Nannolithofacies: an alternative method, using minerals and calcareous nannofossils, for hydrocarbon reservoir characterization and stratigraphic correlation

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Nannolithofacies is proposed as an alternative sediment analysis method, combining two previously known, independent sediment analyses: calcareous nannofossils and heavy minerals. The method consists of the analysis and interpretation of the calcareous nannofossil and mineral content of smear-slides by means of a petrographic microscope. The use of a high-resolution calcareous nannofossil biostratigraphic framework, coupled with mineral analysis, allows us to distinguish different sandstone bodies and seal rocks in turbiditic systems. Our experience has shown that authigenic minerals, such as anatase, dolomite and pyrite are suitable for this purpose. Other common allochthonous heavy minerals in sediments, such as zircon, tourmaline, granade, biotite and rutile, are recognizable in smear-slides and they are considered good indicators to characterize the individual reservoir and its provenance. Although qualitative, this method constitutes a useful tool in specific horizontal-well drilling operations (geo- and biosteering). Provided that time and precision are critical parameters in petroleum exploration, we stress that the nannolithofacies method, along with several independent studies, such as mineralostratigraphy, litho- and biostratigraphy could be a valuable alternative, at low cost.