

## 3D Geomechanical Model the Best Solution of the 21st Century for Perforation's Problems

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**Abstract :** The lack of comprehension of the reservoir geomechanics conditions may cause operational problems that cost to the industry billions of dollars per year. The drilling operations at the Ceuta Field, Area 2 South, Maracaibo Lake, have been very expensive due to problems associated with drilling. The principal objective of this investigation is to develop a 3D geomechanical model in this area, in order to optimize the future drillings in the field. For this purpose, a 1D geomechanical model was built at first instance, following the workflow of the MEM (Mechanical Earth Model), this consists of the following steps: 1) Data auditing, 2) Analysis of drilling events and structural model, 3) Mechanical stratigraphy, 4) Overburden stress, 5) Pore pressure, 6) Rock mechanical properties, 7) Horizontal stresses, 8) Direction of the horizontal stresses, 9) Wellbore stability. The 3D MEM was developed through the geostatistic model of the Eocene C-SUP VLG-3676 reservoir and the 1D MEM. With this data the geomechanical grid was embedded. The analysis of the results threw, that the problems occurred in the wells that were examined were mainly due to wellbore stability issues. It was determined that the stress field change as the stratigraphic column deepens, it is normal to strike-slip at the Middle Miocene and Lower Miocene, and strike-slip to reverse at the Eocene. In agreement to this, at the level of the Eocene, the most advantageous direction to drill is parallel to the maximum horizontal stress (157<sup>o</sup>). The 3D MEM allowed having a tridimensional visualization of the rock mechanical properties, stresses and operational windows (mud weight and pressures) variations. This will facilitate the optimization of the future drillings in the area, including those zones without any geomechanics information.

**Keywords :** geomechanics, MEM, drilling, stress

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