

Analyses of Planar Deformation Features (PDFs) of Shocked Quartz Grains Derived from K-Pg Boundary Deposits within and o

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Impacts of extraterrestrial objects on the Earth have played a major role in the origin and evolution of the Earth and life. Impact processes on the Earth with thick atmosphere are, however, not precisely understood because of lack of detailed study on the distribution of ejecta around the large impact craters on the Earth.

One of the largest impact structures on the Earth is the Chicxulub Crater, Yucatan Peninsula in Mexico, which caused the mass extinction event at the Cretaceous-Paleogene (K-Pg) boundary at 65 million years ago. The details of impact processes of the Chicxulub crater is, however, largely unknown.

In this study, we measured and analyzed planar deformation features (PDFs) on shocked quartz grains derived from asteroid impact at the K-Pg boundary deposits both within the Chicxulub crater (Yaxcopoil-1 site) and outside of the crater (K-Pg boundary tsunami deposits in western Cuba) in order to reveal processes in the large asteroid impacts on the Earth. PDFs are planar micro structures generated under high-pressure condition (5~30GPa) and crystallographic orientation is known to vary with shock pressure. The samples are collected from seven vertical levels of the Yaxcopoil-1 drilling core within the Chicxulub crater. We investigate the characteristic features of the ejection and deposition of shocked quartz grains with various pressure level of PDFs by comparing the samples within the crater with the samples from proximal ejecta around the crater.

Keywords: shocked quartz, K-Pg boundary, planar deformation features (PDFs), impact crater, ejecta