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Research Article

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Lithofacies and Paleontological Analysis of an Outcrop, Anambra Basin, Nigeria

Itiowe K[1], Adiela UP[2], Odelugo Lilian[3]

[1]Department of Geology, University of Port Harcourt, Port Harcourt, Nigeria
[2]Department of Petroleum Engineering, Nigerian Agip Oil Company, Port Harcourt, Nigeria

Abstract The aim of this study is aimed at determining age of sediments and their possible depositional environments using fossils as index in the study area, in order to achieve this, a biostratigraphic study of outcrops X in Anambra Basin. The samples were subjected for paeleontological analysis. The lithology is made up of shales, claystones, siltstones, sandstones, coals, silty shales and silty clays. 98.2% of the analysed samples are Arenaceous Benthonics. Biostratigraphic analysis showing foraminifera distributions and Sedimentological sieve analysis were used for the interpretation to determine the sedimentary structures and their paleoenvironment of deposition. The analyses yielded information on the percentages of Benthonics, Planktonics, Calcareous forms, Arenaceous forms ,the particle size distribution chart, foram diversity chart, foram abundance chart,planktic/benthic ratio,depositional environment, litholog and a composite log for each location.

Keywords Lithofacies and Paleontological Analysis

Introduction

This project work was based on the Biostratigraphy of the outcrop X exposed in Anambra Basin, Nigeria. The outcrop is one of the Campanian-Maastrichtian sedimentary successions of the Anambra basin. The name X was given to the Outcrop beause of proprietary reason [1].

Method of Study

The study involves collection of samples from outcrop in the field, were then analyzed in the laboratory to describe the lithologic characteristics and paleontological assemblages to obtain necessary data or results for interpretation.

The stratigraphic units and lithofacies as presented by Reyment (1965); Whiteman (1982); Fayose (1970) [2-4], are adopted in this research in the discussion of the lithostratigraphy of the sequences penetrated by the Well. The lithologic sequence of the interval sampled covers a depth of about 91.30m. The basal sequence from 91 .30m-74.45m consist of dark grey to greenish grey, fissile, massive, slightly calcareous silty-sandstone. This sequence is characterized by the presence of minerals such as pyrites and iron. There are presence of shell fragments and phosphatic inclusions, all these are associated with a reducing environment. The sequence is known for the occurrence of few organic forms.

Foraminiferal Sample Preparation

The samples available from the oucrops were broken into smaller pieces in a mortar. About 5-l0 grams of the broken sample were put into an enamel plate mixed with water and treated with 2 grams of sodium carbonate (Na_2CO_3). This is allowed to boil for 30 mins on a hot plate. The essence of this is to disintegrate the clay and shales and free the fossils from the matix.

Results and Interpretation

The laboratory description of the samples was carried out and the results tabulated and presented. The results of sieve analysis carried out on samples are presented in the particle size distribution tables in Table 1 and Foraminiferal assemblage are shown on plate 1.

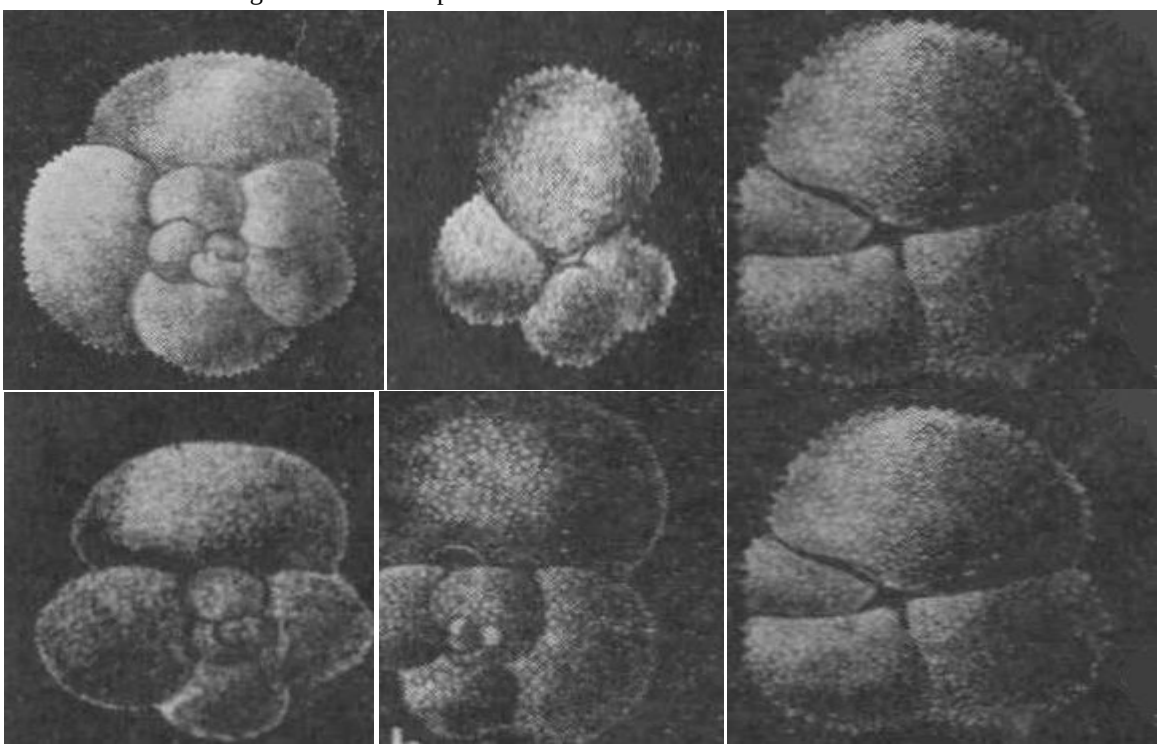

Plate 1: Photographs of Some of the Foraminifera encountered in the Study Area

Table 1: Location Sample Description

Sample Number	Sample Depth (m)	Date Sampled	Lithologic Description
Sample 1	0.6	12-12-2000	Shale, dark grey, black and brown carbonaceous materials present (few), wavy non parallel laminae (0.3 cm), indurated (hard), few shiny grain inclusions, non calcareous, platy.
Sample 2	0.8	12-12-2000	Shale, dark grey, black carbonaceous materials, indurated (hard), wavy non parallel Iaxninae (0.8cm), flagr, non calcareous.
Sample 3	1.2	12-12-2000	Shale, dark grey, few shiny grains present, few black carbonaceous materials, wavy non parallel laminar (0.3cm), platy, indurated (hard), non calcareous.
Sample 4	1.7	12-12-2000	Shale, dark grey, black carbonaceous materials, wavy non parallel laminae (0.6cm), shiny grain inclusions, indurated (hard), non calcareous.

Table 2: Depth of Depth Percentage Formainiferal Count for Sample from Ameki Formation

Depth interval	Total faunal cont	Species count	% calcareous benthonic	% calcareous planktonic	% arenaceous benthonic
91.30	3	2	66.7	-	-
90.09	90	9	67.8	21.1	41.0
89.09	122	11	17.2	40.2	18.5
88.45	27	4	6.3	37.0	-
88.19	156	6	64.7	34.0	-

87.89	73	5	19.2	79.5	-
86.08	8	4	50	-	-
85.76	65	4	49.2	49.2	-
84.54	63	4	46.0	50.8	-
83.78	71	14	78.9	21.1	-
83.28	33	5	84.8	3.0	
82.60	60	8	51.7	40	-
82.30	8	5	50	25	-

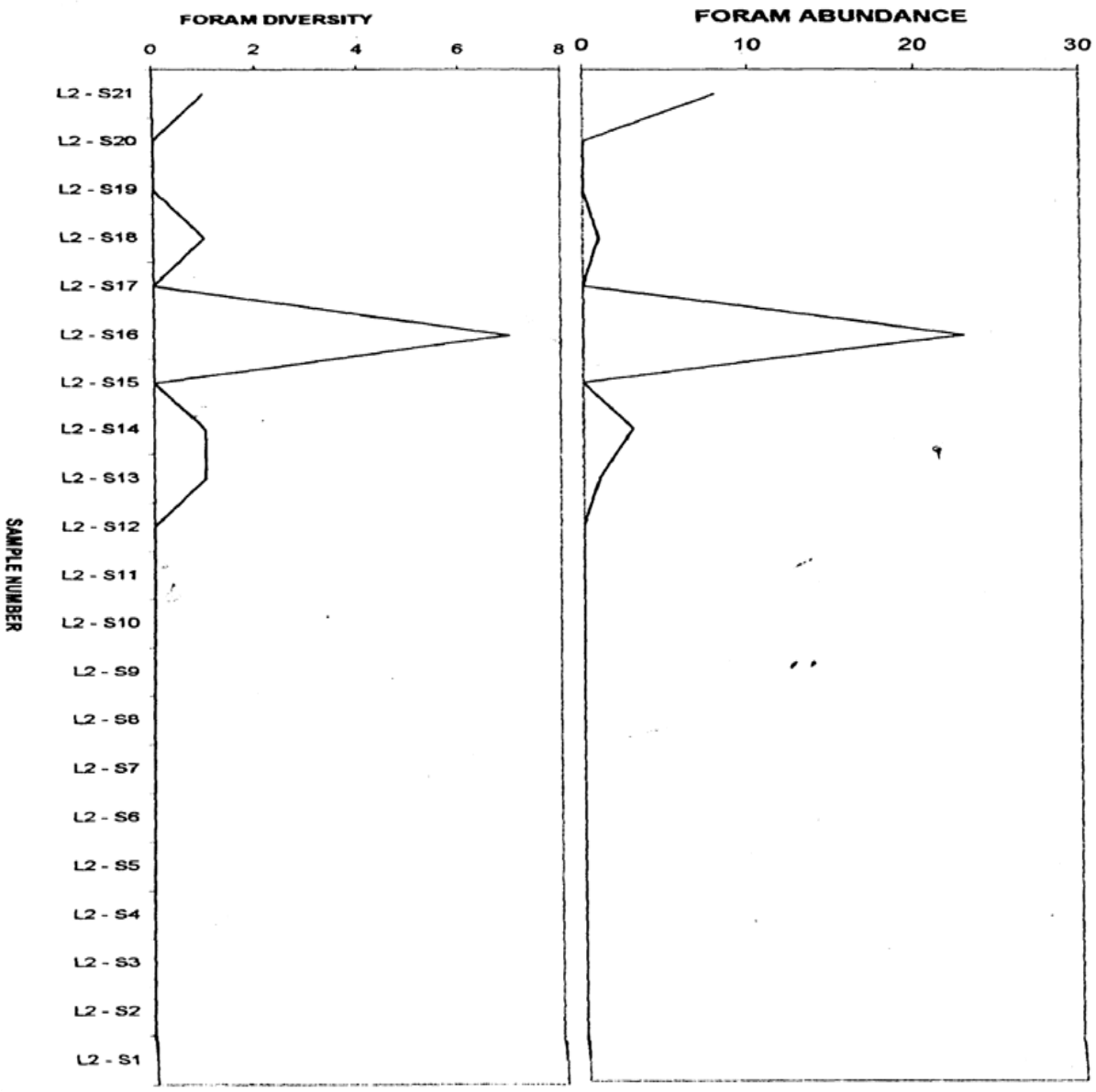

Figure 3: Foram Diversity and abundance Graphs

Biostratigraphy

The marine environment is known to be home for many microfossils. Thurman (1985) [5] subdivided the marine environment into different compartments as shown in based on water depth (bathymetry), microfossils have been known to live within this bathymetric compartments, so a recognition of the fossil corresponds to the water depth in which it is associated. It is on the basis of this association that benthonic animals are known to be limited to shallow depths though evidence abound that they can thrive in every environment.

Results of the analysis shows that the benthonics dominate in abundance but in diversity the planktonics dominate, thus: Globorotalia opilna opima, Globorotalla woodi connecta, Orbuilna universa, Orbulina saturalis, Globorotalia opima continuosa, Globigerina daubjergensis, Globigerina inaequispira, Globo rota/ia pseudobulloides, Morozovella pseudOb ulloides, Globigerina trilocu llnoides, Globigerina parva, Pseudohastigerina wilcoxensis, Truncorotaloides collectea, Globorotalia ex. gr. scitula, Globigenna officinalis, Heterohelix sp., Planorotalides pseudomenardi, Globigeiina euapertura, are regarded as planktonics. The Ostracods (a microfossil) have six different species, thus: Togoina attitogonensis, Cytherella syIvestethradleyi Ruggiera yorubaensis, L.egurninocythereis lagaghiroboensis, Paleocosta sangakamiens.

Using a scheme of Depth distribution of selected recent benthonic foraminifera after Boltovskoy and Wright [6], Bolivina are limited to nearshore/ innershelf environment to abyssal environment. Similar forms like Lagena, Dentalina and Quingueloculina occupy the same compartment as the Bolivina. Forms like Brizalina are found within bathyal to marginal marine, Fursekoina (Lagoons, shelf and bathya!) this, therefore limited the Paleoenvironrnental interpretation to nearshore environment.

The restriction of other Paleoenvironmental analysis to the shelf environment is governed by the abundance of benthonics to the planktonics. The relative abundance of planktonics may be due to favourable conditions. It is wdeIy accepted that an abundance of planktonic foraminifera does not necessarily indicate a deep water environment [4], therefore, it can be rightly concluded that the sediments were deposited within shallow marine environment.

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