



## **Influence of the mechanical stratigraphy in the growth of transpressional structures: 4D analogue modeling and applications to the La Concepción field.**

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The La Concepción field (Maracaibo basin, Venezuela) produces from two different reservoirs superposed in a normal succession: the Cretaceous fractured carbonates of the Cogollo Group and the Eocene siliciclastic Misoa Formation, separated by non-producing formations (Upper Cretaceous shales and Paleocene sandy limestones). A complex fault network affects both reservoirs. This network was mainly formed in response of dextral transpression localized on basement faults.

An integrated structural study reveals that both reservoirs display very strong similarities and they are tectonically linked but separated by a thick shaly interval (Upper Cretaceous shales of the Mito Juan/Colon formation). From seismic interpretation and mechanical stratigraphy, this shaly interval seems to partially decouple deformation between Cretaceous and Eocene reservoirs due to a very distinct rheological behavior.

In order to (i) validate and improve the tectonic model of La Concepción oil field with a special attention of the role of decoupling layers, (ii) access the kinematics of the structures and (iii) establish the fault sequences, we performed a set of 4D analogue models. We investigated parameters such as the effect of the decoupling factor, the influence of the amount of shortening, etc.

The study provided us a good conceptual model combining the impact of the transpressional tectonics on reactivated basement stepover and the effect of a strongly contrasted mechanical stratigraphy in the field. A preliminary comparison with the field data showed that this model fits very well with the general and detailed features of

the structures. Moreover it helped to interpret some features remaining unexplained before.