MODELLING SEISMIC VELOCITY IN 3-D ACROSS THE CHICXULUB IMPACT CRATER

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In the Autumn of 1996, an international group acquired a suite of offshore 2D seismic reflection, and offshore-onshore 2D and 3D wide-angle-seismic data across the Chicxulub crater. In total, 13,000 air-gun shots were recorded on 33 ocean-bottom and 90 land seismometers. The wide-angle data image the variation in seismic velocity across the crater. We have used a suite of inversion packages based on 2D ray tracing, and 2D and 3D tomography. The most prominent feature in our resulting velocity images is a ~1-km-thick low-velocity layer, that coincides with the ~145-km-diameter post-impact basin observed on the seismic reflection data. Surprisingly, the ~80-km-diameter topographic peak ring appears as a velocity low along two of the 2D profiles. Inboard of the peak ring, a velocity increase from 4 km/s to 5 km/s at ~1.7 km depth, appears to represent a lithological change from a suevitic to a melt breccia. Another prominent feature is a velocity high of ~0.5 km/s near the centre of the crater, coincident with a gravity high previously interpreted as the central uplift. The central uplift is 30-50 km wide and offset to the southwest of the crater centre. In the velocity image, there is no obvious link between the central uplift and the topographic peak ring. Although the wide-angle data demonstrate that the base of the crust is offset beneath the outer rings, there is no evidence of significant net Moho uplift in the centre.