

INTERPRETATION OF GEOPHYSICAL CROSS SECTIONS ON THE NORTH FLANK OF THE CHICXULUB IMPACT STRUCTURE. Glen T. Penfield¹ and Antonio Camargo Z.² 1) Intera Aero Service, 10,200 Richmond Ave., Suite 100, Houston, TX 77042, 2) Petroleos Mexicanos, Avenida Marina Nacional 329, Mexico, D.F. 11311.

A possible impact origin for the magnetic and gravity anomalies in the northeast Yucatan was first announced in 1981 by Penfield and Camargo [1]. The absence of samples from the wells drilled on the Yucatan platform and particularly from the three wells which penetrate the central igneous uplift of the structure prevented the confirmation of this feature as an impact site.

Evidence has accumulated for a Caribbean impact site for the K/T boundary event [2]. Therefore the Chicxulub impact structure is of particular interest as a possible K/T boundary crater.

With the recovery of samples of core from two different sources for several of the Pemex Yucatan wells and the positive identification of shocked minerals within these samples, an impact origin is strongly suggested [3][4].

We present evidence from previously unreleased Pemex seismic, magnetic and gravity data for the presence of a buried crater form structure on the N.E. Yucatan Peninsula. The Chicxulub impact structure (21°20'N, 89°30'W) is located on the Yucatan platform. The area is a stable continental platform with metamorphic basement at 3-6 kilometers depth. The sedimentary sequence overlying the basement is dominantly carbonates with some clastics in the lower portion, and ranges in age from Paleozoic to Tertiary.

Profiles of multichannel marine seismic reflection data, marine gravity and high sensitivity aeromagnetic data all indicate or are compatible with a crater of approximately 180 kilometers in diameter centered near of the coastal town of Chicxulub Puerto.

The multichannel seismic reflection data in particular show a strong reflector at the presumed top of the Cretaceous. This surface has more than 4 milliseconds of relief from the surrounding presumed top-Cretaceous reflector outside the structure. This particular seismic line does not reach as far south as the central uplift interpreted from magnetic and gravity data.

The crater is buried by about 1,000 meters of Tertiary sediments.

The top Cretaceous reflector has two 'humps' which appear to correlate with concentric magnetic anomaly rings. Magnetic anomalies in the 2-5 nT range extend to a diameter of 210 kilometers and may be associated with weakly magnetic ejecta deposits. Magnetic susceptibility calculations based on Werner deconvolution profiles indicate susceptibilities of up to 4×10^{-2} S.I. for the central uplift (Zone 1) and 3×10^{-4} S.I. for sources in the outer portions of the structure (Zone 2).

Analysis of magnetic data indicate a central uplift with at least 3.5 kilometers relief from the surrounding basement surfaces.

References: [1] Penfield, G.T. and A. Camargo Z. (1981) Abstracts of S.E.G. Annual Convention. [2] Hildebrand, A.R. and Boynton, W.V. (1990) *Science* 248:843-847. [3] Hildebrand, A.R. and Penfield, G.T. (1990) *EOS Transactions* v. 71, no. 43, p. 1425. [4] Kring, D.A., Hildebrand, A.R. and Boynton, W.V. (1990) The Petrology of an Andesitic Melt Rock and a Polymict Breccia from the Interior of the Chicxulub Structure, Yucatan, Mexico in *Lunar and Planetary Science XXII*.