

Seismostratigraphy of the Cayos Basin Colombia

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Abstract

The Cayos region is located in a basin that has been practically unexplored due to the lack of geophysical surveys (principally seismic prospecting). This is a preliminary study between the ANH (Agencia Nacional de Hidrocarburo) and the Universidad Nacional de Colombia with seismic information seeking to show the oil Potential of the Cayos Basin. With this approximation the structural and stratigraphy feature is described, it is based on the seismostratigraphic and seismic geomorphology interpretation. The Cayos Basin is on the top of the Caribbean Plate with 144.755 Km² of extension and located at the East of the Nicaragua platform and south of the Jamaican Platform. The mentioned area has a sedimentary package with the presence of uplifted blocks (horst); the sedimentary sequences are associated to the intrusion of the crystalline basement, with some tectonic influence. The geomorphology was initially describe, it is based on satellite images, it is possible to observe structural high geofoms, as well as the Cayos slope, thus geofoms are corroborate through the seismic information, which was used to establish the acoustic basement as well as unconformities and disconformities fount.

Introduction

Seismic surveys located on the Colombian Caribbean, is characterized by 2D surveys from 1977 and 1982. The information can be complemented with well log data, two well log, gravimetric and aeromagnetic data. This paper is a preliminary description of the seismostratigraphy interpretation.

Location

The Cayos Basin is located on the convergent Caribbean Plate; it extends from the Nicaragua platform and Jamaica platform. Is characterized by mounds and uplift blocks that describe the basement uplift, influencing the great depth sediments deposition.



Figura 1. Cayos Basin location.

Method

The Cayos basin had been studied based in seismostratigraphy description, that permit describe structural and geomorphologic features, identified in depth or in surface when are tied with surface prospecting method, i.e., satellite images, photos, etc. Seismic analyses like attributes analyses permitted identified anomalies body associated to structural features and stratigraphy variations. The interpretation flux, indicate the sequence for seismostratigraphic interpretation (Figure 2).

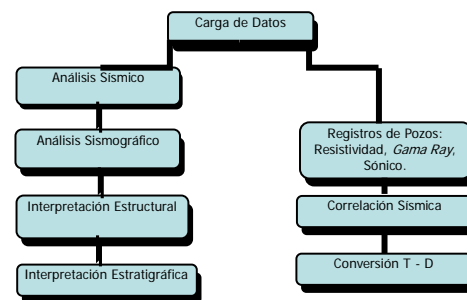


Figure 2. Interpretation sequence for Los Cayos Basin.

The satellite permits to describe some lineaments and features with possible tectonic influence into some sector of the Cayos Basin.

Seismostratigraphy Interpretation

This section includes the stratigraphy and structural integration of interpretation information, from the horizon picking and fault plane identification (Fig.3). In the area were recognized at least four seismic units, that comprise sedimentary package overlying the acoustic basement.

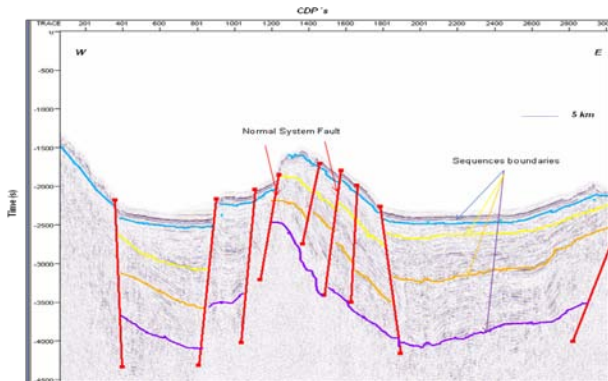


Fig 3 Structural interpretation on Seismic profile, it is possible to observe the package sedimentary affected by a fault system due to tectonic effects in the survey area.

Structural Setting

This area is part of the convergent margin of the Caribbean plate, its origin and evolution had been discussed, and most of the models establish that the Caribbean plate is migrating since the last Jurassic, and this migration is from the Pacific Position (Muñoz *et al*, 1997). Los Cayos Basin is been influenced by South American and Caribbean Plates, that are defined by lateral and normal system faults, interacting with some compression structures. The structural domain is characterized by normal system fault and some syncline.

The Seismic interpretation show a series of present-day structural elements, characterized by normal faults, anticline forms, mounds and blocks which indicate structural highs.

Seismostratigraphic Interpretation

The stratigraphy information results from the two well tied to seismic line, it allowed recognized at least for sequences, limited by two unconformities and a concordance limit. It is important refer the Cayos Basin like a mixed carbonate-siliciclastic sedimentary system. The lower sequence is the basement; it is represented by the seismostratigraphy unit free of reflections, which is limited by a strong reflector, reflector that corresponds to the unconformity that separate the basement from the first sedimentary package (unit C). Overlying is the unit B and A, that comprise parallel reflectors, with high amplitude.

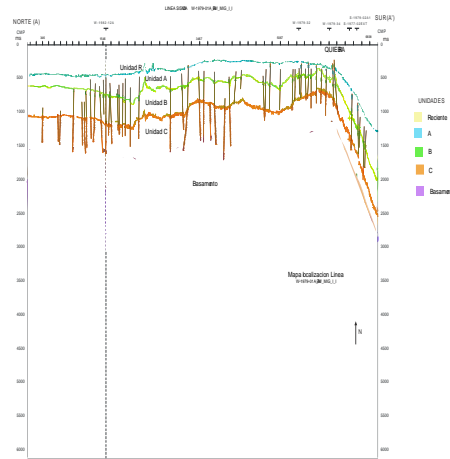


Fig 4. Sedimentary sequence definition overlying the basement.

Results

The following interpretation represent the preliminary study of the Los Cayos Basin, based in seismic interpretation, where could be described the characteristic of the structural and geology features found on the Colombian Caribbean.

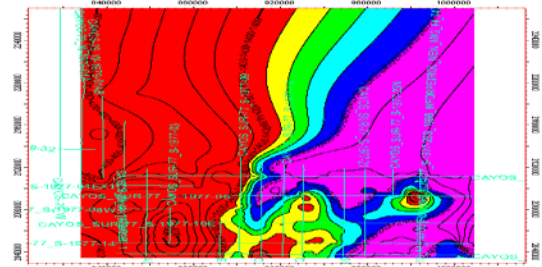


Figure 5. Map from the first horizon referent to the top of the sedimentary sequence.

The four surfaces could be visualized in a 3D view, where could be described the boundaries from the three sedimentary package (Fig. 6)

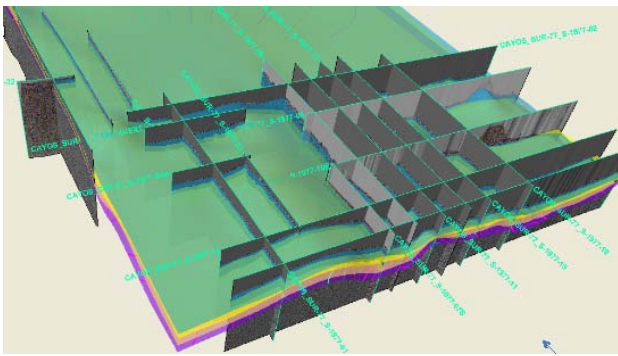


Figure 6. Seismic surfaces interpolated from the horizons.

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