SEISMIC FACIES AND STRATIGRAPHY OF THE CENOZOIC SUCCESSION IN THE YUCATÁN PLATFORM

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OBJECTIVES

1) Delineate the evolution of the Yucatán Platform that was divided into two blocks by a north-south oriented trough at the time of the asteroid impact at the end of the Cretaceous to the modern smooth platform.
2) Estimate the age of the Cenozoic sequences filling the trough and the Chicxulub crater in the Yucatán Platform.
3) Assess the progradational geometry and direction of the Cenozoic sequences to determine the influence of sea level and currents on the progradation.

INTRODUCTION

The combination of seismic, gravity, and borehole data resulted in the construction a digital terrain model (DTM) of the Yucatán carbonate platform at the end of the Cretaceous. This DTM reveals that, by the time of the Chicxulub impact event, the carbonate platform was divided into two blocks by an ~ 95–205 km wide and ~ 470 km long trough-shaped depression (Yucatán Trough), which contained the central structure of the Chicxulub impact crater (Fig. 1) (Guzmán-Hidalgo et al., 2021). The modern Yucatán peninsula and shelf are a continuous body with a flat and gently dipping surface that ends abruptly at the escarpment, which is similar to the morphology of the distally steepened carbonate ramp of West Florida.

The smothering of the uneven topography is achieved by prograding sequences that fill the trough and expand the platform to the north and east (Fig. 2). The Paleocene to Miocene sequences display prograding pulses that seem to be sea-level controlled and its progradation direction by the prevailing trade winds. In contrast, the geometry of the younger sequences bears characteristics

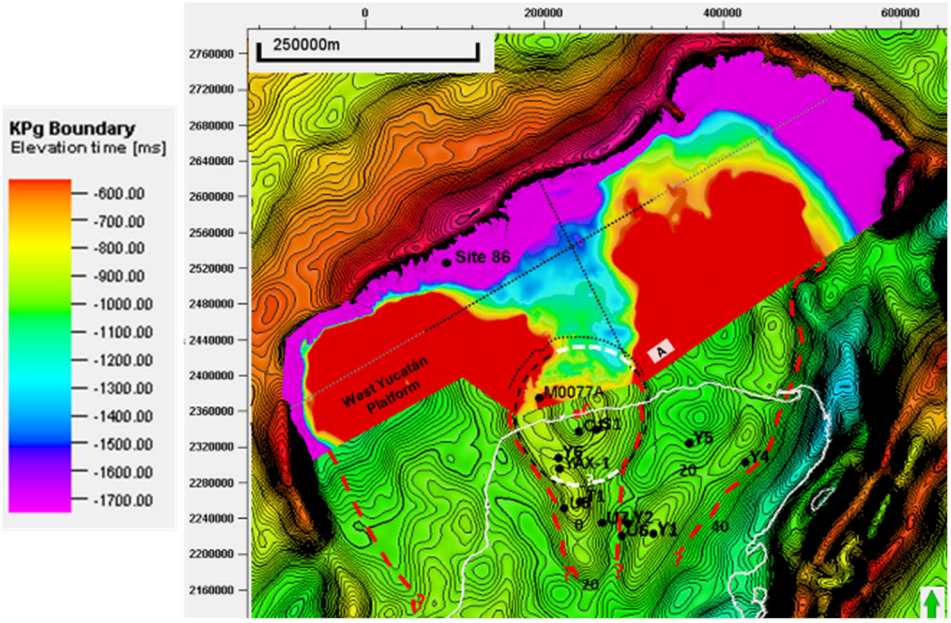

Figure 1: K/Pg boundary map constructed from seismic data and gravity anomalies in the Yucatán Platform. nYT =northern Yucatan Trough. sYT= southern Yucatan Trough.

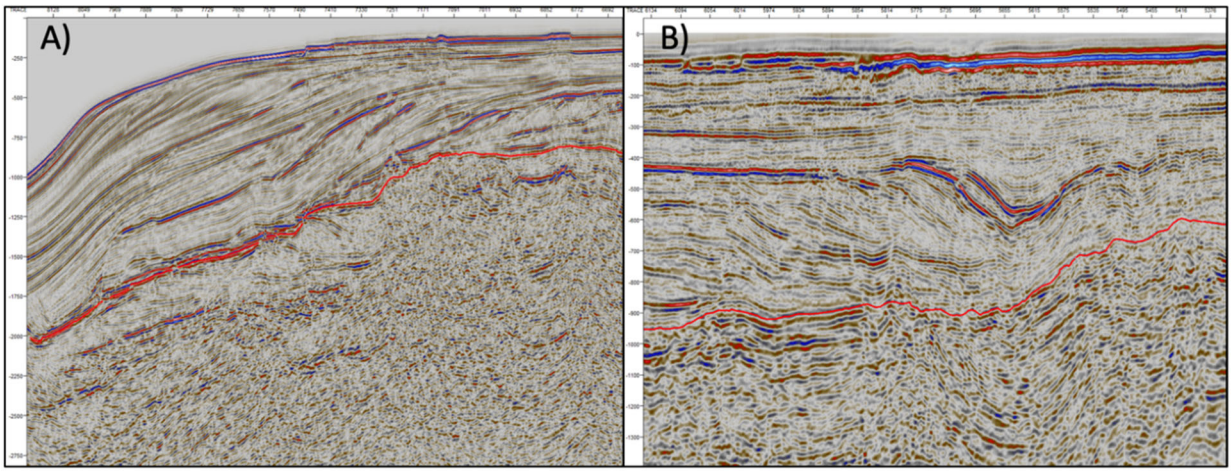

Figure 2: Examples of progradational geometries above the K/Pg boundary (red). (A) Progradation of the platform towards the north. (B) Infilling progradation in the Yucatán Trough overlain by horizontal successions.

indicative of current control. This project aims to unravel the influence and timing of sea level versus current control in the progradation that leads to the formation of the large modern Yucatán Platform.

DATA SET AND WORKFLOW

This study relies on 57 regional 2D seismic lines in the offshore Yucatán Platform and 18 boreholes with information about the lithology and ages (Whalen et al., 2013; Morgan et al., 2016).

We will identify the main surface boundaries and map them within the Yucatán Trough and correlate the boundaries to the boreholes to determine the Cenozoic ages. We will map and describe the main Cenozoic sequences observed in the offshore seismic profiles in time-domain. We will estimate the depth of these reflections using reported interval velocities in the Yucatán Platform and Bahama Bank, and project them towards the onshore boreholes. The geologic map at the surface will also be included to delimit the lateral distribution of the shallower deposits.

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