Stratigraphy applied to oil industry

Factors controlling trace-metal distribution in alluvial and coastal deposits: implications for hydrocarbon exploration

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Reliable estimates of sediment transport and storage from a multi-sourced system across a variety of depositional environments require accurate identification of the sediment sources and their role in modulating sediment supply to the downdip components of the dispersal system. Through a modern example from the Po Plain, involving three segments (drainage area, alluvial plain and coastal plain/delta) of the system, this study provides additional insight on the critical role of a combined sedimentological and geochemical approach, which can be highly reproducible in the ancient record. Unlike ancient successions, where individual causes of compositional variability are generally very difficult to unravel, recent (late Holocene) sedimentary successions provide an excellent opportunity to understand the relative impact on trace-metal distribution of source-rock composition and changes in grain size, helping to predict whether and to what extent these two variables might be combined or superposed in the rock record. Among the variety of facies associations that compose the sediment routing system, channel-related deposits, for which connection between river transport and hinterland sediment supply can reasonably be inferred, represent the building block for a comprehensive approach to sediment transfer and storage. For trace-metal characterization, levee and crevasse fine to medium sand appears as more suitable to provenance analysis than its coarser-grained (bar sand) counterpart. Identification of end members for individual catchment-river systems with sufficient precision may help disentangle provenance mixing from lithologically homogeneous, alluvial (floodplain), deltaic (bay, lagoon, delta front) and nearshore (beach), facies associations, for which the relative contribution from individual detrital sources is virtually unknown.

Keywords: Trace metals, sediment provenance, source-to-sink analysis, high-resolution stratigraphy, Po Plain.

Stratigraphy and sedimentology of the Triassic's lower series reservoirs in South Hassi R'mel. Saharan platform – Algeria

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In order to develop the reservoirs of the lower series of the Southern part of Hassi R'mel field, this work aims to improve the knowledge about the stratigraphy and sedimentology of different units of these series. To do so an analysis of many wells particularly: HRS-11, HRS-9, HRS-21, HRS-3 and HRS-7, has been done and interpreted.
Hassi R'mel is one of the most important gas-fields in the world, regarding its surface (3700 km²) and reserves producing gas condensate with a presence of an important oil ring in its Eastern and Southern periphery.
This field consists of four (04) sandstone reservoirs of Triassic age, (A, B, C and the lower series). They are separated from each other by beds of fine grained.
All the previous studies, in this field, were focused on the upper reservoirs (A, B and C) which show excellent petrophysical properties with important net pays, whereas the lower series were considered more or less not interesting for petroleum potential because of their shaly facies and volcanic intrusions.
The stratigraphic analysis of the area under study (Southern part of Hassi R'mel) is similar to that encountered at the over all Hassi R'mel field; however, the Triassic exhibit variation in the thicknesses and the facies from the North to the South of the field.
The wireline logs analysis and core drill description, of the area understudy, enable us to define the main stratigraphic units that are from the bottom to the top: The shaly sand, the andesites, and the sandstone formation.

The cores analyses allow us to precise the depositional environment at the bottom of the Triassic: This area is a transition zone between a braided fluvial system and a meandering fluvial system.
From this study, the formation of the base of the lower series in the Southern part is composed of four (04) units. Each unit is represented by channels of 1 m piled up one on the other with fining upwards in the sequence.
An important pinch out of the units 1 and 2 from the South to the North is observed. This pinch out is associated with a decrease of the sandy material and an increase of the fine material towards the North. This lateral evolution of the lower series from South to North, which is related to the trend of the major faults, fits with the direction of the sediments flow. The South Hassi R'mel region is a transition zone between the braided fluvial system and the meandering fluvial system.

Keywords: Triassic, Hassi R'mel, lower series, reservoirs, fluvial system.

A multi-facetted approach to stratigraphy; one that is applicable to the oil and gas industry?

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The importance of high resolution, chronostratigraphically-grounded correlations in the oil and gas industry is being increasingly recognized as more and more challenging reservoirs are sought and exploited. The "traditional" approaches of wireline log correlation, biostratigraphy and seismic correlation commonly do not provide confident or high resolution chronostratigraphic correlations.
Here, we document the results of an elemental chemostratigraphic, isotopic chemostratigraphic and magnetic susceptibility stratigraphic study on the Upper Miocene reef complexes on the southern coast of Mallorca. The aim of the paper is to demonstrate the potential for recognizing chronostratigraphic surfaces and units in these sequences by applying the stratigraphic techniques listed above and to comment on their suitability for subsurface application.
Magnetic susceptibility data define maximum regressive surfaces that can be related to base level fluctuation. Elemental data enable reef complexes of differing ages to de characterized based on elements and element ratios that are reflecting changes in wind-blown and tuffaceous detritus. Carbon and oxygen isotope data have been reset by meteoric diagenesis and therefore do not offer chronostratigraphically significant information.

Keywords: Chemostratigraphy, magnetic susceptibility, carbonate platform.