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ABSTRACT

**THE EXTENSION OF THE SURFACE GEOLOGY OF TRINIDAD INTO THE GULF OF
PARIA USING 3D SEISMIC DATA**

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The southern part of the Gulf of Paria, Trinidad has now been covered by 3D seismic data with surveys in 1984 (147km²), 1992 (500 km²), 2004 (300 km²) and a reshoot over the West/SW Soldado area in 2005 (215 km²). It is now possible to extend the surface geological map of Trinidad into this surveyed area of the Gulf of Paria through integration of geological rock data encountered in wells with the seismic 3D data. The nomenclature of the geological rock formations onshore Trinidad established by H. Kugler (1959) is maintained as much as possible. Transition zone 3D seismic data is used where available to bridge the seismic data gap in the near shore area and to establish a more accurate link between the offshore and land geology. Seismic stratigraphic sequences and biostratigraphic zonations are iteratively integrated with well log and lithological data to establish chronostratigraphic surfaces that are correlatable to Kugler’s stratigraphic formations.

Major structural features such as the Warm Springs fault, the Los Bajos Fault, the Erin syncline, the Central Range anticline and the Southern Range anticline can be traced westwards as far as the seismic data will allow. The recently reprocessed 2005 3D data and the two newly acquired 3D seismic surveys show better quality than previous vintages. The Los Bajos fault is now interpreted to extend further west than was observed previously by Knowlton and Hosein (1995). Major structural deformation took place in the late Pliocene- early Pleistocene creating the Main Soldado, West Soldado, and Southern Range anticlines.

Oblique compressive dextral-slip motion along the Los Bajos Fault appears to have commenced and has been episodic since the mid Pliocene creating a narrow submarine anticline along the fault plane. This anticline had enough relief to separate the Northern Basin Manzanilla sediments from the Southern Basin Cruse, Forest and Morne L’Enfer sediments during the middle to late Pliocene. The anticline became sub-aerial and erosional at the end of this period. Later subsidence in the Northern Basin led to regional tilting to the north and the onlap of post Manzanilla / Springvale formations onto this

erosional surface in an irregular zone along the Los Bajos fault. The Los Bajos fault system would appear to terminate westwards where it meets the Central range complex.

In the late Pliocene /early Pleistocene rapid and intense structural changes seemed to have occurred. The Southern anticline, the Soldado Anticline and the West Soldado Anticline were formed at this time along with their associated intervening synclines. These two latter anticlines are terminal thrust structures that are associated with the sinistral Soldado and West Soldado strike slip faults. Movement along the Los Bajos fault was slowing down and became transtensional during this period. The exploration significance of these events are examined as several potential syntectonic sub basins and structures have developed during the mid Pliocene/early Pleistocene deformation period. The extension of the seabed geology further west and north of the surveyed area is now possible due to the recent availability of 3D surveys in these areas.