

### **Structural Inversion and Exploration Implications in the Cagüi Sector, Northern Middle Magdalena Valley Basin, Colombia**

Garavito, Flavio <sup>1</sup>; Trudgill, Bruce <sup>2</sup>; Kluth, Chuck <sup>2</sup> (1) Exploration Vicepresidency, Ecopetrol S.A., Bogotá, Colombia. (2) Geology and Geological Engineering, Colorado School of Mines, Golden, CO.

We have produced a structural analysis and restoration of the present day geometry of the of the Cagüi area of the Middle Magdalena Valley of central Colombia based on 2D, 3D and well data, in order to test the structural interpretation and assess current structural models for the tectonic evolution of the study area, as most of the oil fields in the region produce from structural traps.

The data indicate that the listric normal Cagüi Fault and its associated half graben are Jurassic in age, and were inverted to their present configuration as a reverse fault with an associated hanging wall anticline. The evidence for this includes: 1) reflectors diverging toward the Cagüi Fault, indicating growth of the normal fault during the Jurassic, 2) the syn-rift package is located in the hanging wall of the Cagüi Fault, 3) the structure shows typical minor faulting related to tectonic inversion such as a) footwall and hanging wall shortcuts, b) back thrusts and c) an anticline fold with increasing structural relief up section in the hanging wall.

The extensional phase corresponds to proposed Jurassic rifting in the central part of Colombia. The Maastrichtian-Paleocene compressional phase is related to subduction located along the western margin of the South American continent.

This tectonic inversion is an important factor in the petroleum system since it can significantly modify the burial history, porosity (secondary) of uplifted sediments, directions of fluid migration, and the sealing properties of reactivated faults.

Inverted syn-rift structures, can have a wide regional distribution, but have not been well explored in Colombia, opening a new play opportunity in the Magdalena Valley.