

SFD[®] Case Example: Castilla

The Cretaceous-aged Castilla oil field consists of an anticline which is part of a buried structural complex of the Llanos foreland basin of the Andean thrust belt within east-central Colombia. Discovered in 1969, the field is located about 15 km to the east of the exposed frontal thrust fault.

NXT has conducted various Research and Development surveys in the area to quantify the response of the SFD[®] survey system. These fields were used as templates for surveys conducted in similar geological settings.

References:

Guarupe, L. A. B., 2009, ANH: Heavy Oil in Colombia and other investment opportunities; World Heavy Oil Congress 2009

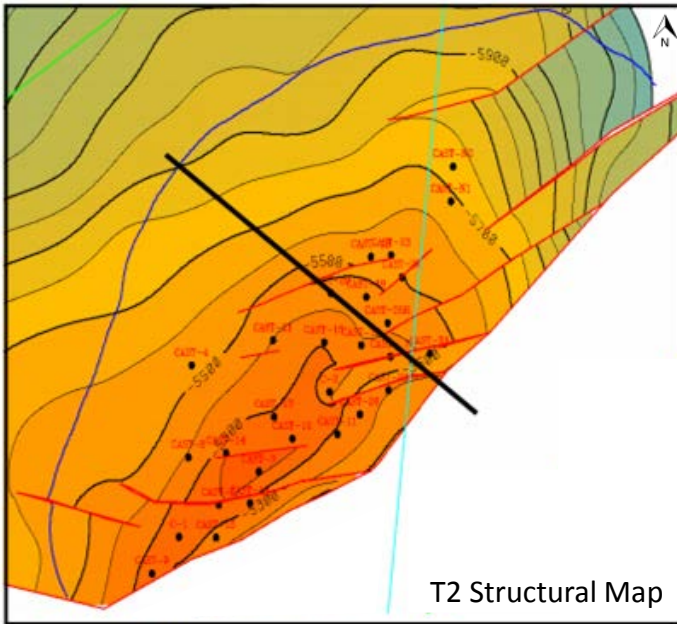
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Parravano, V., Teixell, A. and Mora, Andrés, 2015, Influence of salt in the tectonic development of the frontal thrust belt of the eastern Cordillera (Guatiquía area, Colombian Andes). Interpretation: November 2015, SSA17-SSA27

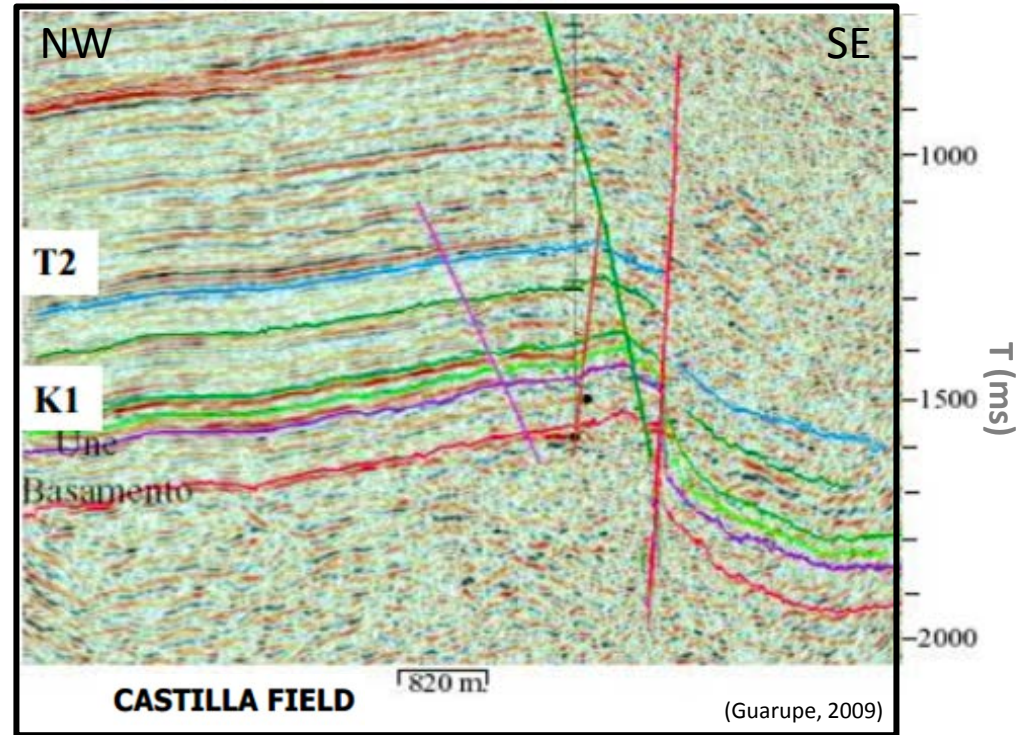
Peidrahita, J. R., Lazala-Silva, M. C., Velandia, A. B., Casanova, M. A., Fernandez, F. N. and Yepes, G.; Ecopetrol S.A.; World Heavy Oil Congress: CASTILLA 100K: A GIANT PRIMARY, HISTORICAL PRODUCTION IN A HEAVY OIL FIELD. Aberdeen, Scotland 2012.



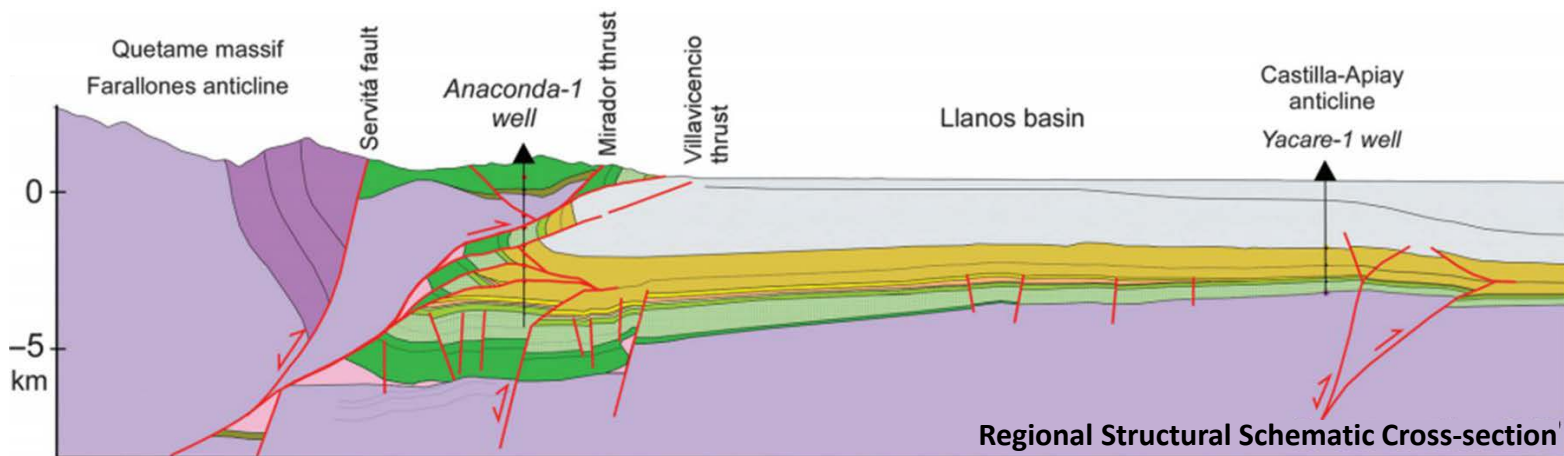
Castilla Field - Structural Setting



Ecopetrol, 2004



(Guarupe, 2009)

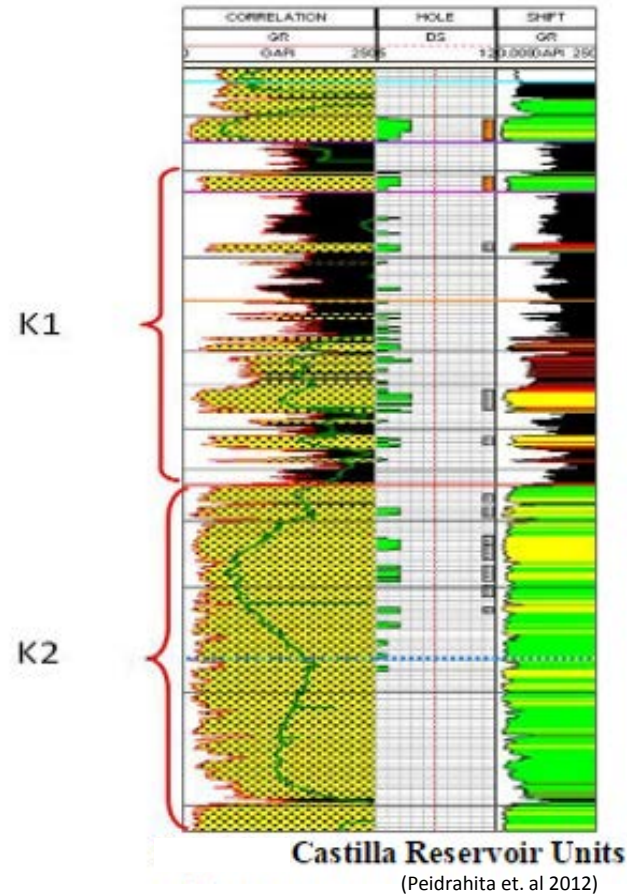


Regional Structural Schematic Cross-section

NXT Energy Solutions Inc.

SFD® Case Example – Central Colombia Cretaceous Anticline – Castilla Field

- The Castilla Field anticline is a NW-SW-trending structure with a three-way dip closure against the Castilla Fault complex to the southeast. Its two largest producing units are the Massive Guadalupe (K2) and Upper Guadalupe (K1) formations.
- The Guadalupe formation has a gross thickness of up to 100 ft with porosity from 15%-22%.
- The **K2** formation consists primarily of sand with alluvial/fluvial aggradational channel fill deposits from braided and meandering channel belts. The sandstones and gravel deposits are poorly sorted from fine to medium-grained exhibiting planar to trough cross-bedding.
- The **K1** unit consists mostly of shale and siltstone with some sand lenses. These lenses are thin, isolated and discontinuous that exhibit fair reservoir quality. They were deposited in a shallow marine setting.



CASTILLA FIELD

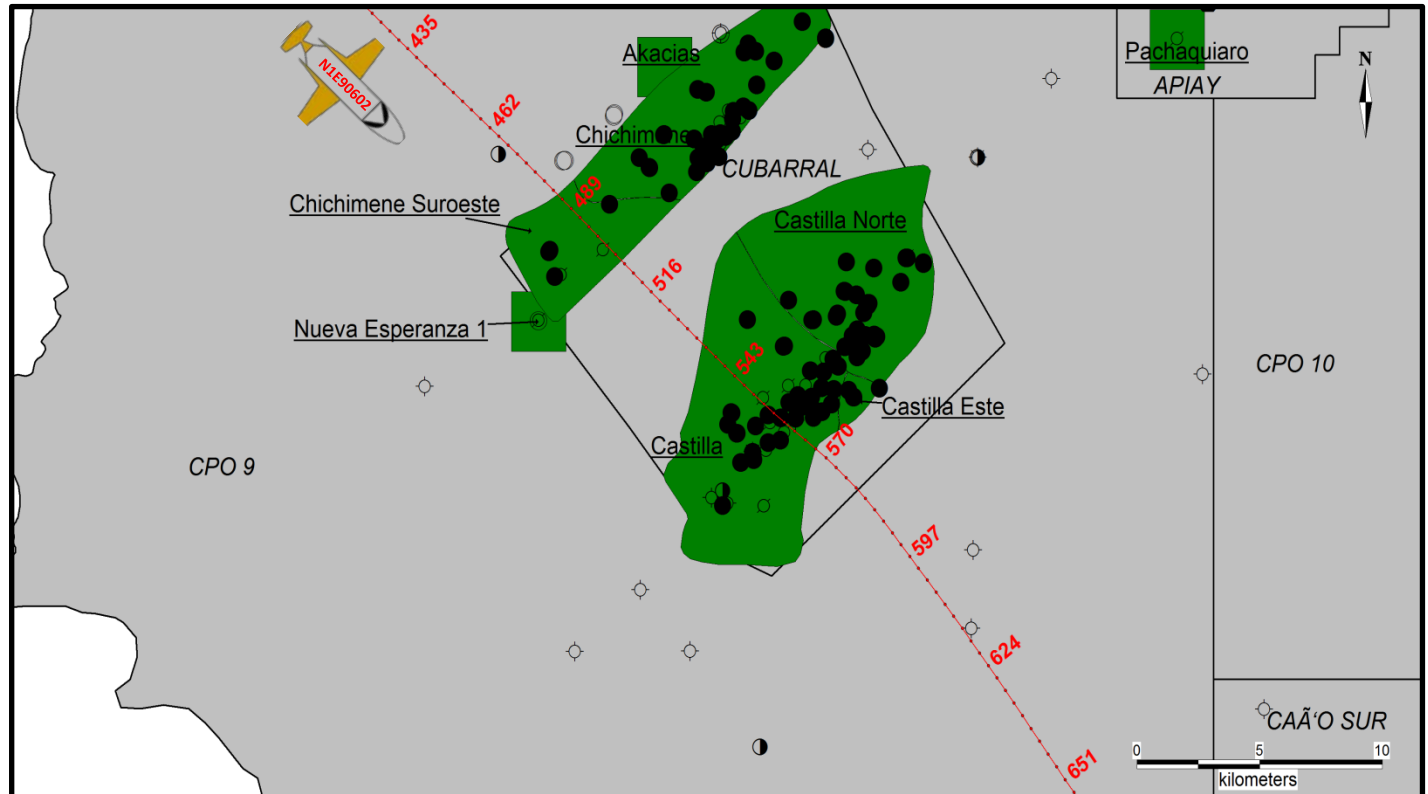
Formation	K1	K2
Depth ft	6300`	6600`
Net Pay ft.	80	400
Porosity %	16	17
Permeability md	1000	450
Gravity API	13	13
Reservoir Temperature - F	180	180
Viscosity reservoir conditions cp	60	60
Reserves OOIP MBP	2600	

SFD® Case Example – Central Colombia Cretaceous Anticline – Castilla Field

Central Colombia

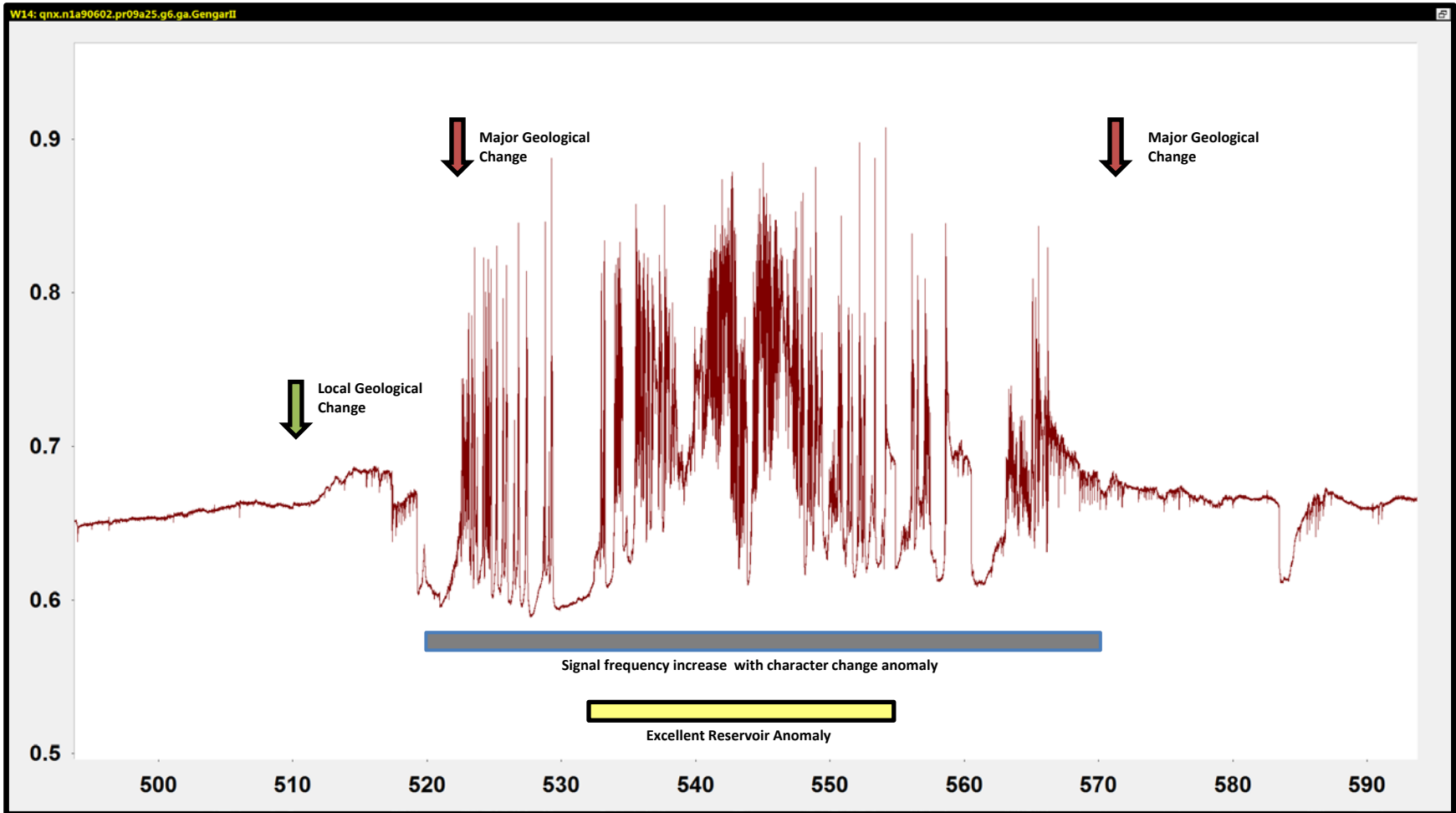
- SFD® flight 90602 was acquired in central Colombia over the Cubarral area.
- The Castilla field was picked to evaluate the SFD® signal responses.
- Surface Area: 55.4 km²
- In-Place Volume: ~ 2,600 MMbbl
- Net Pay (K1+K2): 144 m
- Oil API : 13.5°

Castilla Field – Central Colombia



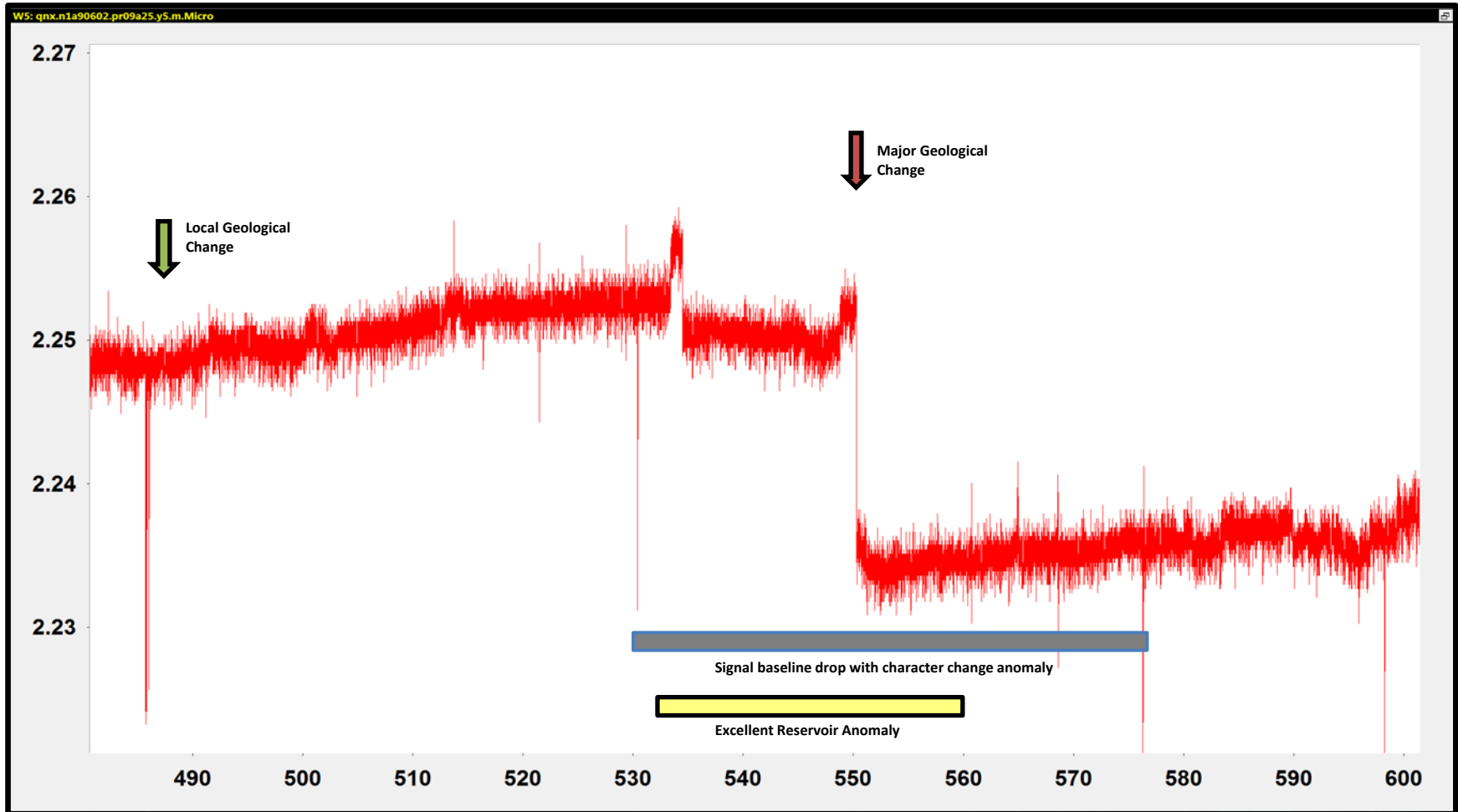
SFD® Case Example – Central Colombia
Cretaceous Anticline – Castilla Field

SFD® 90602 Castilla Anticlinal Structure



SFD® Case Example – Central Colombia
Cretaceous Anticline – Castilla Field

SFD® 90602 Castilla Anticlinal Structure



SFD® Case Example – Central Colombia Cretaceous Anticline – Castilla Field

Summary

- SFD® flight 90508 detected an excellent reservoir anomaly over the Castilla field
- SFD® showed an anomalous region starting with a local geological change at 510 and finishing with a major geological change at 570.
- Within the anomalous region the signal attributes are used to further delineate the core reservoir anomaly between 530 and 555.

Castilla Field – Central Colombia

