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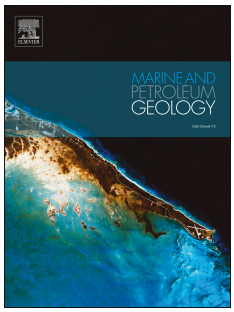

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Geochemical assessment of the Colombian Oils based on bulk petroleum properties and biomarker parameters

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ABSTRACT
This geochemical survey defines the typical features of representative oils from the major Colombian basins, and proposes a classification scheme useful for hydrocarbon exploration. This work is based on properties of whole oils such as API gravity, sulfur, vanadium and nickel concentrations, and gas chromatography fingerprints. The framework is completed by inclusion of biomarker parameters derived from GCMS and GCMSMS analysis.

Oils from the basins of the Middle Magdalena Valley, Upper Magdalena Valley, Sinú - San Jacinto, Putumayo-Caguan, Lower Magdalena Valley and Catatumbo were assessed. Conclusions were drawn regarding possible sources of origin, oil families, degree of thermal evolution, biodegradation, mixing and refreshing, and inferences regarding exploration implications.

The oils from the Middle Magdalena Valley and Upper Magdalena Valley (intermontane basins) and Putumayo (foreland basin), except those from the Caguan area, are oils with similar characteristics. In these three cases the oils are probably coming from source rocks intervals deposited in a marine Cretaceous platform, with variable carbonate /siliciclastic features. In these basins there are no oils derived from Tertiary source rocks.

In Sinú-San Jacinto and Lower Magdalena Valley basins the main proportions of oils comes from very proximal environments, probably deltaic type, of Tertiary age with a minor proportion of oils coming from Cretaceous source rocks of marine anoxic environment (the only marine Cretaceous oils discovered so far in the Sinú-San Jacinto and Lower Magdalena Valley basins).

The oils from Eastern Foothills of the Eastern Cordillera, look to be derived mainly from proximal Cretaceous source rocks with some mixing of oils derived from Tertiary strata. In the Catatumbo basin there are oils derived mainly from Cretaceous source rocks and some from Tertiary source rocks.

Regarding the processes after entrapment, in all of the basins, the biodegradation effects were observed in varying degrees. These processes are dominant toward more quiescent regions, beyond the areas with more tectonic activity, far from the foothills of the Eastern Cordillera. Instead, close to the Eastern Cordillera are more common the paleobiodegradation processes due to reburial of younger molasses. The effects of mixing or refreshing are remarkable close to the Eastern Cordillera foothills in Llanos, Middle Magdalena Valley, and Upper Magdalena Valley basins.

1. Introduction

This paper shows a comprehensive analysis of the geochemical features of the Colombian oils (Figure 1). Firstly, on the basis of bulk geochemical parameters and gas chromatograms, the oils are preliminarily classified within each basin. Then, the biomarker compositions of oils was discussed. The oils were analyzed by GCMS and GCMSMS, to validate and extend previous findings related to oil families, geographical