

## Subsalt Drilling

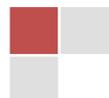
***DSI have analyzed hundreds of subsalt wells in the Gulf of Mexico (shelf and deepwater). Among those wells, the ultra deepwater wells and many record breaking deep wells. We have created vast knowledge base that we can put to good use on your next challenging subsalt well. We literally wrote the book on the best drilling practices in the subsalt sediments and advanced new ways to determine pore pressure below salt.***

*The deepwater and subsalt plays provide the greatest challenges and opportunities for the industry today. The complex salt tectonics and extreme depths necessitate high development costs and require innovative technology to bring these fields on stream. There is a big incentive to go deep and drill through salt. Well, since seismic cannot “see” well below salt, there are risky drilling surprises ahead!. Too often, these surprises are costly, and can lead to the demise of the well short of its intended targets. Today, impressive advances have been realized in “seeing” below the salt with seismic interpretation and with VSP look ahead during drilling; the challenge of correctly analyzing these data remains difficult. Well, frankly, this task is not for the novices. DSI has been developing methods to analyze real time VSP look data to determine accurately the drilling window below salt and make the best recommendation possible of the proper mud weight to exit the salt with.*

*DSI carries a wealth of subsalt look ahead experience and can quickly “re-invent it” for other parts of the world provided that we access and analyze reasonable offset well data. So, if you are planning a subsalt well anywhere in the world, you can count on Drill-Sense to provide you with the support you need from planning to well completion.*

*DSI probed the majority of the Gulf of Mexico subsalt plays such as Mickey, Typhoon, Mahogany, Tahiti, Teak, Enchilada, Conger, Princes to name few.*

Contact us:  
[info@drill-sense.com](mailto:info@drill-sense.com)  
(713) 609-9865 (USA)  
drill-sense.com



## Outline of Subsalt Drilling Services

*DSI is poised to help the well construction process starting from the stage of drilling it on paper. We can help you on many fronts.*

*We envision our focus would be on the following decisive tasks:*

### **Well Planning:**

- *Analyze the offset wells for drilling window*
- *Develop a rock physics based database from the offset wells for further analysis*
- *Apply current DSI models and compare against known pore pressure events*
- *Based on the offset wells rock physics database, fine tune the pore pressure prediction models*
- *Analyze all drilling events and leak off test to estimate the minimum and maximum horizontal stresses*
- *Analyze shear and compressional velocity data*
- *Examine the effect of salinity changes in the vicinity of the salt and determine its effect on pore pressure prediction from resistivity data*
- *Calibrate the resistivity-derived pore pressure model*
- *Analyze all RFT/MDT data taken in the area and check for sand hydraulic continuity in the new well location.*
- *Calibrate a geomechanic model to predict mud weight requirement*
- *Use the best available seismic velocity to predict supra salt and subsalt pore pressure and the drilling window*

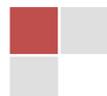
### **Real Time Support**

- *Monitor well prognosis for drilling window using MWD/LWD real time data*
- *Analyze the Vp/Vs VSP data for look a head drilling window if acquired just prior to exiting the salt.*
- *If necessary, revisit the pre drill models in the event of new information.*
- *Monitor the sediments properties during the subsalt drilling for signs of the existence of a “gouge zone”*
- *Provide daily reports to the drilling team and maintain a close contact in critical drilling events such as salt exit, encountering drilling difficulties, extra.*
- *Revisit pre drill casing setting depths and recommend changes if necessary*

### **Near Real Time Service**

*While we are not yet set up to cater to 24/7 basis data analysis, frequent daily transmission of log data via emails and web based solution is definitely adequate for processing and delivering timely analysis without missing a beat. This will allow us to deliver several well analysis and diagnosis report daily.*

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Off course, we can always chat over the phone or the web when the decision makers wish to collaborate.

## The Driller Nightmare

*A narrow drilling window is a tough challenge especially when the window is so narrow (as seen in the example below) that it approaches 0.3 ppg. With such drilling window, drillability of the well is almost impossible. Well, it is the case for this well. DSI can provide timely analysis of the drilling window so that enlightened mud weight adjustments can be made, no shooting from Heb!!!*

