

Figure F1. Peak rings are roughly circular rings of rugged hills and massifs that stand above the otherwise flat crater floor. In peak-ring basins, the crater rim is the outer edge of a terrace zone. In multi-ring basins, two or more rings (inward-facing asymmetric scarps) lie outboard of the central basin. Photo credit: NASA.

Figure F2. Location of site survey data overlain on the gravity field. Coastline is in white. Small black dots are cenotés. Marine seismic profiles acquired in 1996 and 2005 are shown in black dashed and solid lines, respectively. Offshore and onshore seismometer locations in the 1996 and 2005 surveys are shown with large black and white circles, respectively. Existing well locations are shown with yellow squares. Hole M0077A is shown with a yellow triangle. Modified from Gulick et al. (2013); from *Reviews of Geophysics*.

Figure F3. Seismic reflection data along Chicx-A (see Figure F2 for location). At about 20–30 km outboard of the crater rim at Chicxulub, the relatively undisturbed, flat-lying, pre-impact stratigraphy is abruptly offset vertically by 400–500 m (outer ring). The outer ring faults are observed out to radial distances of 90–120 km, giving a crater diameter of ~195–210 km (Morgan et al., 1997; Gulick et al., 2008). Projected location of Site M0077 shown. Modified from Gulick et al. (2008); from *Nature Geoscience*.

Figure F4. Hole M0077A projected onto a seismic reflection profile and velocity model obtained from full-waveform inversion. Core was recovered between 505.7 and 1334.69 mbsf. The principal targets were the PETM at ~600 mbsf, followed by the K-Pg boundary at ~650 mbsf and the rocks that form the peak ring. The uppermost peak-ring rocks are formed from 100–150 m of low-velocity material, below which there is a low-frequency reflector coincident with an increase in velocity. Modified from Morgan et al. (2011); from *Journal of Geophysical Research: Solid Earth*.

Figure F5. Hydrocode simulation of the formation of the Chicxulub crater (Collins et al., 2002; Morgan et al., 2011). Layering shows stratigraphy; impact point and center of crater are at a horizontal distance of 0 km. (A) Sedimentary rock that forms the transient cavity rim collapsed inward and downward, whereas (B) material in the central crater collapsed upward. C. In this model, the stratigraphically uplifted material (central uplift) collapses outward across the downthrown rim material to form a peak ring. D. Cross section through the final crater. Color shows maximum shock pressures to which rocks have been subjected during crater formation. Dashed line = location of sediments that originally formed the transient cavity rim (see A). Modified from Morgan et al. (2011); from *Journal of Geophysical Research: Solid Earth*.

Figure F6. A. Location map of the State of Yucatán showing onshore drill holes from the UNAM scientific drilling program (Holes U1–U8), the ICDP borehole (Yax-1), and PEMEX drilling. All parts modified from Rebolledo-Vieyra and Urrutia-Fucugauchi (2004); from *Meteorics & Planetary Science*. (Continued.)

Figure F6 (continued). B. Lithologic columns and stratigraphy from PEMEX and Yax-1 boreholes. Site M0077 is ~45 km from the crater center. (Continued.)

Figure F6 (continued). C. Lithologic columns and stratigraphy from UNAM and Yax-1 boreholes.

Figure F7. Numerical modeling of a hydrothermal system through a peak ring in a large impact structure (redrawn from Abramov and Kring, 2007).

Figure F8. Microbial enumerations (log abundance per gram dry weight) through the Chesapeake Bay impact structure, showing a modern-day microbial habitat in the impactites. Modified from Cockell et al. (2009); from *Special Papers—Geological Society of America*.

Figure F9. Generalized climate curve for the Cretaceous and Paleogene derived from deep-sea benthic oxygen isotope data (Zachos et al., 1993, 2001). Also shown: Eocene/Oligocene boundary, PETM, K-Pg boundary, mid-Maastrichtian event (MME), and early Aptian Oceanic Anoxic Event (OAE1a). Modified from the Leg 198 Synthesis (Bralower et al., 2006).

Figure F10. Simulation of ejecta plume from Chicxulub 35 s after impact. Green = basement, gray = projectile and sediments, light blue = atmosphere, dark blue = mantle. Modified from Artemieva and Morgan (2009); from *Icarus*.

Figure F11. Expedition 364 drilling strategy.

Figure F12. Lithology summary, Hole M0077A.

Figure F13. Physical property data, Hole M00077A. MS = magnetic susceptibility, NGR = natural gamma radiation, MSCL = multisensor core logger, VSP = vertical seismic profile.

Figure F14. Wireline downhole log data, Hole M0077A. Shallow and deep reading resistivity (RLLS and RLSD), resistivity from induction (Res from IL), conductivity (IL), P-wave sonic (V_p), magnetic susceptibility (MSUS), total gamma ray (GR), borehole fluid temperature ($^{\circ}$ T FTC; $^{\circ}$ T Oc), conductivity (Cond FTC; Cond Oc), pH and redox, gravity and local magnetic field, borehole tilt and azimuth, amplitude and traveltimes acoustic images (ABI Amplitude and ABI TT), borehole diameter (CAL and ACCAL), traveltimes cross section of the borehole (ABI TT cross section) and optical borehole image (OBI).

Figure F15. VSP, velocity zones vs. depth regions, and lithostratigraphic units (47.5–1325.0 m WSF), Hole M0077A. Linear best fits are assigned to four manually picked velocity zones (right) and compared to depth regions (left). Lines = upper and lower bounds of P-wave velocity using one standard deviation.

Figure F16. Borehole deviation, Hole M0077A. A. True vertical depth. B. North and east direction of the borehole path.