

Oil and Gas Potential of the Cretaceous La Luna Formation in the Cesar Valley, Colombia. An Application of Basin Modeling in a Complex Thrust System

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La Luna Formation, an Upper Cretaceous sequence is one of the most important source rocks in Colombia and its hydrocarbon potential is not completely known. The importance of this study is to define the oil and gas potential of La Luna Formation as a source rock and reservoir in the Cesar Valley Basin, Colombia. This formation has been tectonically affected by compressive regimes with three principal thrust faulting systems: the Bucaramanga-Santa Marta, the Cesar and the Perija which created anticline and syncline regional structures. Several representative 2D seismic lines were interpreted for the Cesar Valley Basin, which allowed the identification of the structural style. The tectonic style was initially formed by a basement detachment. The main structures are: A Regional Anticline folding, imbricate faults bend folds with forward breaking that involves the Jurassic and Cretaceous Sequences. A regional Syncline folding associated to fault propagation folds that deform the Upper Cretaceous and Tertiary formations. According to the growth strata, the deformation of La Luna Formation started in Late Cretaceous by the Cesar thrust system. The Perija uplift in the Miocene-Pliocene generated the reactivation of the Cesar thrust system, forming an emergent fault that crates the regional Syncline structure. 1D, 2D and 3D Basin modeling indicates that La Luna Formation entered the oil window since 28 Ma ago. According to the geochemical model the main risk of finding hydrocarbon accumulation is the presence of effective seal rocks; otherwise the oil and gas generated have reached the surface. In other areas of the basin with structural traps and efficient seals, is very possible to find hydrocarbon accumulations associated to the structural highs and thrust faults