Correlation between Chemostratigraphical Data (XRF/XRD) and Wireline Data (SGR/ECS)

Geo**ROX**

Client

Pemex. Offshore, Exploratory, Middle Cretaceous. Cordova Basin, Mexico.

Challenges

The necessity of having an elemental and mineralogical evaluation coupled with high prices assigned on the ECS (Elemental Capture Spectroscopy) and SGR Sondes, the risk of introducing a radioactive source into the wellbore, the threat of LIH some expensive tools, and the risk of being stuck which leads to a rise in the budget in an Exploratory or Development project.

Solution

The XRF analyses done by Geolog provided a detailed measurement of the elemental data, obtaining a split of the U, Th, and K2O to be compared with the Spectral Gamma Ray. Moreover, the accurate evaluation provided by the XRD on the identification of the main minerals (Carbonates, Siliciclastic, and Clays), which differs from the elemental extrapolation done by the ECS sonde to obtain the mineralogy.

Results

The application of the GeoROX Service has demonstrated their ability to identify and differentiate the calcareous mineralogy (calcite and dolomite) in a reservoir predominantly carbonatic, as well as the quartz, and Clays Minerals which have an exceptional correspondence with the one obtained on the ECS downhole tool. Moreover, an excellent correlation between our elemental U, Th, and K2O versus the obtained on the SGR.

Value

The GeoROX service can be applied on-site in near real-time, at our base or postmortem, and it has a far lower cost than using more complex LWD tools. A complete elemental and mineralogical data can be obtained using the GeoROX Service.

Services used

Geo**ROX**
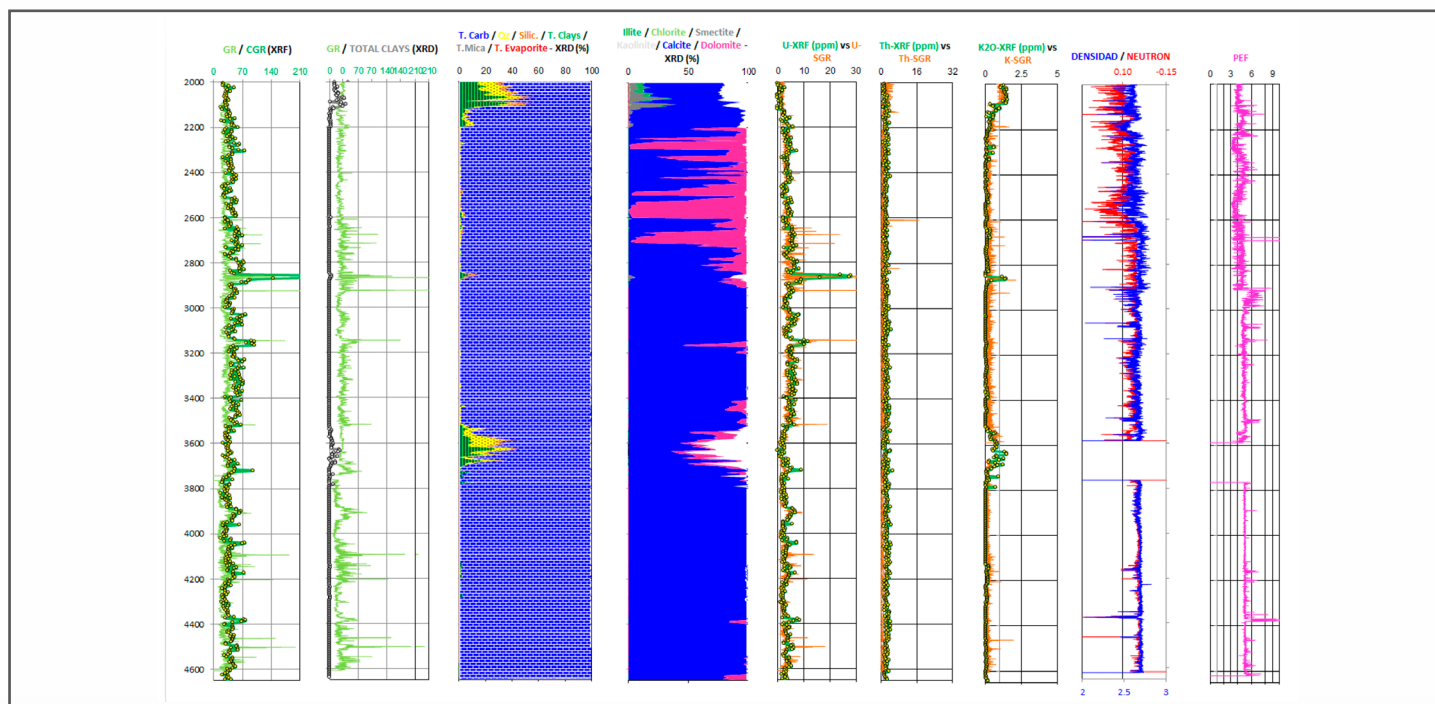
Elemental (XRF) and Mineralogical (XRD) Analysis.

Fig.1, Elemental Data (XRF), SPG - special WL Logs correlation

Chemostratigraphical analysis provides an accurate inorganic reservoir characterization, which is predominantly limestone with some dolomitic interdigitations at the top of the section corroborated by the separation on the neutron / Density curves. A good on-trend comparison between the CGR and Wireline curves was observed. An excellent correlation is observed between the Spectral Gamma Ray and the elemental data from the XRF (U, Th, and K2O). The PEF log is perfectly following the dolomitic levels, muddy limestones at the top of the section, and the clean limestone (3 b/e, 4 b/e, and higher than 5 b/e respectively).
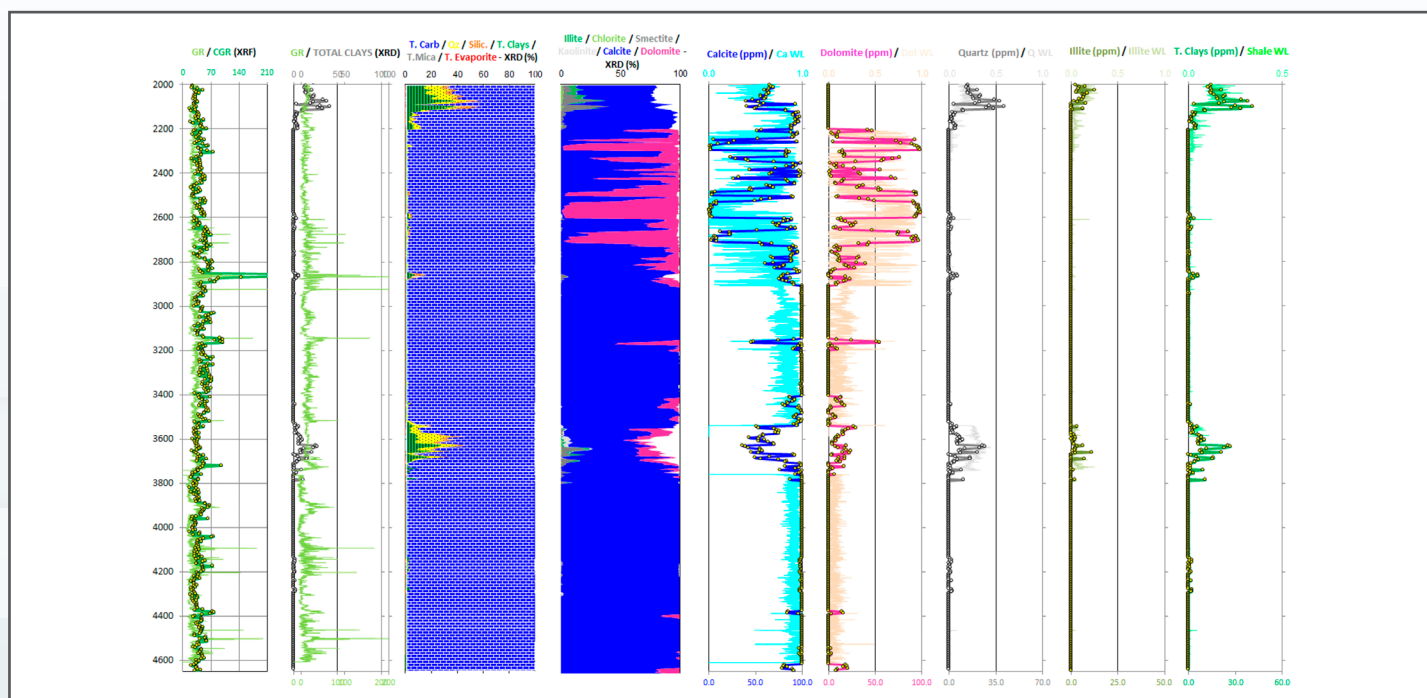

Fig.2, Mineralogical Data (XRD) and ECS Logs correlation

It was identified the speciation of the carbonatic minerals highlighting predominant percentages of calcite, and in less proportion dolomite, followed by the Quartz identification, and the Clays input from Smectite, Illite, Chorite, and Kaolinite. All of them with an excellent comparison between XRD data versus ECS logs (limited just to Calcite, Dolomite, Quartz, Illite and Total Shale).

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