pebble-sized suevite. Unit 1 is 13.39 m thick, and is composed of coarse sand to pebble sized suevite. The suevite in units 1 and 2 is relatively well sorted, and the grain size of the melt fragments and the carbonate lithics is small compared with those in units 3 to 6. Goto et al. (2004) interpreted that units 1 and 2 were formed due to the ocean water invasion into the crater based on the presence of cross lamination, at least 10 pulses of upward fining layers, presence of well preserved nannofossils in the matrix, and reverse chronology of nannofossils.

The suevite in the UNAM 5 core have characteristics similar to those in the units 2 and 1 of the YAX-1 core. For example, the upper approximately 15 m thick suevite in UNAM5 core is composed of a dark greenish, relatively well-sorted suevite, and has cross lamination at the top, suggesting the influence of current during the sedimentation of this interval. Moreover, at least 8 pulses of deposition are observed in the strata deposited in the upper part of the section in the UNAM 5. In the UNAM7 core, there is no suevite, which is similar to those in the units 2 and 1 in the YAX-1 core. On the other hand, Claeys et al. (2003) reported more than 200 m thick suevite layer in the Y6 core, approximately 50 km from the center of the crater. The crater-ward thickening trend of the reworked suevite layer probably suggests that the suevite once deposited outside of the crater were eroded and transported crater-ward by the high-energy resurge of ocean water into the crater.