

# **Stratigraphic Traps as Exploration Targets: Examples From Petrotrin's Soldado Acreage, Gulf of Paria, Trinidad\***

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## **Abstract**

To date, most of the exploration and development drilling in Petrotrin's Soldado fields have targeted accumulations associated with anticlines and updip fault closures, usually with good success. After fifty-nine years of exploitation, all of the simple (easy) structural targets have been identified and tested. As part of a re-evaluation of exploration leads, existing 3D seismic data was re-interpreted and four major stratigraphic surfaces mapped. Interval RMS amplitude maps for the Forest interval revealed meanders, channels, and point bars never before seen in the area; the unconformity at the base of the Morne L'Enfer was also seen in areas to erode deeply into the underlying Forest, truncating the reflectors and associated stratigraphy. This unconformity and its overlying claystone-dominated sediments have created a stratigraphic trap on the southern flank of the Erin Syncline. The occurrence of a flat spot within the Forest Formation strongly suggests a fluid contact within the (Forest) interval. Traditionally the Lower Cruse interval has been mapped as being dominated by basin-floor fans; however, a re-examination of the paleo-bathymetries and log motifs suggest a slope setting. Spectral Decomposition was used to further understand the stratigraphic setting of the Lower Cruse. Various tuning cubes were generated for the Lower Cruse interval at a low frequency of 10 Hz, and a time window of 100 ms illustrated a channelized system with a sand trend from SW–NE and source direction from the SW. A south to north-trending progradational feature was mapped on seismic, which internally exhibits bidirectional downlap that created potential closures in an updip direction. A second deeper feature was also mapped. This extraction illustrates WSW–ENE-trending high amplitude that parallels the interval thickness map. It was inferred that the amplitude variation reflects a change from claystone to sand. Within this study area no structural traps were identified; however, the data shows that stratigraphic traps exist within all of the formations mapped. Two exploration wells have been proposed to be drilled to test the validity of these stratigraphic concepts.

## **References Cited**

Moody, J.D. D.R. Pyles, J. Clark, and R. Bouroullec, 2012, Quantitative outcrop characterization of an analog to weakly confined submarine channel systems: Morillo member, Ainsa Basin, Spain: AAPG Bulletin, v. 96/10, p. 1813–1841.

Reading, H.G., and M. Richards, 1994, Turbidite systems in deep-water basin margins classified by grain size and feeder system: AAPG Bulletin, v. 78, 792-822.



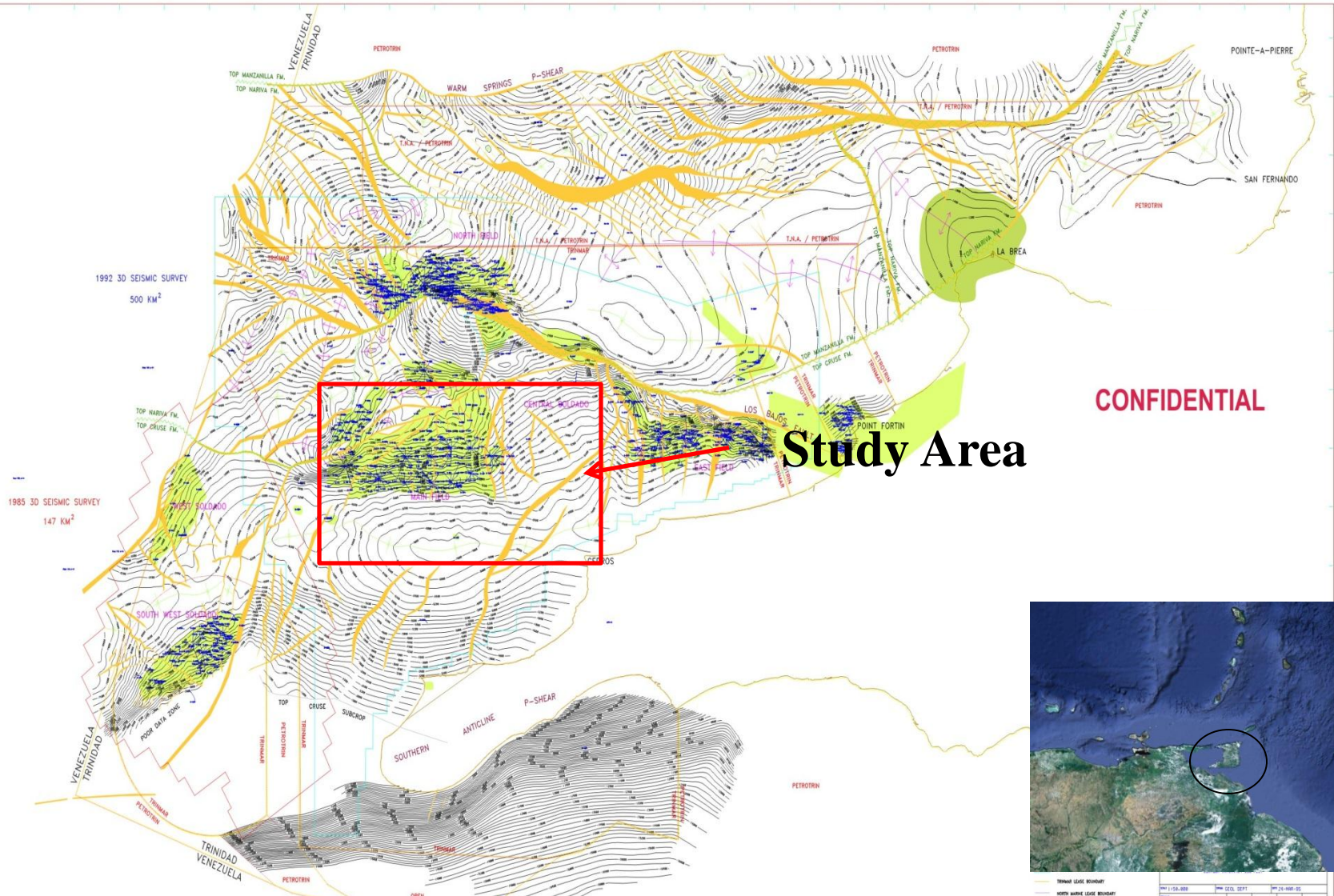
**Petroleum Company of Trinidad and Tobago Limited**

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**CURTIS ARCHIE  
&  
NANCY GALLAI**

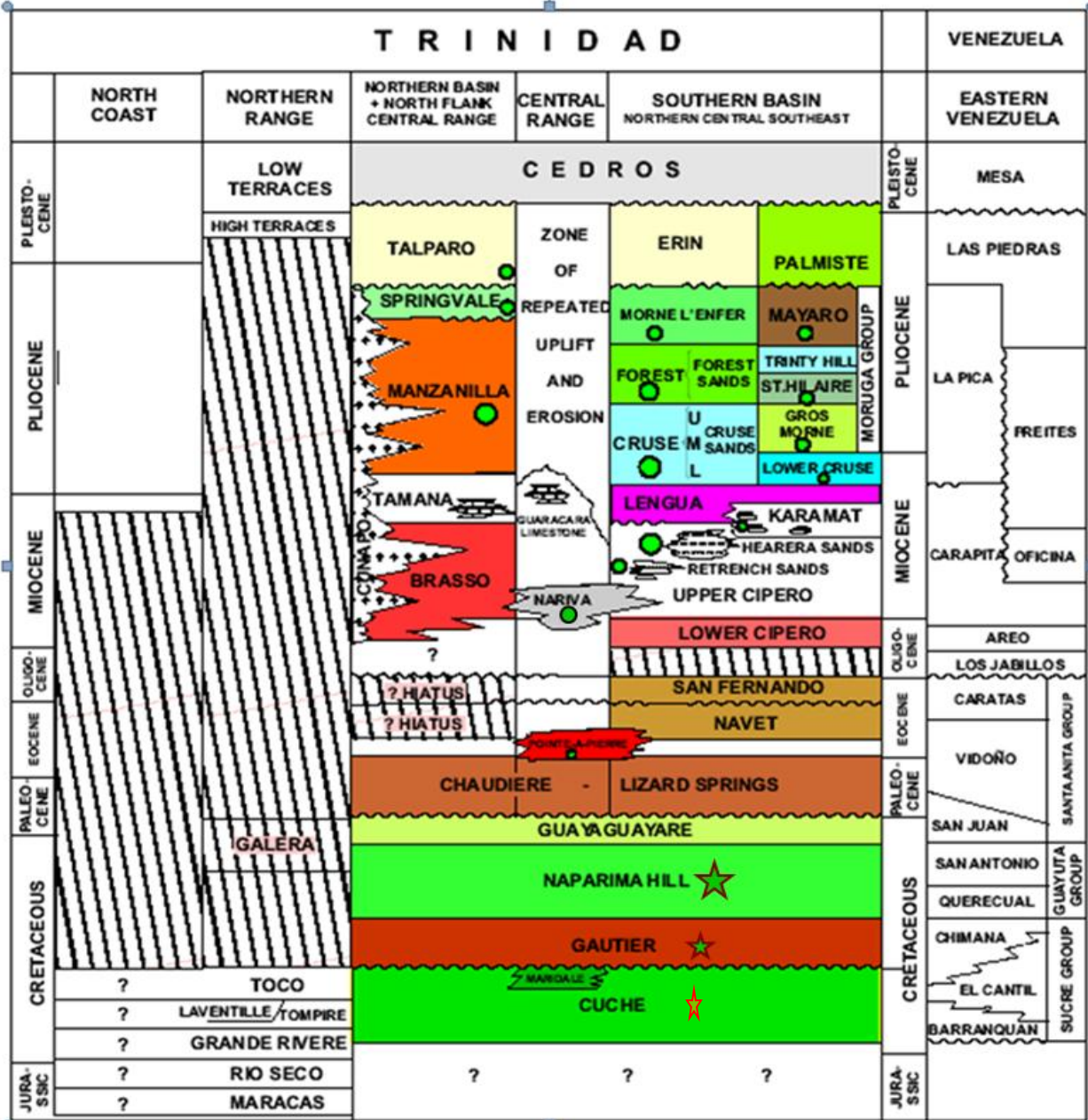


N



# STRATIGRAPHIC CHART

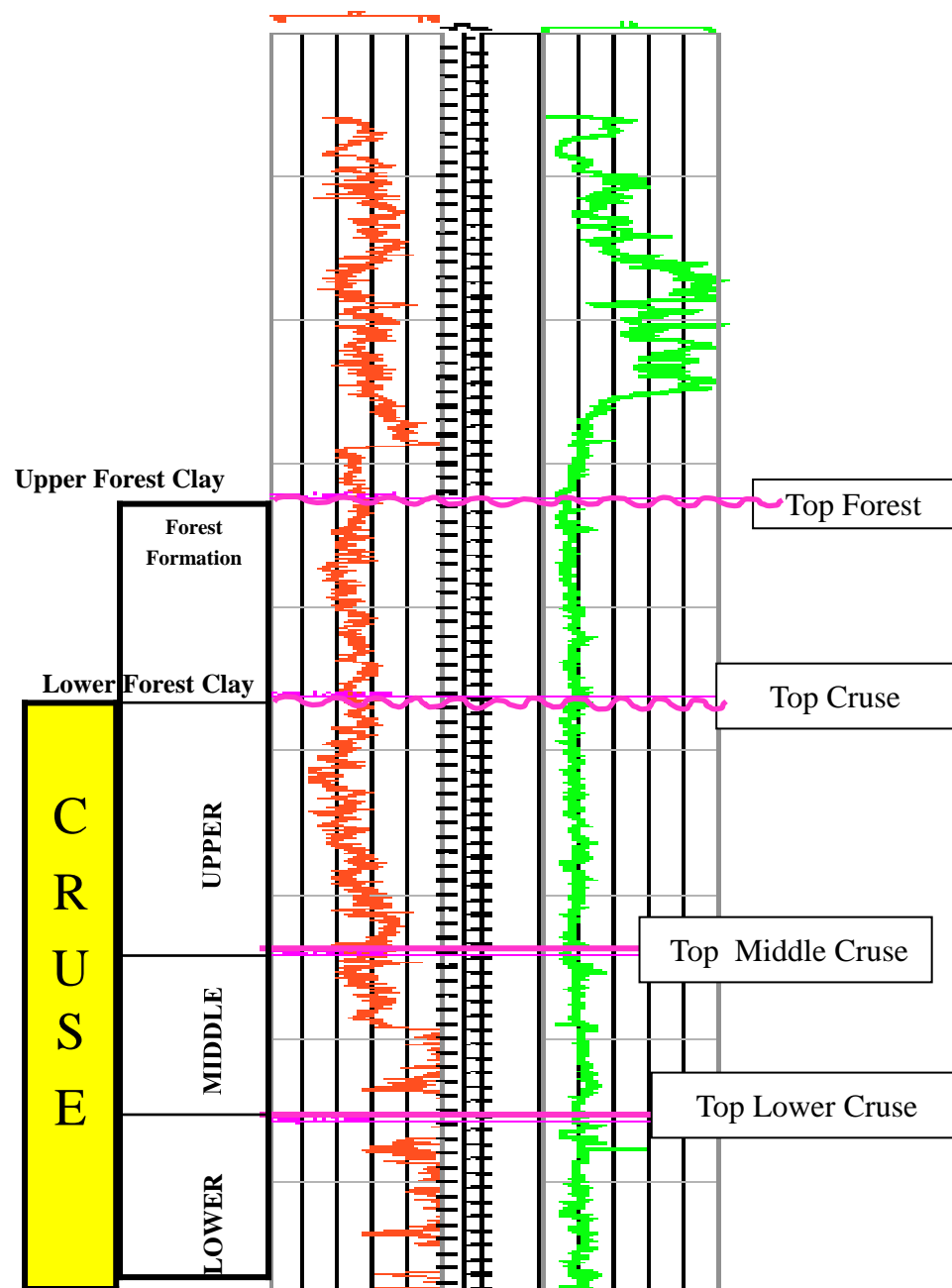
## T R I N I D A D



● Oil & Gas producing Reservoirs

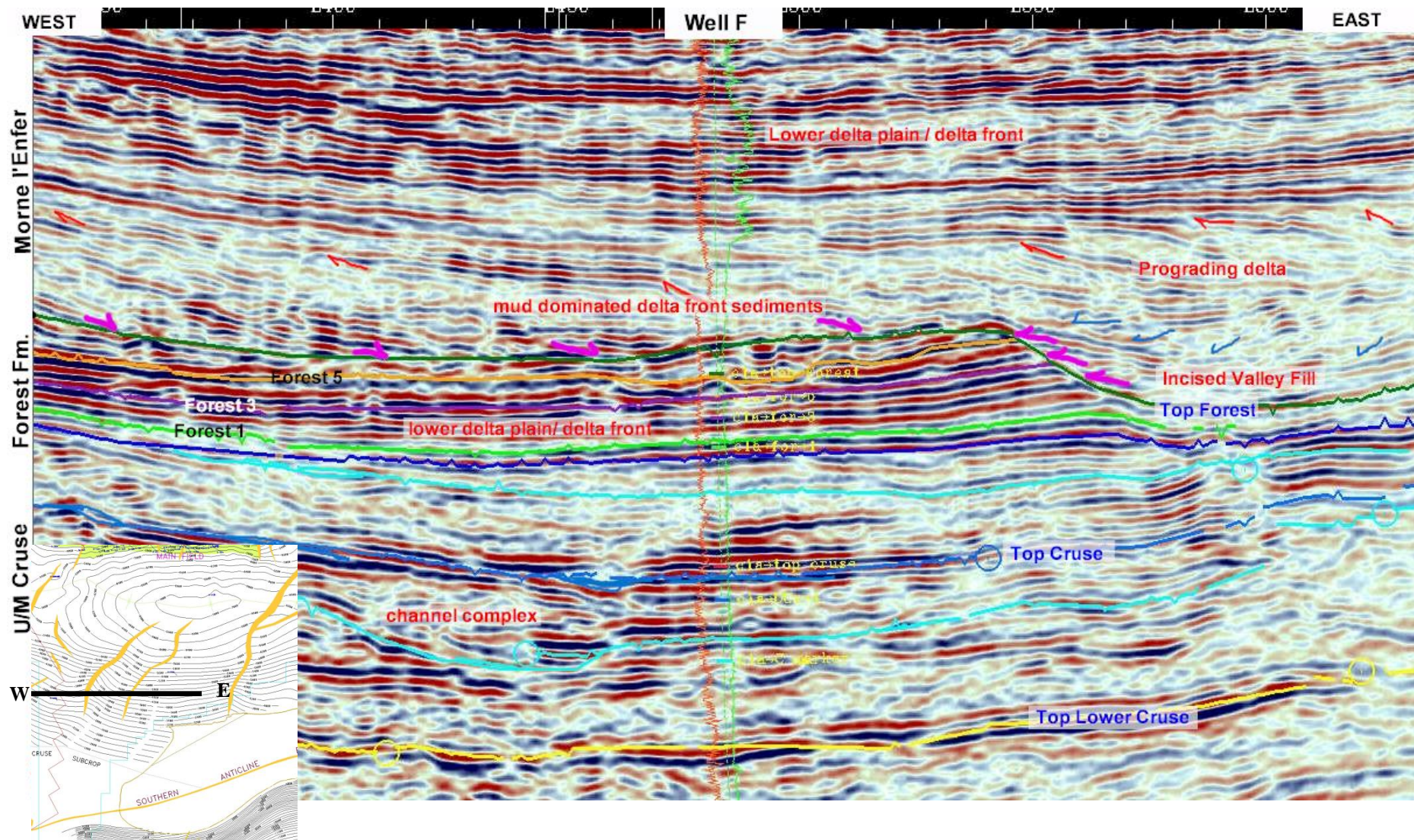
★ Source Rocks

# TYPE LOG ILLUSTRATING SAND PACKAGES





# SEISMIC LINE ILLUSTRATING TOP OF FOREST UNCONFORMITY AND STRATIGRAPHIC FEATURES IN THE MORNE L'ENFER AND CRUSE

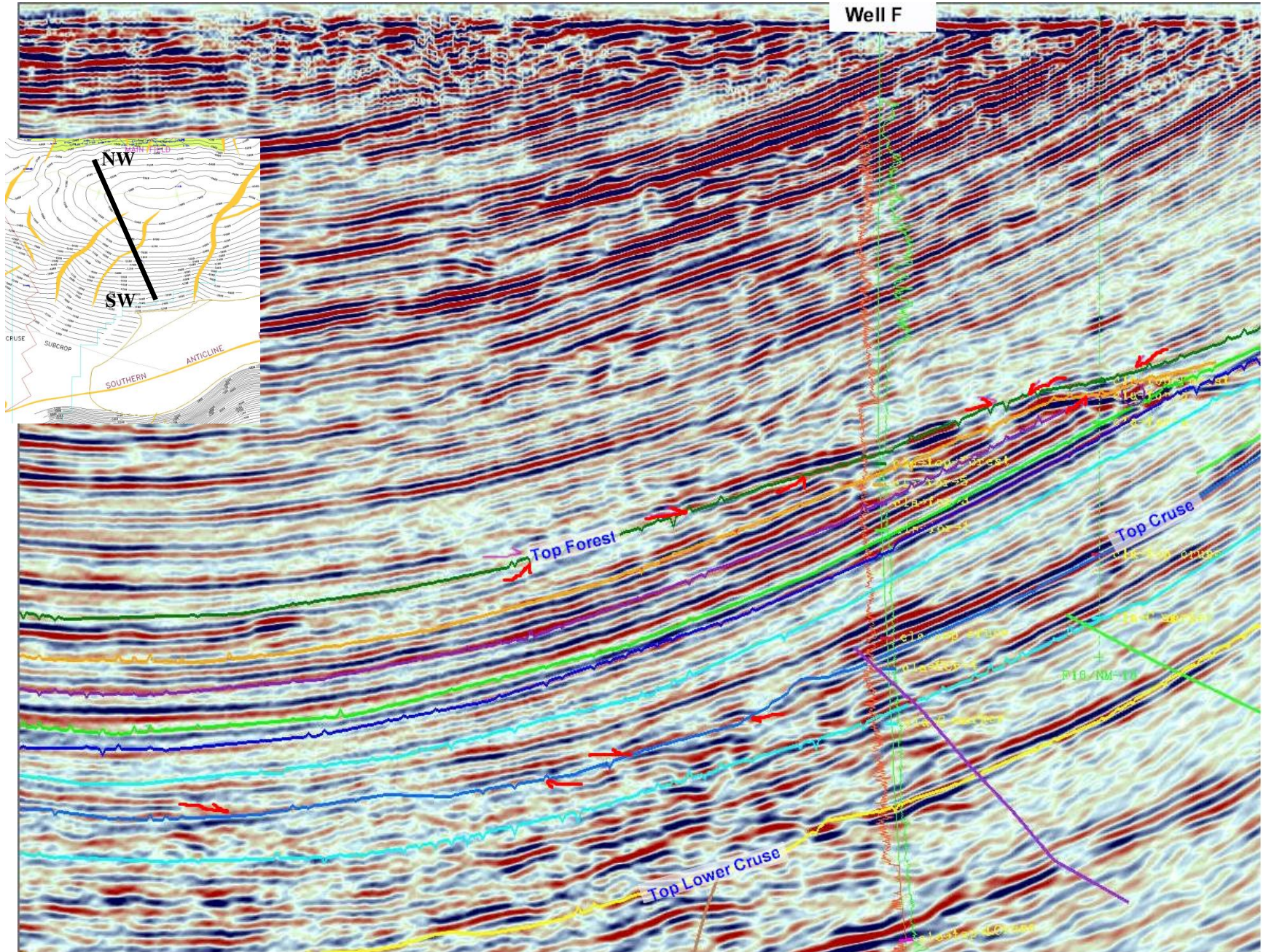




# SEISMIC LINE ILLUSTRATING TOP FOREST UNCONFORMITY AND FLAT SPOT

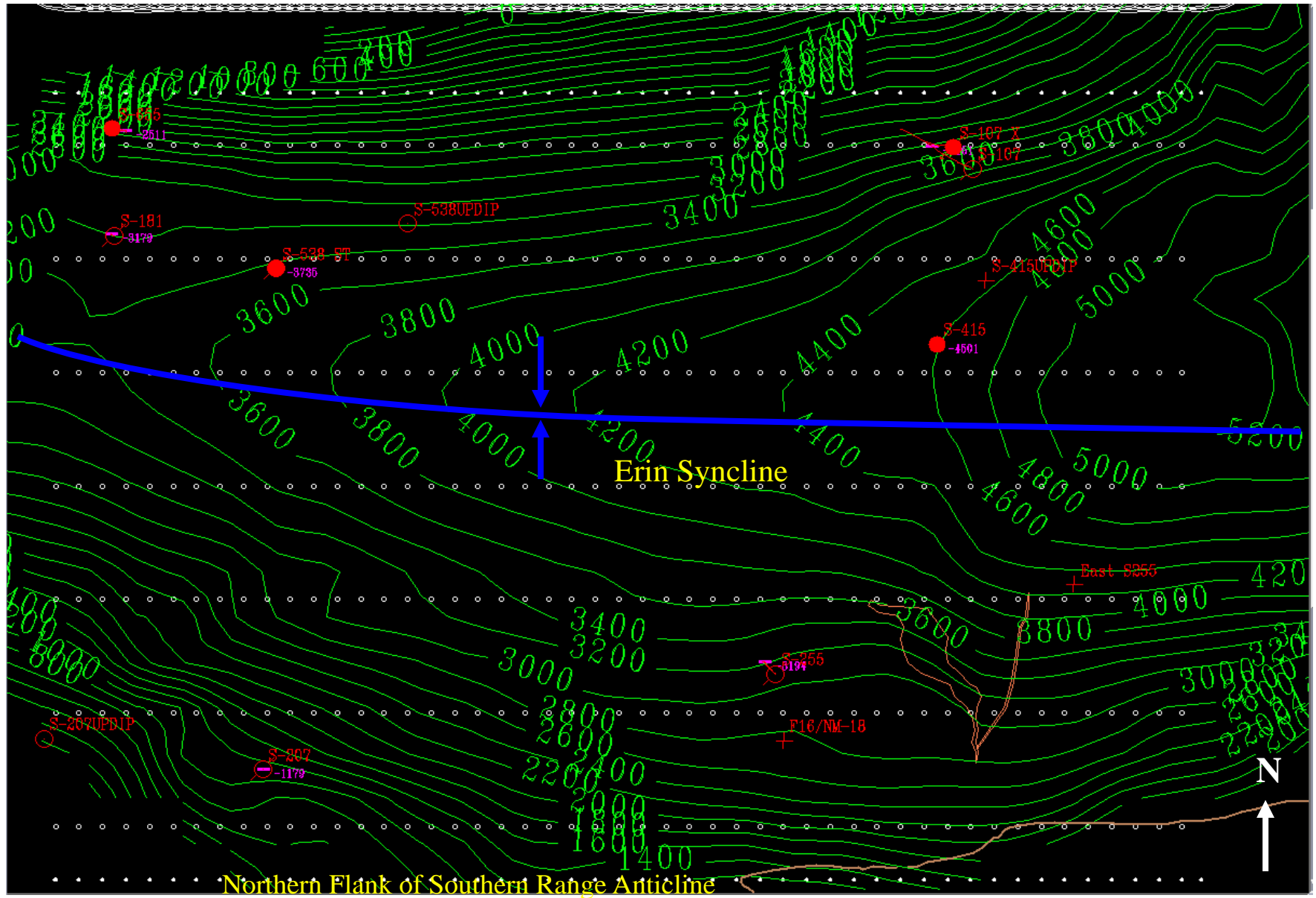
NW

SE

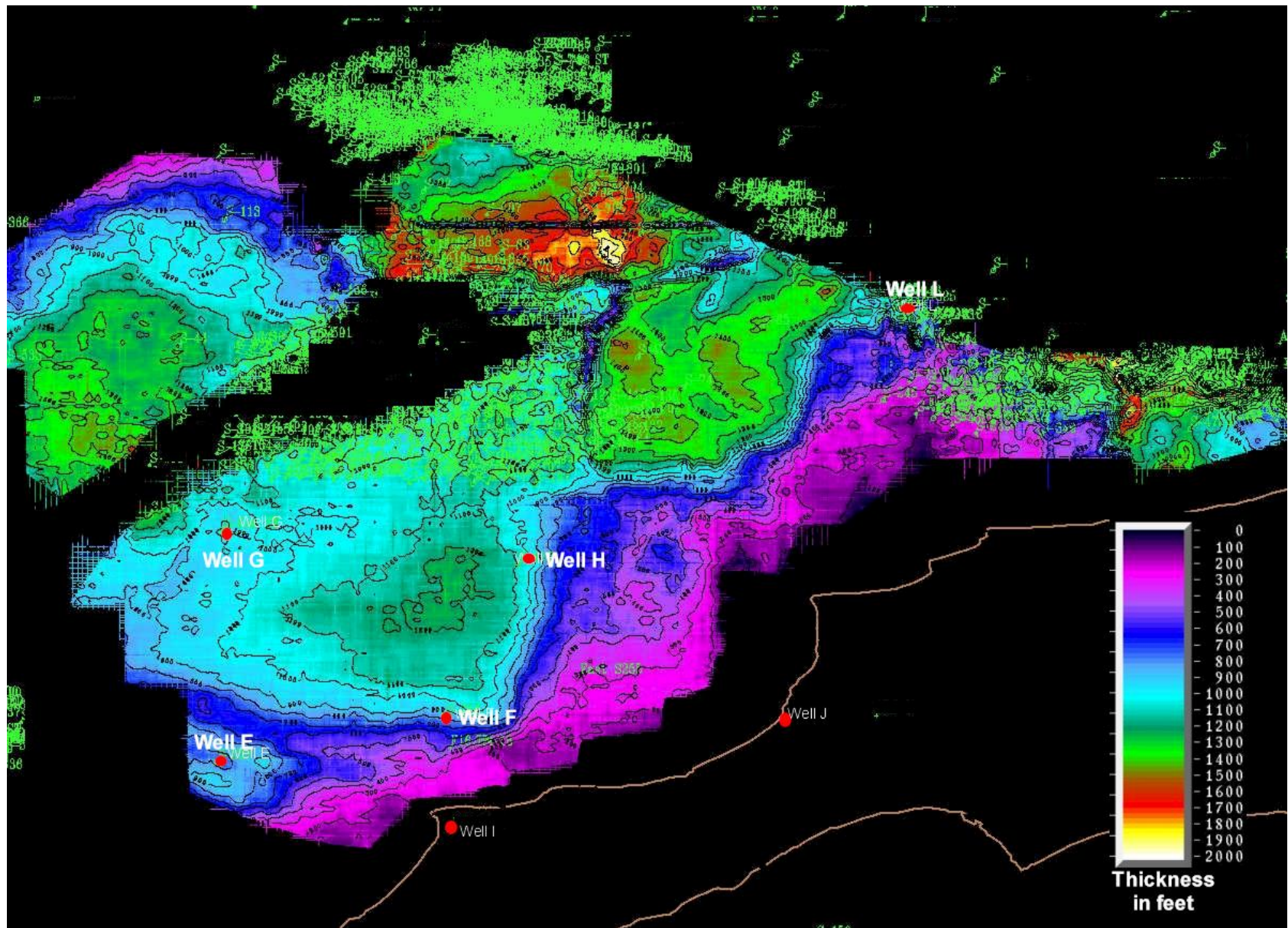




# DEPTH STRUCTURE MAP : TOP FOREST( depths in feet tvdss)

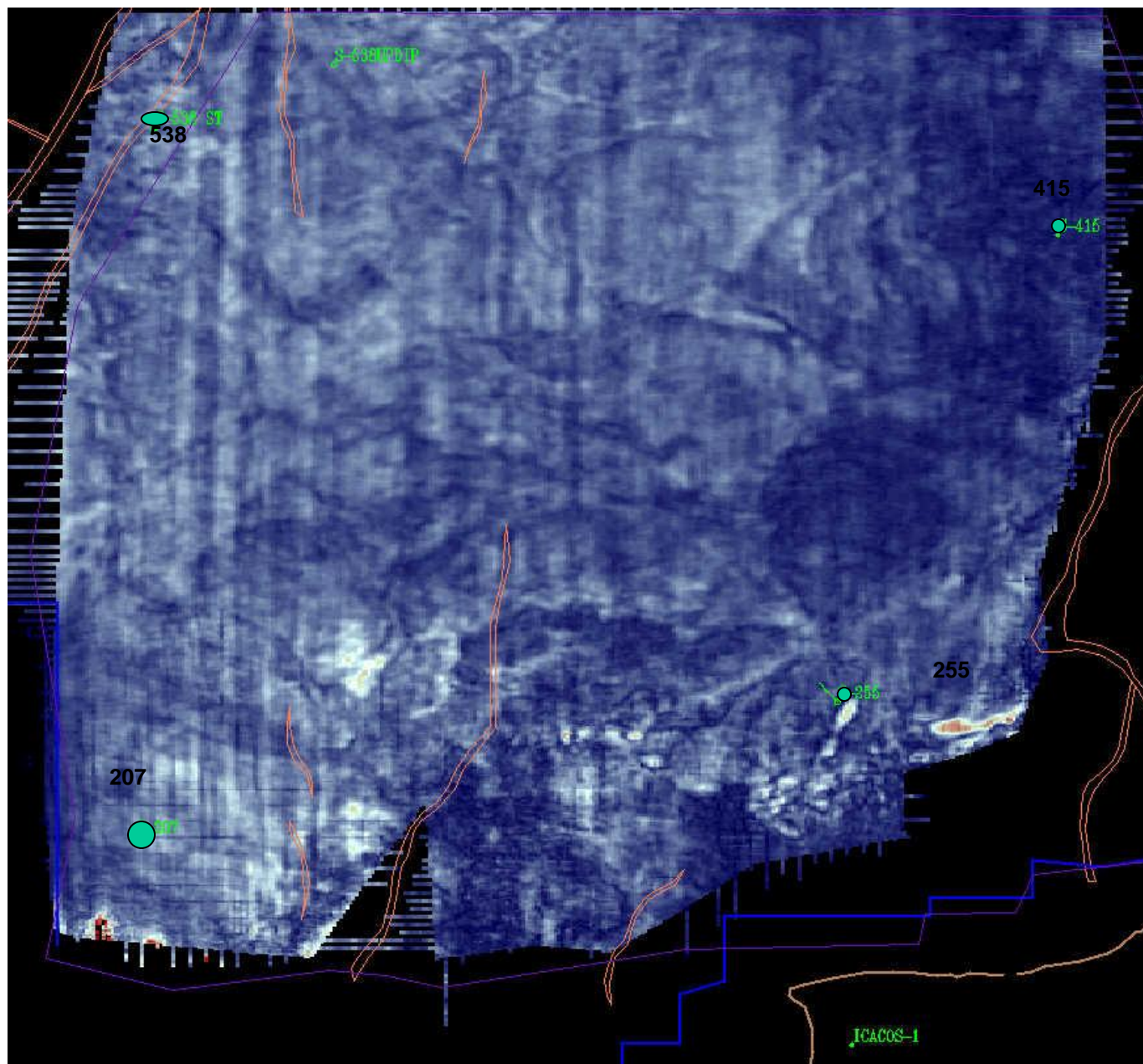


# INTERVAL THICKNESS ISOPACH - FOREST INTERVAL



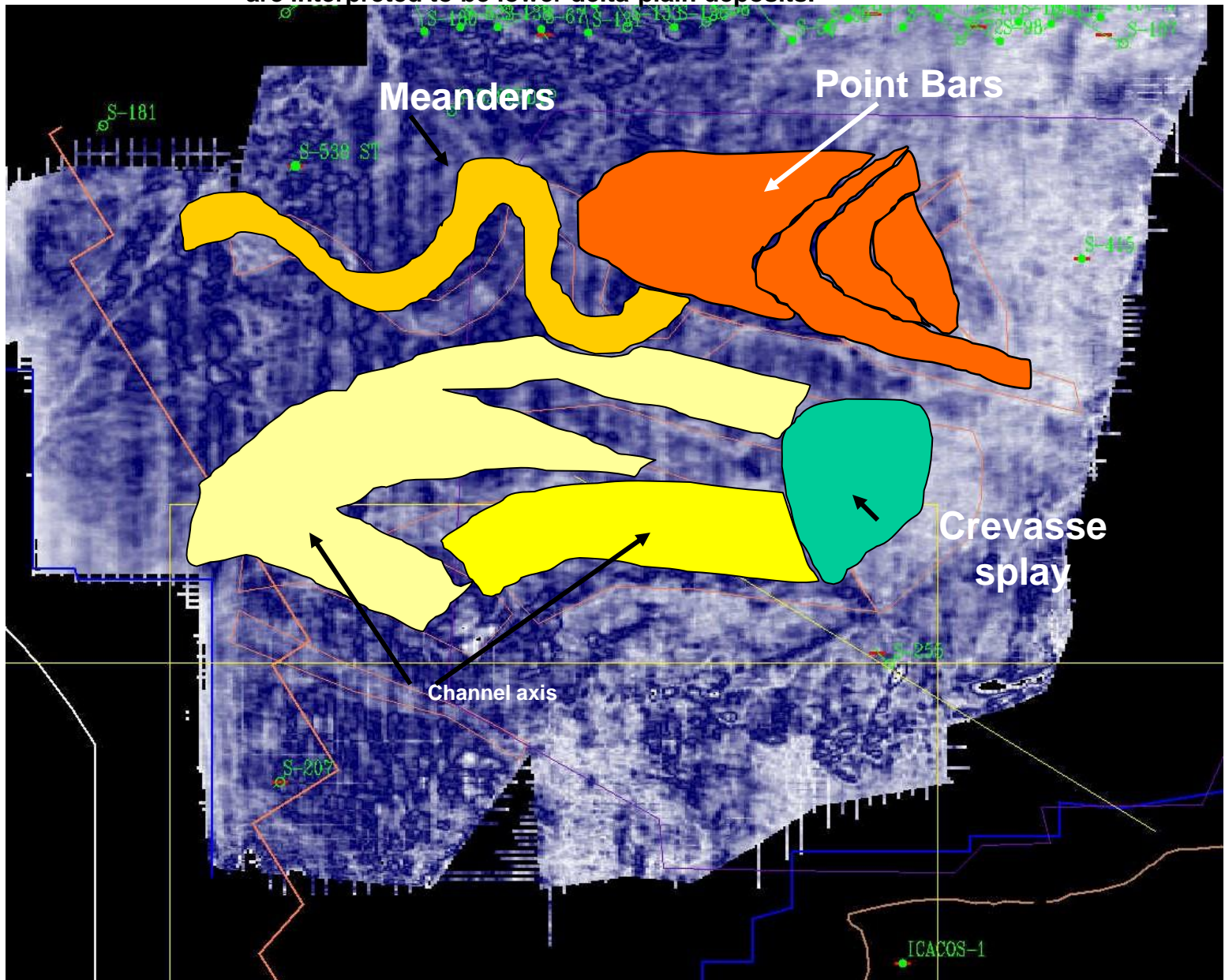


## RMS Amplitude Extraction – Top Forest – Forest 5 Interval



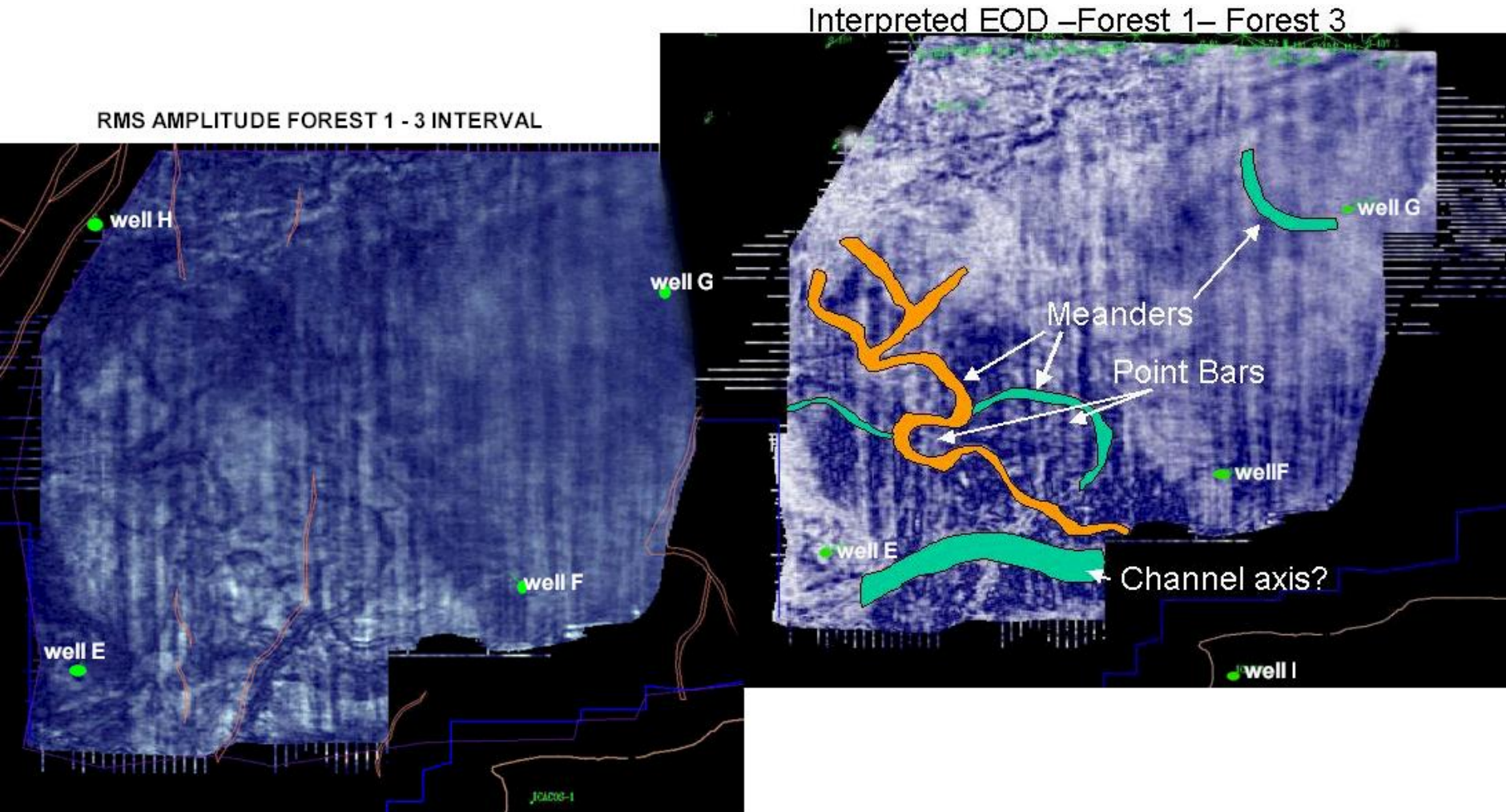
## Environment Of Deposition – Top Forest – Forest 5 Interval

**This interval RMS shows west-east-trending meandering channels, point-bar deposits and a crevasse splay, in what are interpreted to be lower delta-plain deposits.**

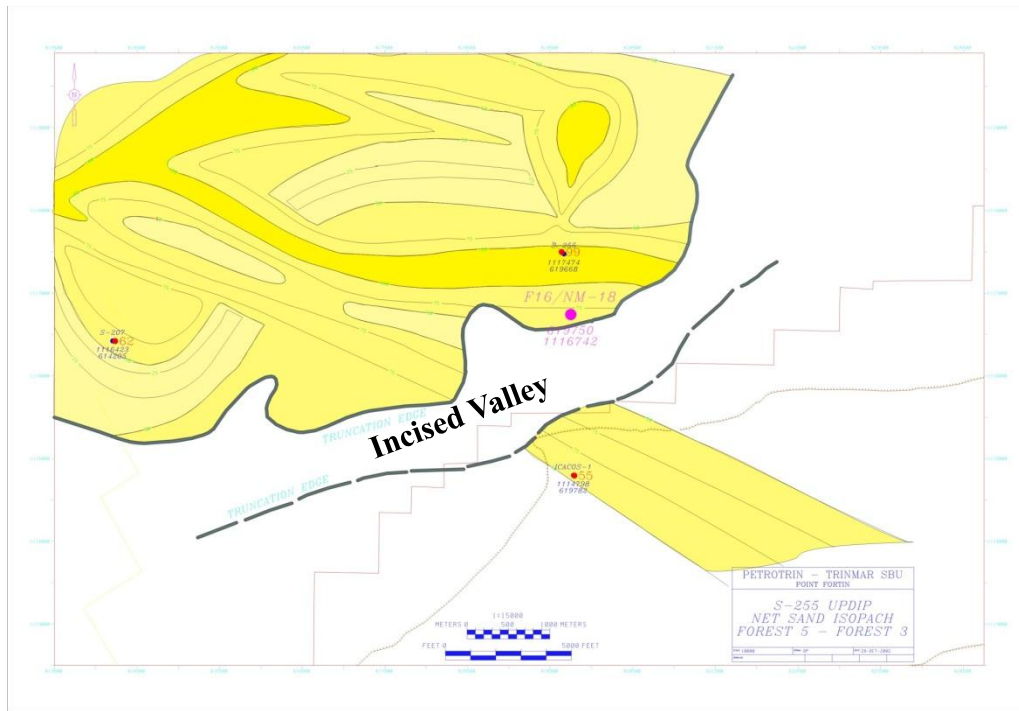




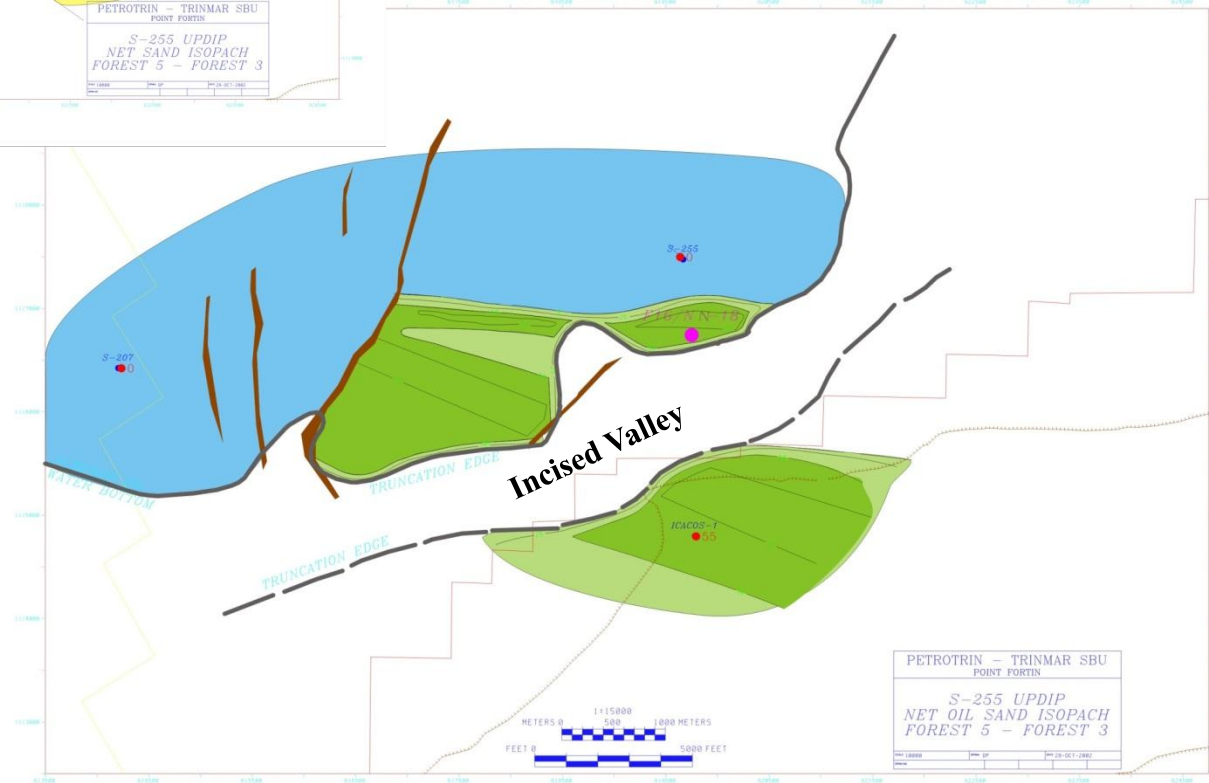
**The Forest 1- 3 interval RMS amplitude extraction illustrates  
NW - SE trending meandering channels.**



## Net Sand Isolith Forest 5 – Forest 3 Interval

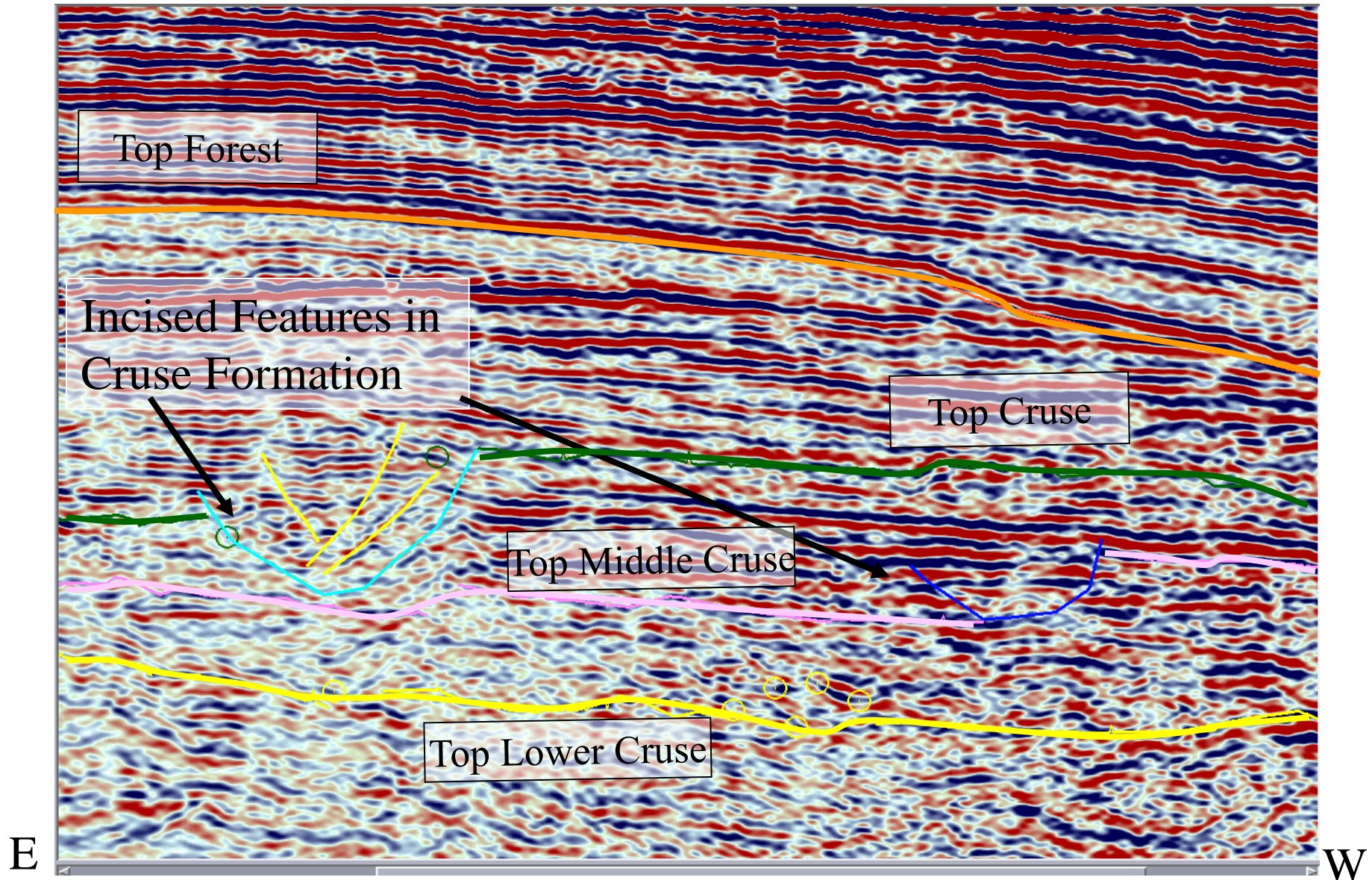


## Net Oil Sand Isopach Forest 5 – Forest 3 Interval





# SEISMIC E-W LINE ILLUSTRATING INTERPRETED HORIZONS AND INCISED FEATURES IN THE CRUSE FORMATION

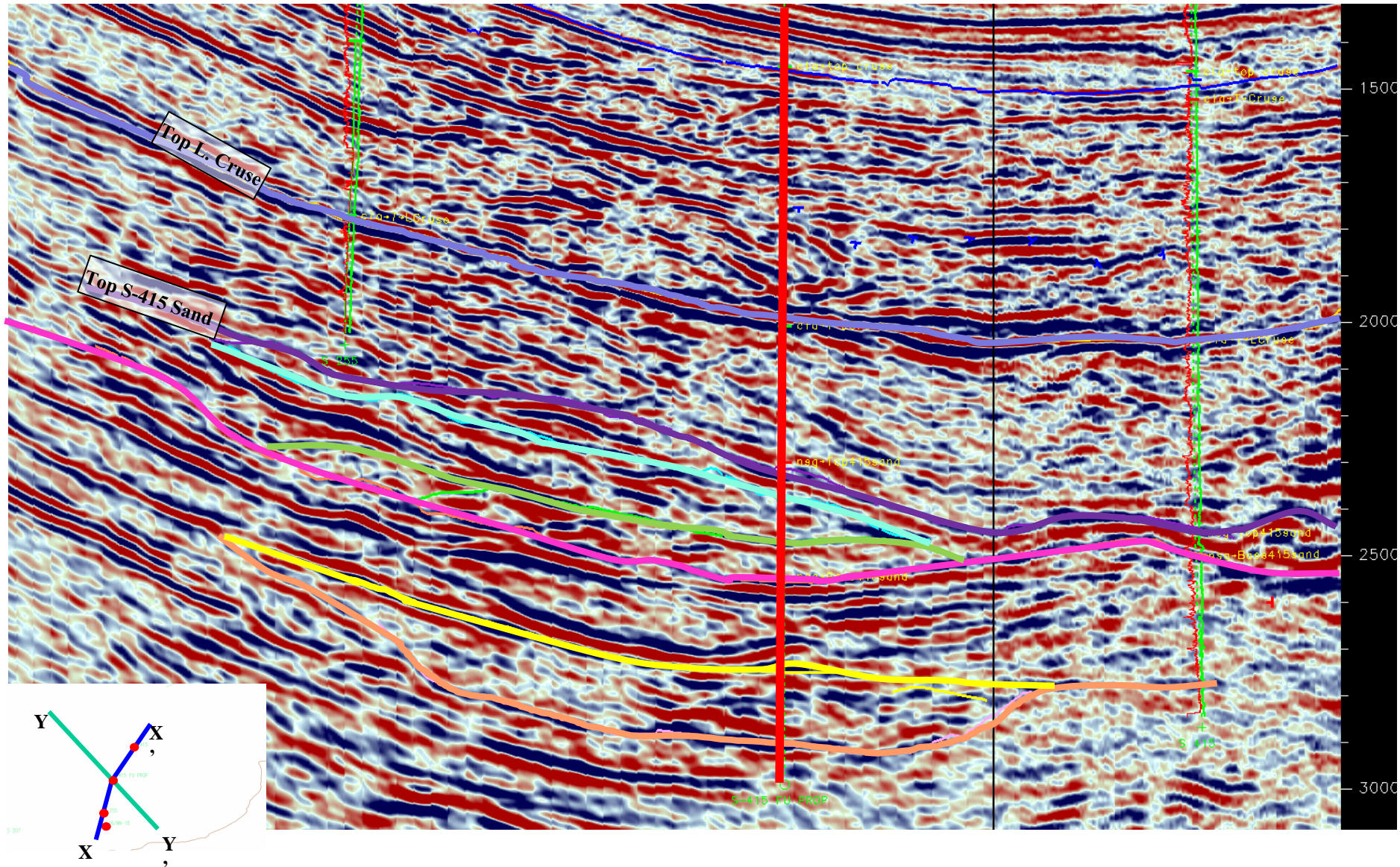




# Seismic Line XX' Illustrating Offset Wells, Proposed Well and Targets

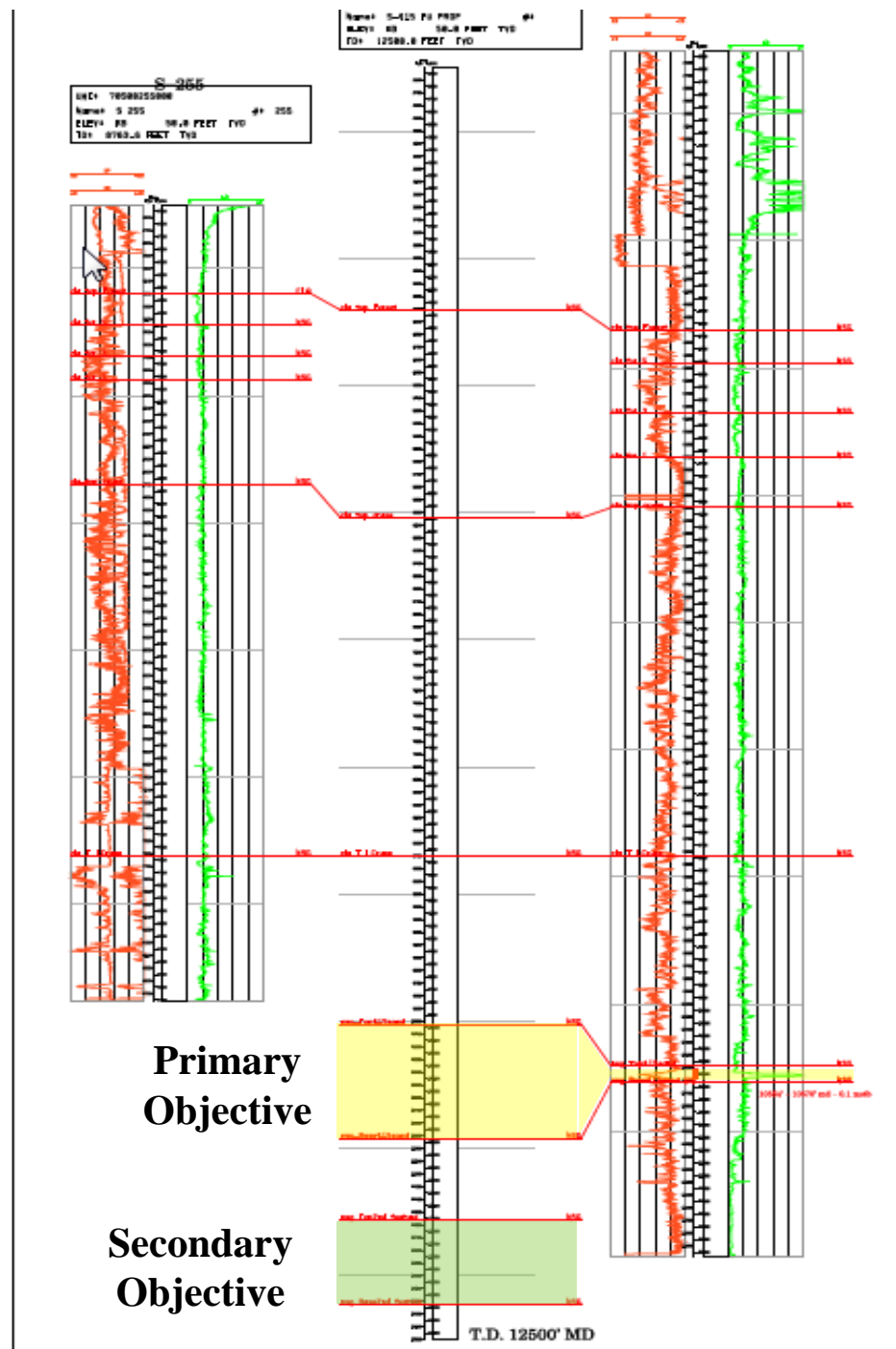
X

X'





# Well Correlations

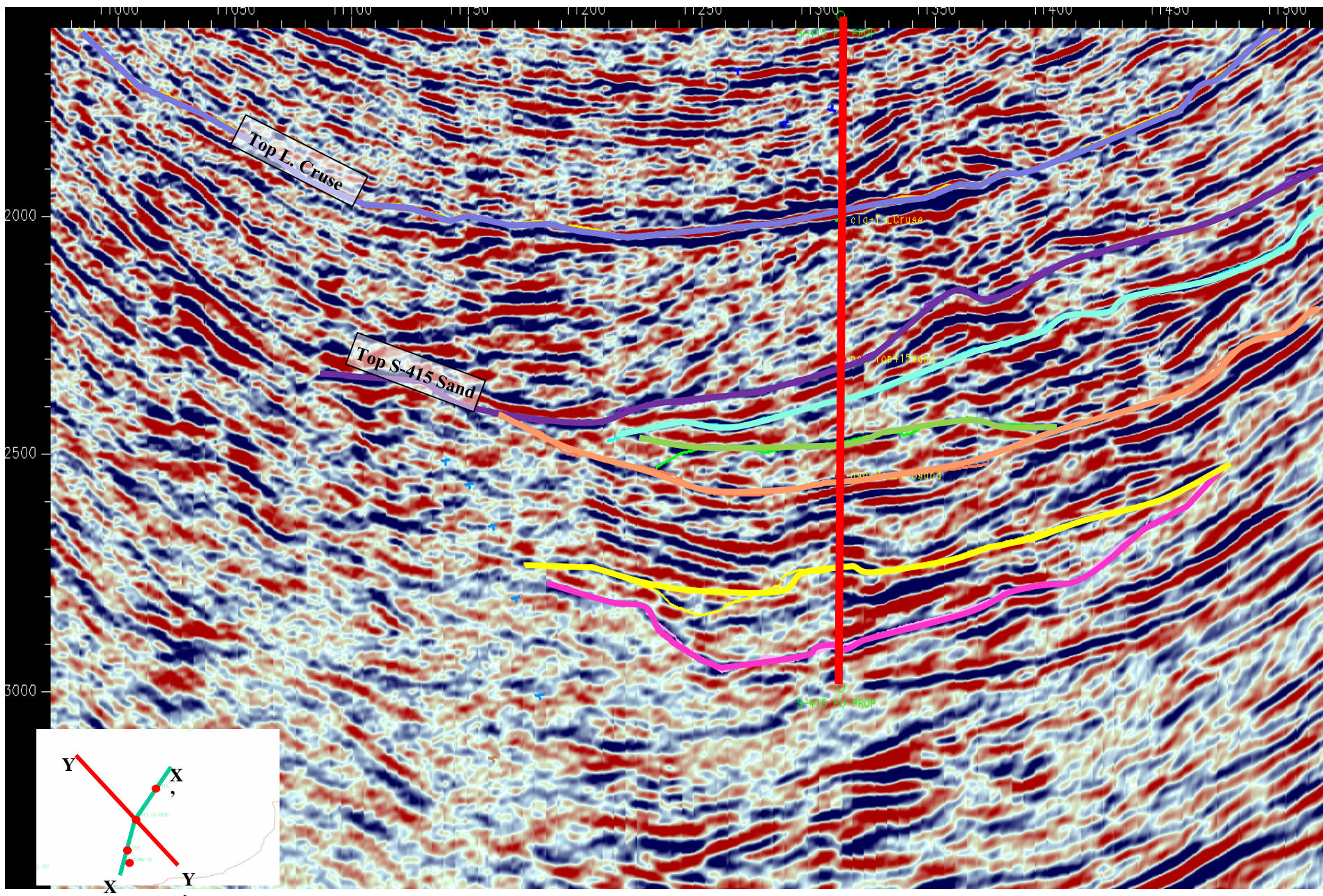




Y

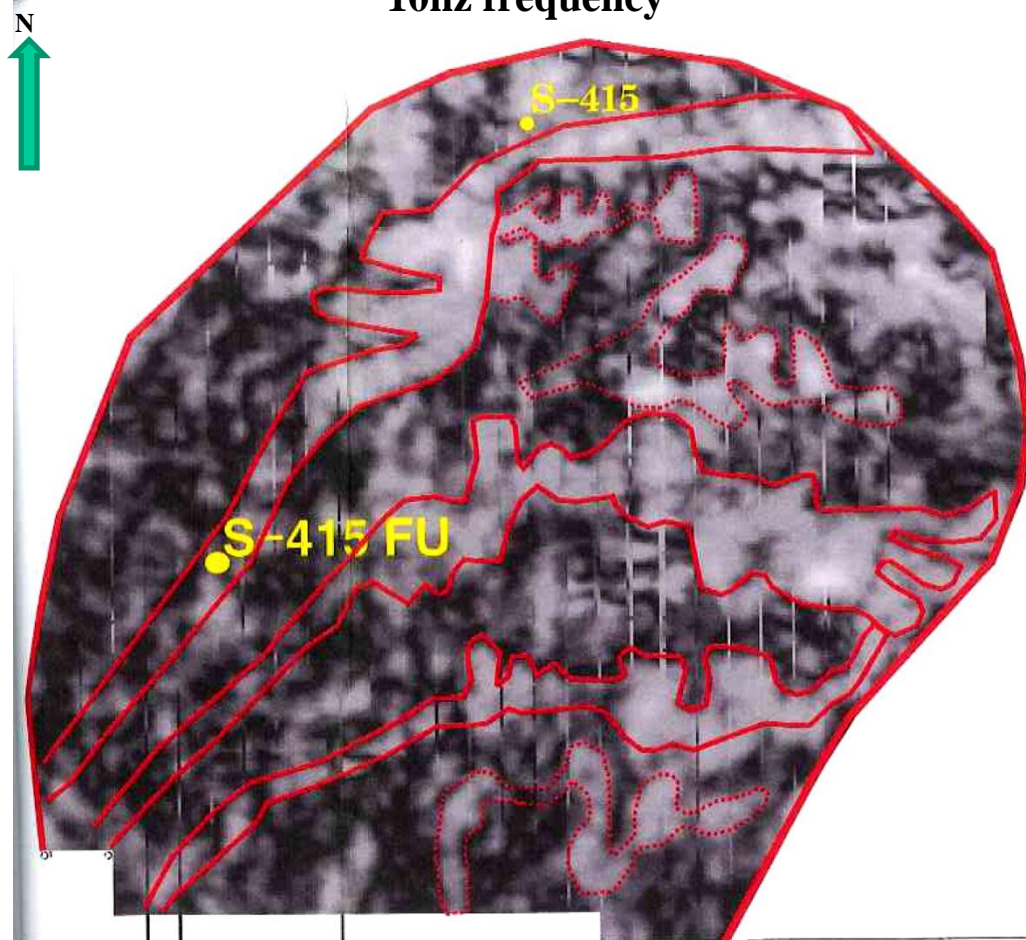
# Seismic Line YY' illustrating Proposed Well and Targets

Y'

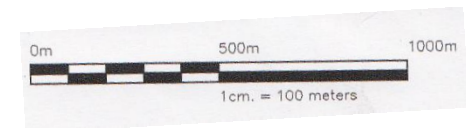
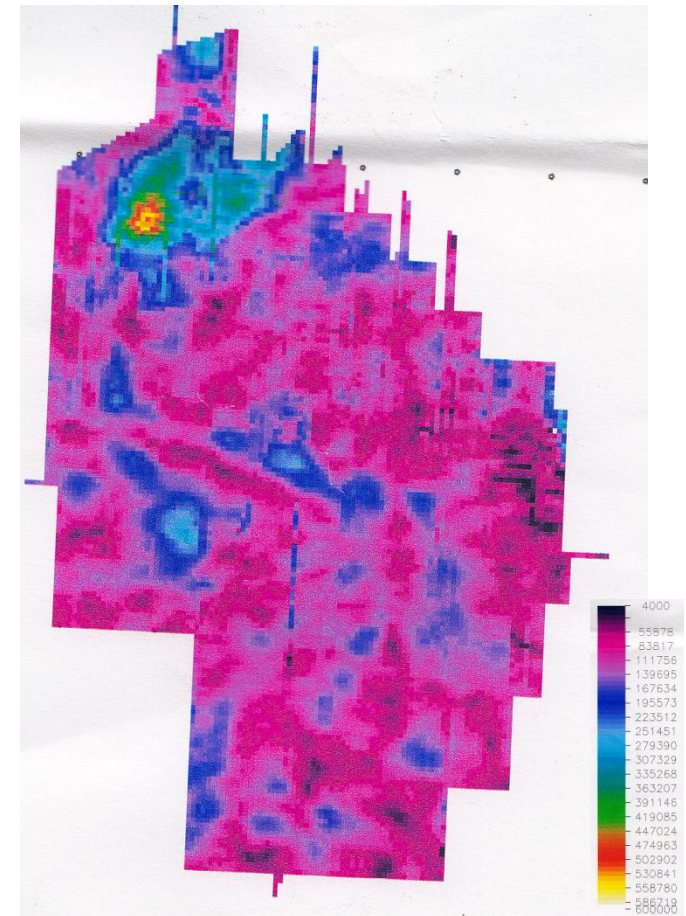




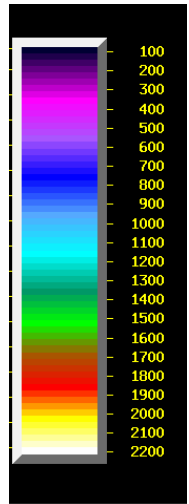
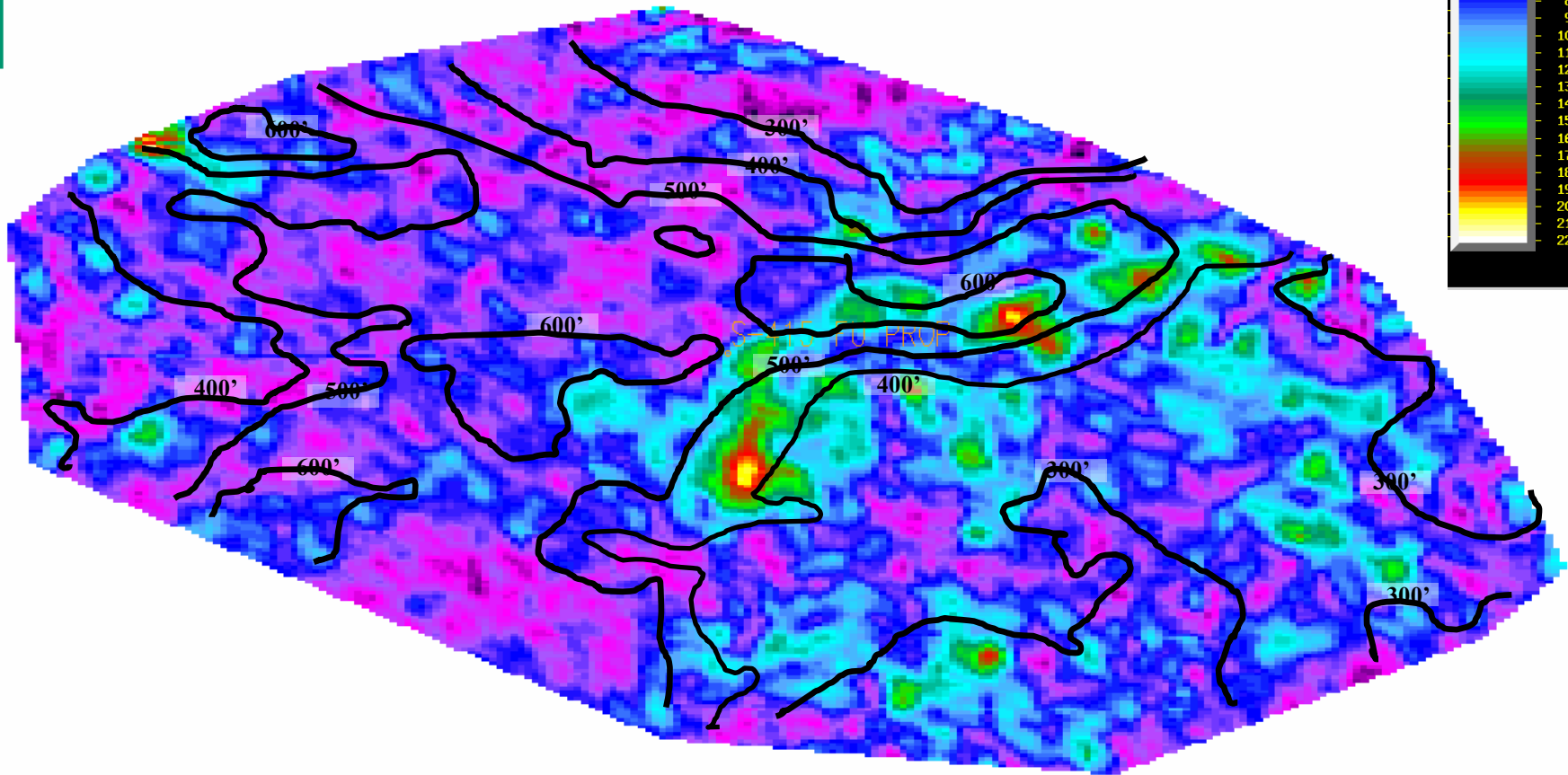
**Spectral Decomposition Slice: Using a 100ms window centered on the High Amp. Reflector at a 10hz frequency**



**RMS Amplitude horizon extraction from M2 – base of feature**



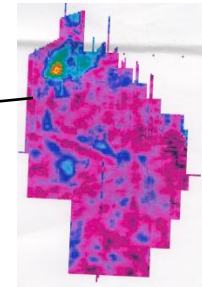
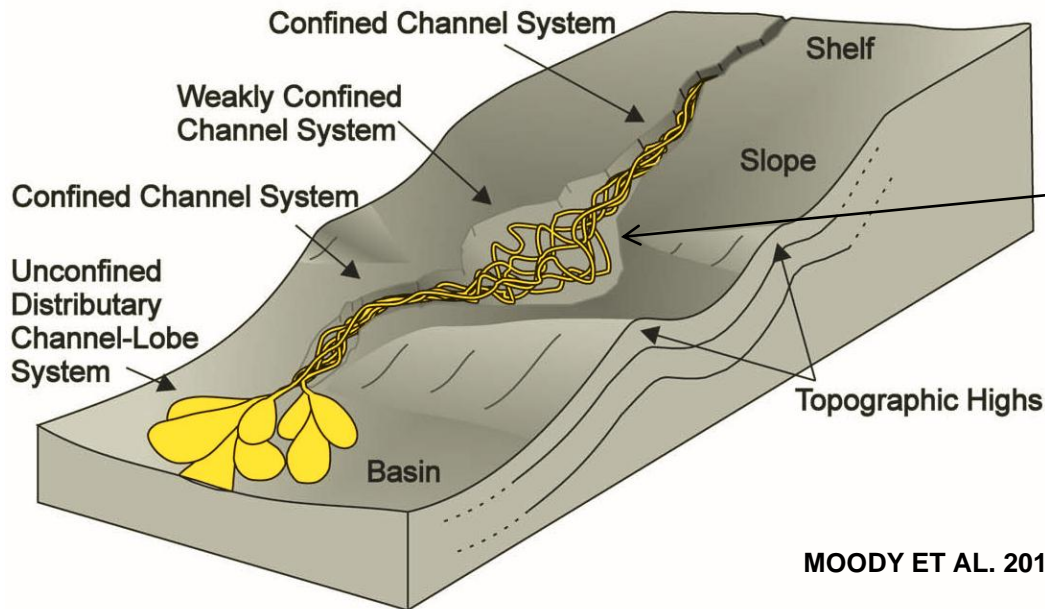
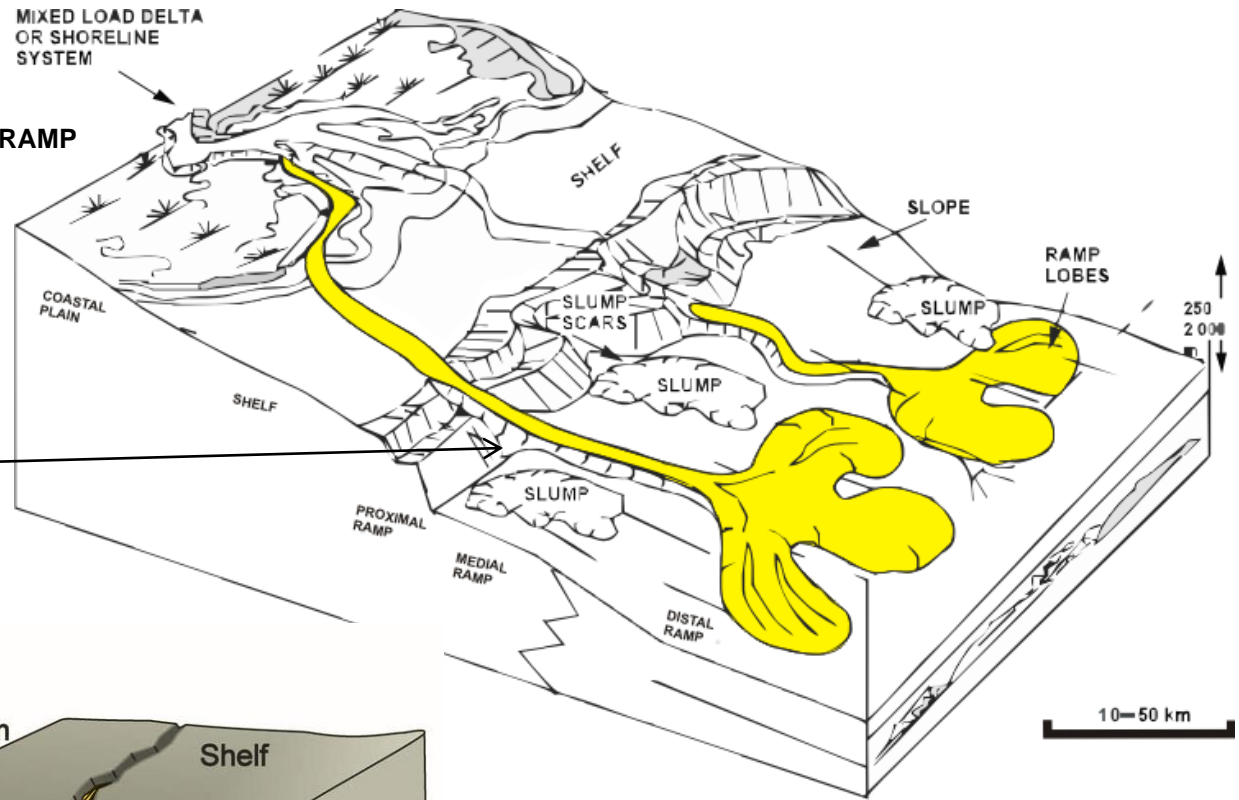
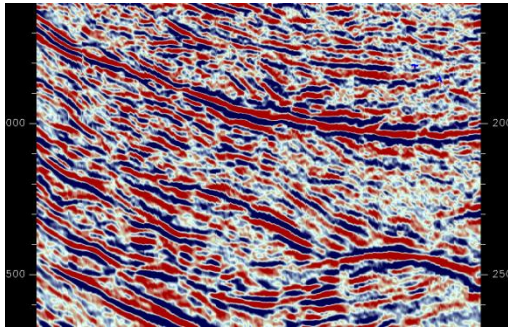
# Interval thickness superimposed on RMS Amplitude horizon extraction (Secondary Objective)



S 255



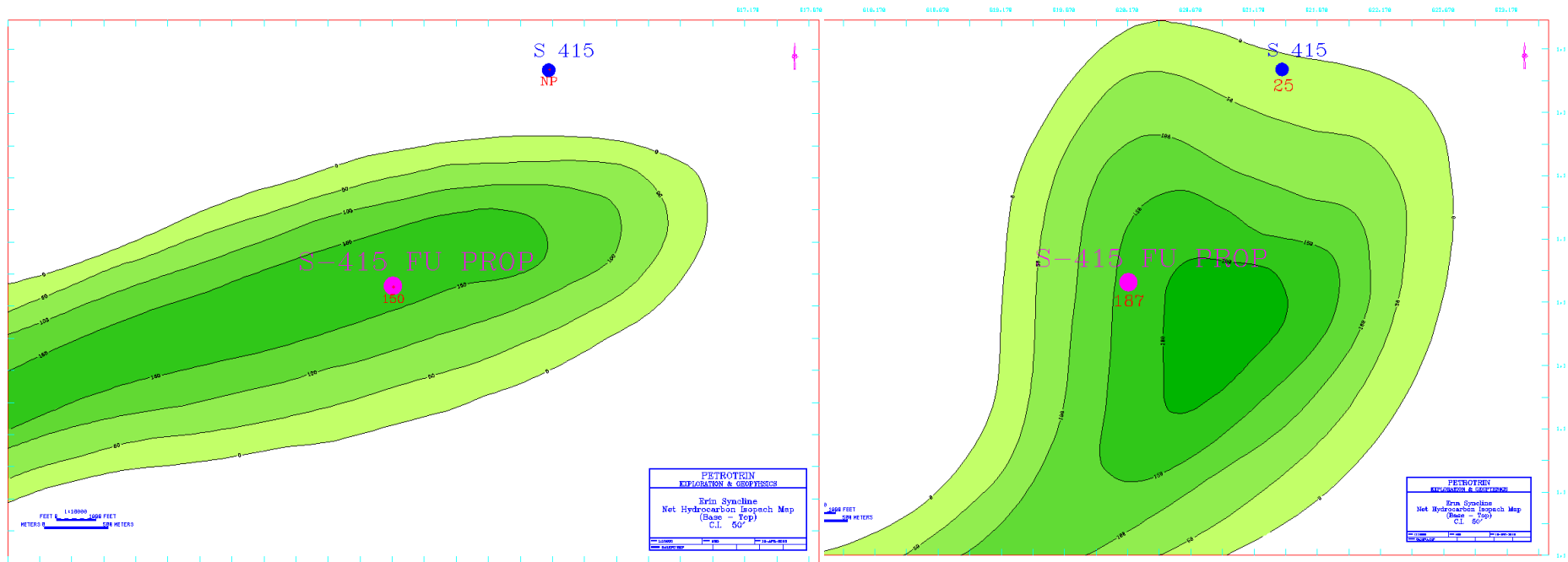
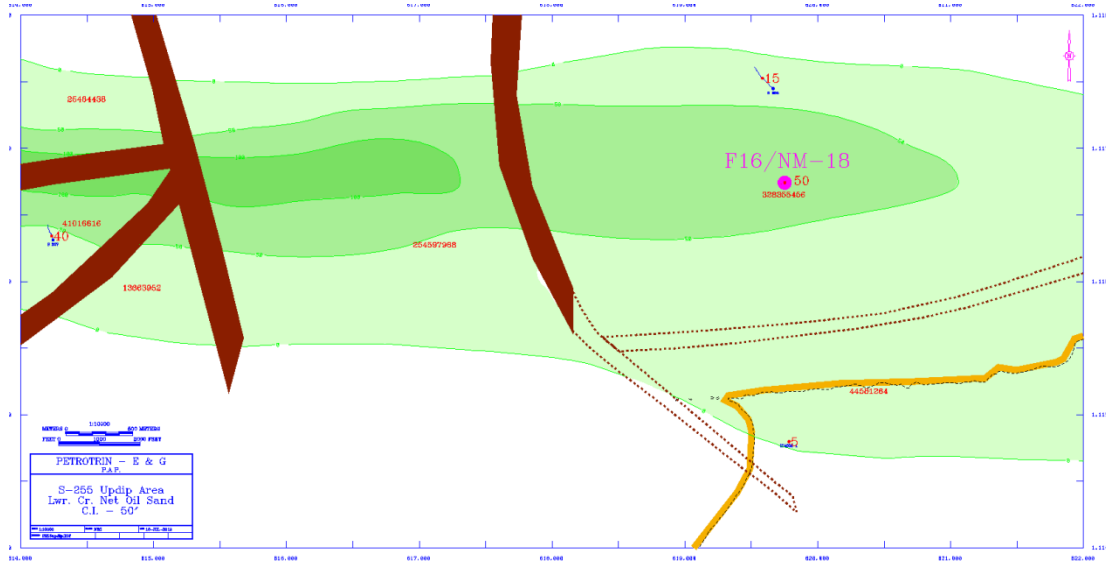
**MULTIPLE SOURCE SAND/MUD-RICH RAMP**  
**READING AND RICHARDS 1994**



MOODY ET AL. 2012

**DEPOSITIONAL  
 SETTINGS USED IN  
 INTERPRETATIONS**

# NET OILSAND ISOPACH MAPS FOR LOWER CRUSE OBJECTIVES





- **Within this study area no structural traps were identified; we have, however, demonstrated that stratigraphic traps exist within all of the formations mapped.**
- **Two exploration wells, one to 10,000 ft and the other to 12,500 ft, have been proposed to be drilled to test the validity of these stratigraphic concepts.**
- **To date one well has been drilled to 10,107' and is currently being evaluated; the second will be spudded shortly.**