Oil and Gas
Exploration
Development

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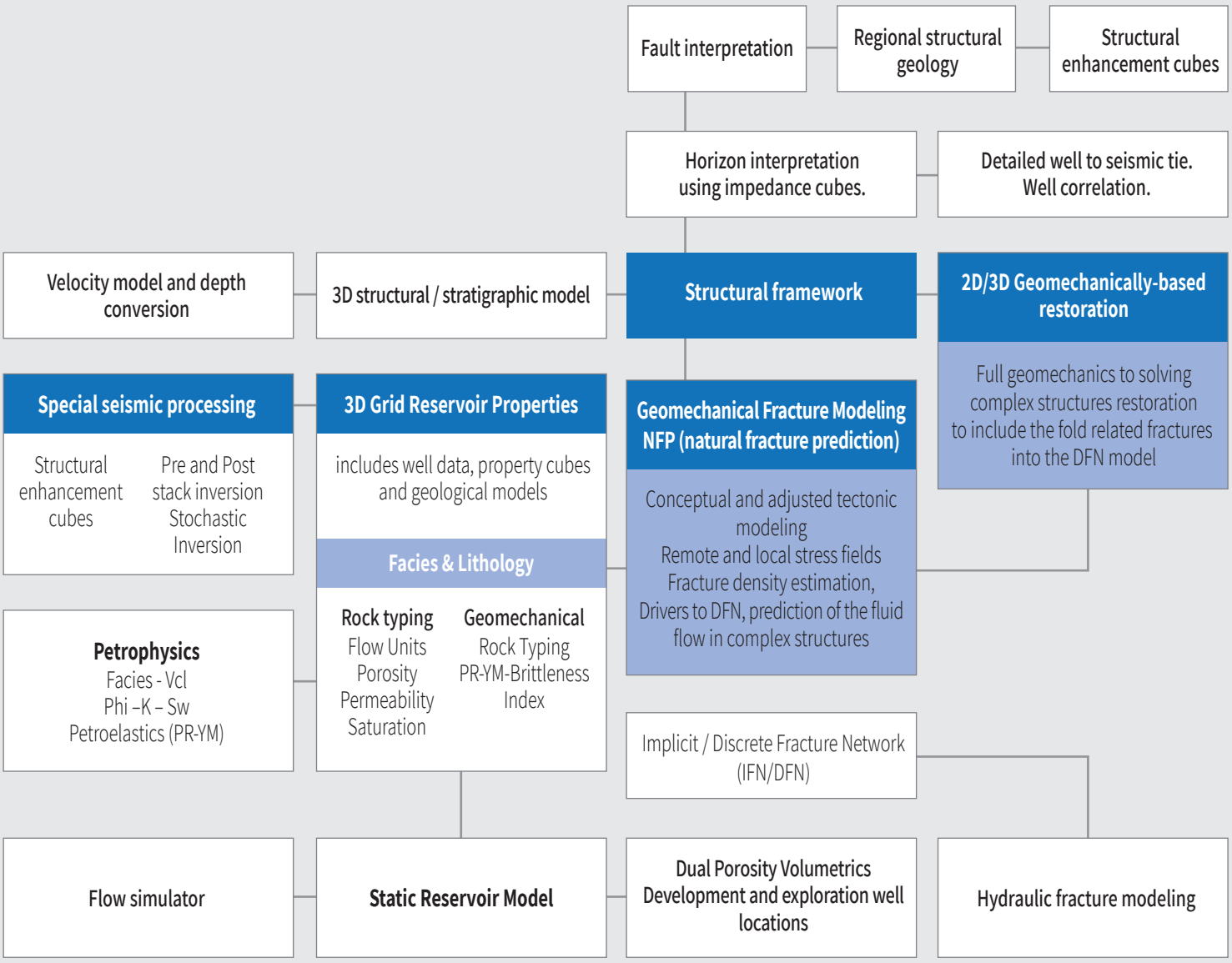
Fractured Reservoir Characterization
Integrated Workflow

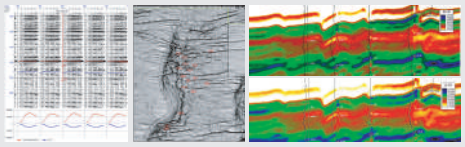


Characterization of fractured reservoirs carried out in

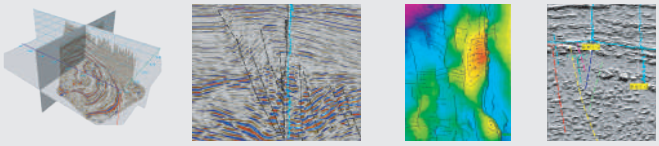
Neuquén basin: Lajas, Precuyo, Basamento
Austral/Magallanes Basin: Serie Tobifera
Cuyo Basin: Cabras and Cacheuta
Tampico-Misantla Mx Basin: El Abra and San Andres Limestones

NFP (Natural Fracture Prediction)

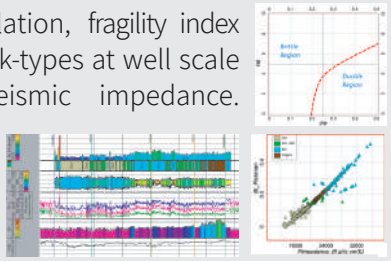
- Special Seismic Processing. Pre-stack and Post-stack seismic inversion, stochastic inversion and structural enhancement processes.



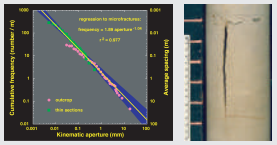
- Seismic interpretation atregional and reservoir scale faults and horizons.



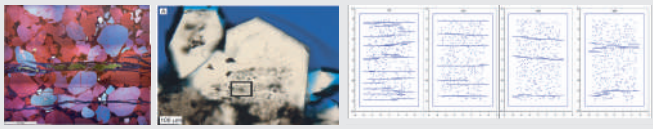
- Elastic moduli calculation, fragility index and geomechanical rock-types at well scale and relation to seismic impedance. Calibration to mineralogy-based brittleness index.



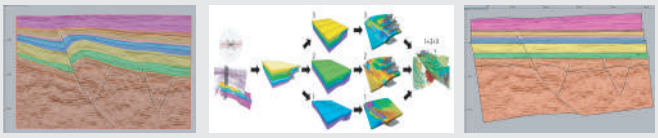
- Detailed fracture description to get important fracture properties such as aperture, spacing, structural diagenesis, etc.



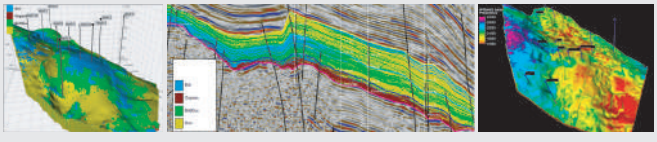
- Supervise complementary lab analysis such as subcritical crack index, chatodeluminiscense, fluid inclusions, isotopes to get fracture porosity, timing and age of the fractures.



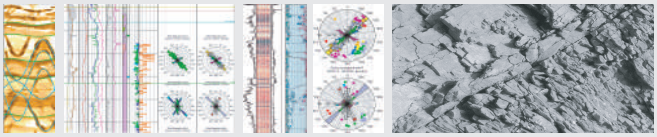
- Geomechanical structural evolutive restoration to know fold-related fractures in 2D and 3D to include into the DFN.



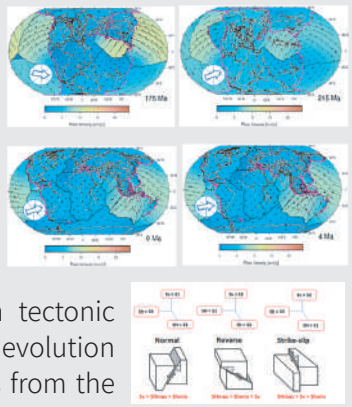
- Structural frameworks and 3D grid property modeling. Rock properties population, Facies, GRT (geomechanical rock types) and Matrix Poro-Perm grids.



- Analysis and classification of fracture data from processed wellbore images, cores and outcrops.



- Definition of main regional tectonic events responsible for natural fracturing. Assessment of orientations and relative magnitudes of remote stress field according to dominant tectonic regime at each tectonic event by the structural evolution and/or inversion analysis from the fractures detected in the borehole images. Depth converted structural frameworks for each tectonic event.

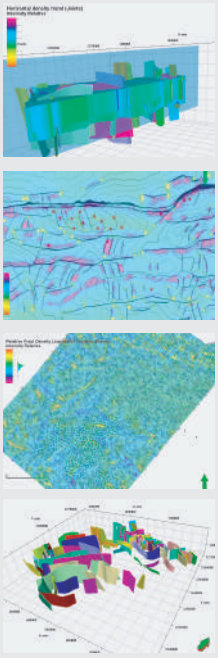


- Poly3D/iBem3D and NFP forward deformation and stress modeling technique optimizes fractured reservoir modeling within areas of complex geological background.

  The fracture network created using the perturbed stress field concept is very different than the one generated using classical fracture analysis.

  Calculation of theoretical fracture intensity grids through MCSS (maximum coulomb shear stress) calibrated with well log, core and outcrop data.

  Additionally, a new and more powerful YouWol DDM (Displacement Discontinuity Method) is soon to be integrated into the reservoir characterization workflow.



- **Deliverables**
  - 3D grid geomechanical rock-types blending seismic property cubes and well data.
  - Natural fracture intensity 3D grid (supervised or unsupervised) to drive DFN grids.
  - Composite geomechanical fracture intensity maps
  - Dual porosity volumetrics and sweet spots location for development and exploration wells.
  - DFN´s
  - Dual poro-perm grids as input to reservoir dynamic simulation.