

# Completion and Wellbore Geomechanics in High Stress Settings

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## **Global Tectonics and Wellbore Design**

Proximity to convergent plate boundaries can be one of the most important factors controlling treatment design and wellbore stability



### **Microseismic Geomechanics – Vaca Muerta Example**



- Did not observe textbook "hydraulic fractures"; majority of stimulation reactivated large scale faults
- Wells and completions were designed to "Texas standards"
- Initial design based on normal faulting stress regime



#### **Microseismic Geomechanics – Identifying Failure Plane**





### **Microseismic Geomechanics – True Failure Plane**





### Fault Likelihood and Fault Plane



## **Sonic Log versus Microseismic Stress Models**



## **Sonic Log versus Microseismic Stress Models**



## **Sonic Log versus Microseismic Stress Models**





## **Summary**

- Microseismic focal mechanisms are very sensitive to in situ stress and can be used to quantify the tectonic stress field
- Equations used to derive stress values from sonic logs appear to fail in highly compressive stress fields (i.e. SHmax is the max principal stress)

