

Fault-Related Fracture Reservoir: A Case Study from the Cretaceous of Cogollo Group, Western Venezuela

Denis Marchal, Enrique Peralta, and Ferro Elmer. *Gerencia Reservoirio, Petrobras Energia Venezuela, Piso 6, Torre Lamaletto, Avenida Venezuela, El Rosal, Caracas, 1060, Venezuela, phone: +58-212-9577405, fax: +58-212-9577304, dmarchal@petrobrasenergia.com*

The calcareous Cretaceous fractured reservoir of La Concepción field (Maracaibo Basin) structurally consist of two almond-shaped pop-up zones striking NE- SW. Such structures are interpreted as dextral transpressional stepovers caused by strike-slip to wrench tectonic processes. Further tectonic events added normal fault network and pure strike-slip corridors.

The successive stress fields generated various sets of fractures with many different directions. The open to semi-open fractures strike NW-SE and seem to be linked to the present day tectonic stress. Analysis of acoustic images reveals that fractures are organized in clusters. Comparison of these results with 3D seismic data and production logs shows that the productive fracture clusters are associated to seismically visible fault zones.

Build-up tests exhibit three main types of response: (i) A-type displays a radial flow without testing boundaries in extended times, (ii) B-type showing a short radial flow period followed by bilinear flow and (iii) C-type is related only to bilinear flow. These three kinds of flow responses are linked to the structural model of fault-related fractures: A-type most productive wells are in the fault zone, B-type medium productive wells are in the “process zone” at fault terminations, C-type poor productive wells are crossing background fracture systems.

Analysis of geological and production datasets suggests that the spatial distribution of productive fracture zones is primarily controlled by faulting and secondly by stratigraphic features. A better understanding of the productive system allows us to optimize the drilling location and to select the adequate well completion.
