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**SEQUENCE STRATIGRAPHY AND HYDROCARBON POTENTIAL,
PIJIÑO AREA, LOWER MAGDALENA BASIN, COLOMBIA**

by

Edgar Baquero-Santa

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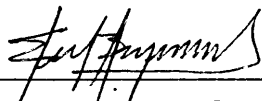
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Golden, Colorado


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ABSTRACT

Hydrocarbon exploration in the Pijiño area, Lower Magdalena Basin, Colombia, has been pursued to this time only with respect to structural traps. Several structural traps were drilled without success; two of them, located in the deeper part of the basin, had hydrocarbon shows and prompted continued exploration, mainly with 2D seismic. However, to date, no stratigraphic framework had been established to understand the relationships between hydrocarbon generation, migration, and accumulation.

An integrated study using geological and geophysical subsurface information was undertaken to evaluate the hydrocarbon potential in the Pijiño area. The purpose of this research is to establish a sequence stratigraphy framework that creates exploratory ideas for search of new reserves.

The method followed in this research is the interpretation of subsurface geology based on the integration of exploration tools. The subsurface data provided by wells were tied to seismic profiles in order to obtain a regional framework. Sequence stratigraphy concepts constitute the basis for interpretation.

Two sedimentary sequences are defined based on the unconformities at their boundaries. The sequence stratigraphic analysis consists of the description of the facies contained within these sequences, the construction of Wheeler diagrams to present the chronostratigraphic relationships, and the discussion of factors that controlled sedimentation like tectonic subsidence and eustasy.

The major new findings of this research are the presence, at the base of the younger sequence, of a large-scale submarine canyon with the correspondent canyon-fill sequence and submarine fans that provide the area

with new hydrocarbon exploration targets. The petroleum system of the Pijiño area consists of gas-prone source rocks with moderate production potential, fault planes and siliciclastic beds as short-distance carrier units for hydrocarbons, and adjacent reservoirs that are basin floor and slope fan turbidites. These reservoirs are sealed with bathyal shales and form traps for hydrocarbon accumulations. Estimated reserves make this area attractive for exploration.

The sequence stratigraphic framework determined from this research indicates the existence of new plays for exploration in Pijiño area. Implications of this framework establish a new exploration scheme in the basin. Four prospective areas are identified: two are adequately studied from the geological standpoint and require only risk analyses and economic evaluation before drilling decisions; the other two require more geological analyses before their economic evaluation.

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DEDICATION

To my parents, my wife and my daughters.

The original material for this dissertation includes a significant number of oversized pages. The full text can be viewed by accessing the supplement file.

