THE USES OF MICROFOSSILS IN PETROLEUM EXPLORATION

Makanjuola Eyitayo Joshua

Foraminifera are the major microfossils which are used in petroleum exploration and are used routinely to interpret the ages and paleoenvironments of sedimentary strata in oil wells, others include nannofossils (or coccoliths), diatoms, radiolaria and plant matter (pollen and spores). Because of their small size and abundance in Phanerozoic rocks, they are easily recovered from drill cuttings without the drill bit destroying the fossil In an operational environment, microfossils can be examined shortly after being brought to the surface in cuttings Well-site analysis permits immediate identification of stratigraphic levels and drilling objectives, minimizing drilling time.. Multidisciplinary studies use a combination of microfossils to overcome poor recovery between marine and non-marine deposits and achieve the highest resolution when assigning age zonations. Biostratigraphic correlation of rock sequences deposited during equivalent time intervals will determine the lateral continuity of reservoirs and traps. Paleoenvironmental analysis using microfossils will decipher past water depths, climate, oceanography and nutrient concentrations. Integration with litholog, petrophysical and seismic data develops far superior sequence stratigraphic models. Basin eustasy, sequence boundaries, systems tracts and maximum flooding surfaces can be identified with greater confidence. In addition, the modern micro benthonics are used in environmental baseline surveys (EBS) which are essential to attaining permits and meeting environmental requirements. Quantitative analysis of live and dead specimens are obtained using grab samples of the sea floor.

References

Baker, R. 1979. A Primer of Oilwell Drilling. Petroleum Extension Service, the Univ. of Texas at Austin, Austin. 94 pp.

Breard, S.Q., A.D. Callender and M.J. Nault. 1993. Paleoecologic and biostratigraphic models for Pleistocene through Miocene foraminiferal assemblages of the Gulf Coast basin. Gulf Coast Association of Geological Societies, Transactions 43: 493-502.

Culver, S.J. 1988. New foraminiferal depth zonation of the Northwestern Gulf of Mexico. Palaios, 3: 69-86.

Davies. E.H. and J.P. Bujak. 1987. Petroleum exploration applications of palynological assemblage successions in the flexure trend, Gulf of Mexico. In Innovative biostratigraphic approaches to sequence analysis: New exploration opportunities. Gulf Coast Section Society of Economic Palaeontologists and Mineralogists. p. 47-51.

Fleisher, R.L. and H.R. Lane. (eds.). In press. Applied Paleontology, In E.A. Beaumont and N.H. Foster (eds.), Exploring for Oil and Gas Traps, Handbook No. 3, Treatise of Petroleum Geology. American Association of Petroleum Geologists.

Galloway, W.E., D.G. Bebout, W.L. Fisher, J.G. Dunlap, Jr., R. C. Cabrera-Castro, J. E. Lugo-Rivera and T.M. Scott. 1991. Cenozoic. In A. Salvador (ed.). The Gulf of Mexico Basin. The Geology of North America Vol. J. p. 245-324.

Haq, B.U. and A. Boersma, (eds.). 1978. Introduction to Marine Micropaleontology. Elsevier, New York. 376 pp.