

**THE CENOMANIAN - TURONIAN SUCCESSIONS IN THE
BENUE TROUGH AND DAHOMEY BASIN, NIGERIA:
PETROLEUM POTENTIAL EVALUATION FROM
NEW SOURCE ROCK DATA.**

Adeoye, J. A., Akande, S. O., and Adekeye, O. A.

**DEPARTMENT OF GEOLOGY AND MINERAL SCIENCES,
UNIVERSITY OF ILORIN, ILORIN, KWARA STATE, NIGERIA.**

**PRESENTED @ 2012, 30TH NAPE ANNUAL INTERNATIONAL CONFERENCE &
EXHIBITIONS, EKO HOTEL & SUITES, VICTORIA ISLAND, NIGERIA**

PRESENTATION OUTLINE

- **INTRODUCTION**
 - ✓ **Location and Geologic Overview**
 - ✓ **Objectives/Benefits**
- **PREVIOUS WORK**
- **DATABASE AND DATA ANALYSIS**
- **RESULTS AND DISCUSSIONS**
- **CONCLUSIONS AND RECOMMENDATIONS**

INTRODUCTION- LOCATION AND GEOLOGIC OVERVIEW

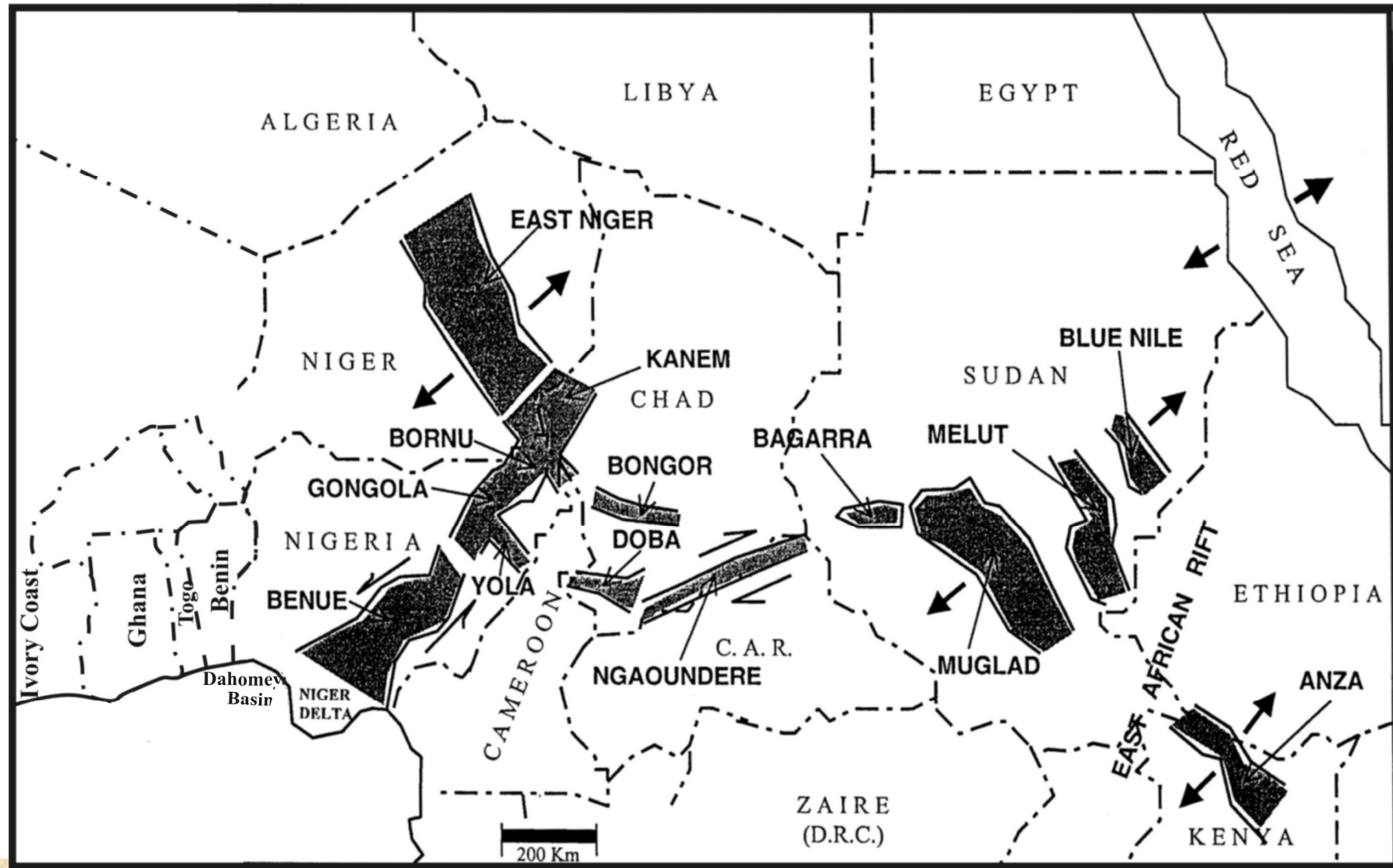


Fig. 1: Map of the rift related basins in West, Central and East Africa. (Adapted from Schull, 1988)

INTRODUCTION- OBJECTIVES OF THE STUDY

- To investigate the depositional environments of the Cenomanian – Turonian successions across the selected Nigeria inland basins.
- To evaluate the palaeogeographical correlation of the source rock
- To evaluate their petroleum potential for exploration and exploitation.

INTRODUCTION- LOCATION AND GEOLOGIC OVERVIEW

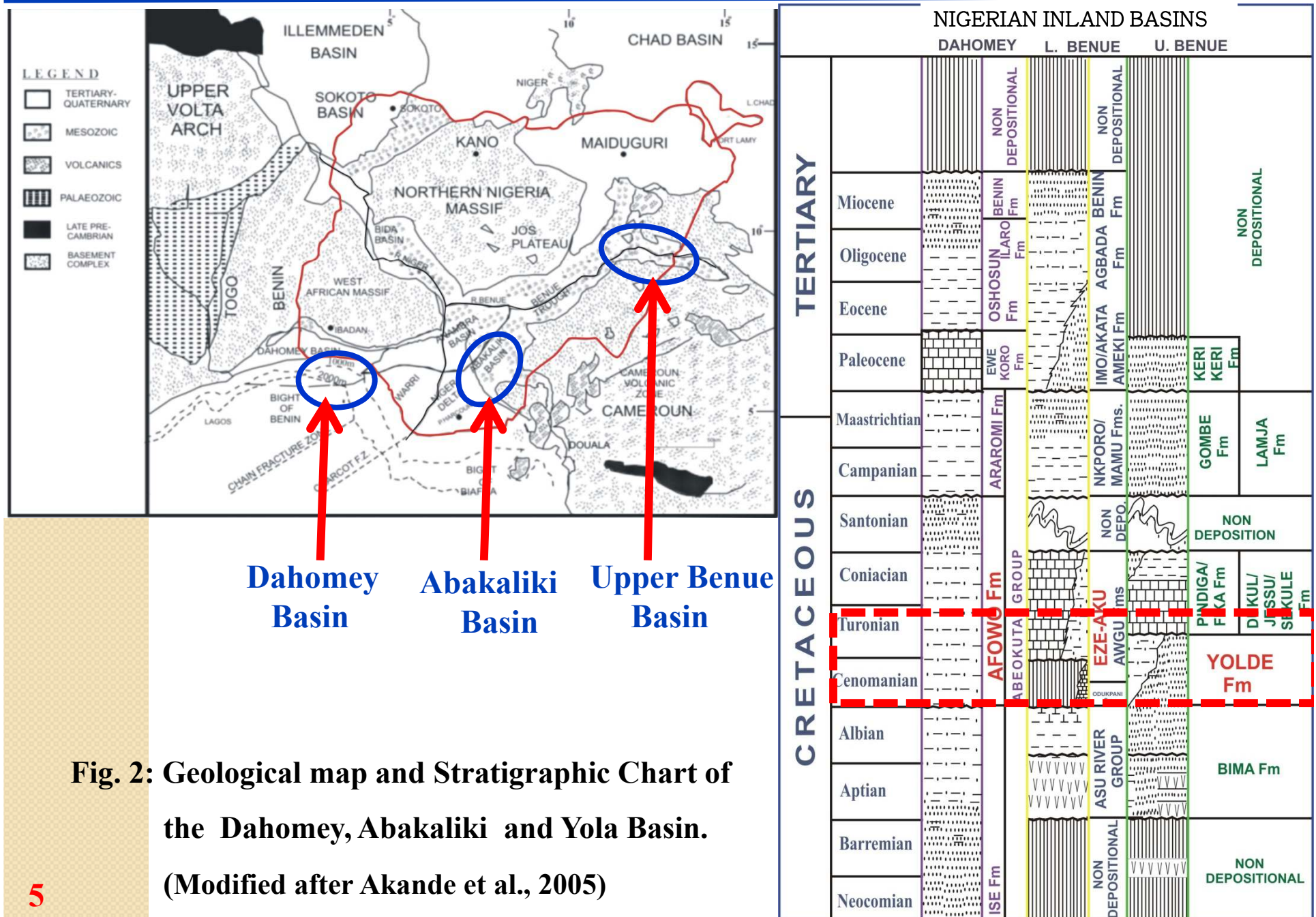


Fig. 2: Geological map and Stratigraphic Chart of the Dahomey, Abakaliki and Yola Basin. (Modified after Akande et al., 2005)

PREVIOUS WORKS

BENUE TROUGH

- The tectonic evolution studies of the Benue Trough had been carried out by several authors among whom are Burke et al., (1970), Olade (1975), Benkehlil, (1989) .
- The paleothermometric, paleontology, palynology and geochemical investigations of aspect of this basin have been reported in Ekweozor and Unomah, (1990), Unomah and Ekweozor, (1993), Ehinola et al., (2003, 2004) Akande et al., (1998, 2005, 2008, 2012), Obaje et al., (2005). Abubakar et al 2008, and Ojo et al., (2010)

DAHOMY BASIN

- Aspects of the tectonic evolution of the Dahomey Basin have been reported by Adegoke, (1969), Omatsola and Adegoke, (1981) and Adediran and Adegoke, (1987) among others.
- The aspects of paleontology, sedimentology and geochemistry of sediments in the Dahomey Basin have been reported by authors such as Okosun (2000), Adekeye et al., (2006) and Gebhardt (1997, 2004, 2010)

DATABASE AND DATA ANALYSIS

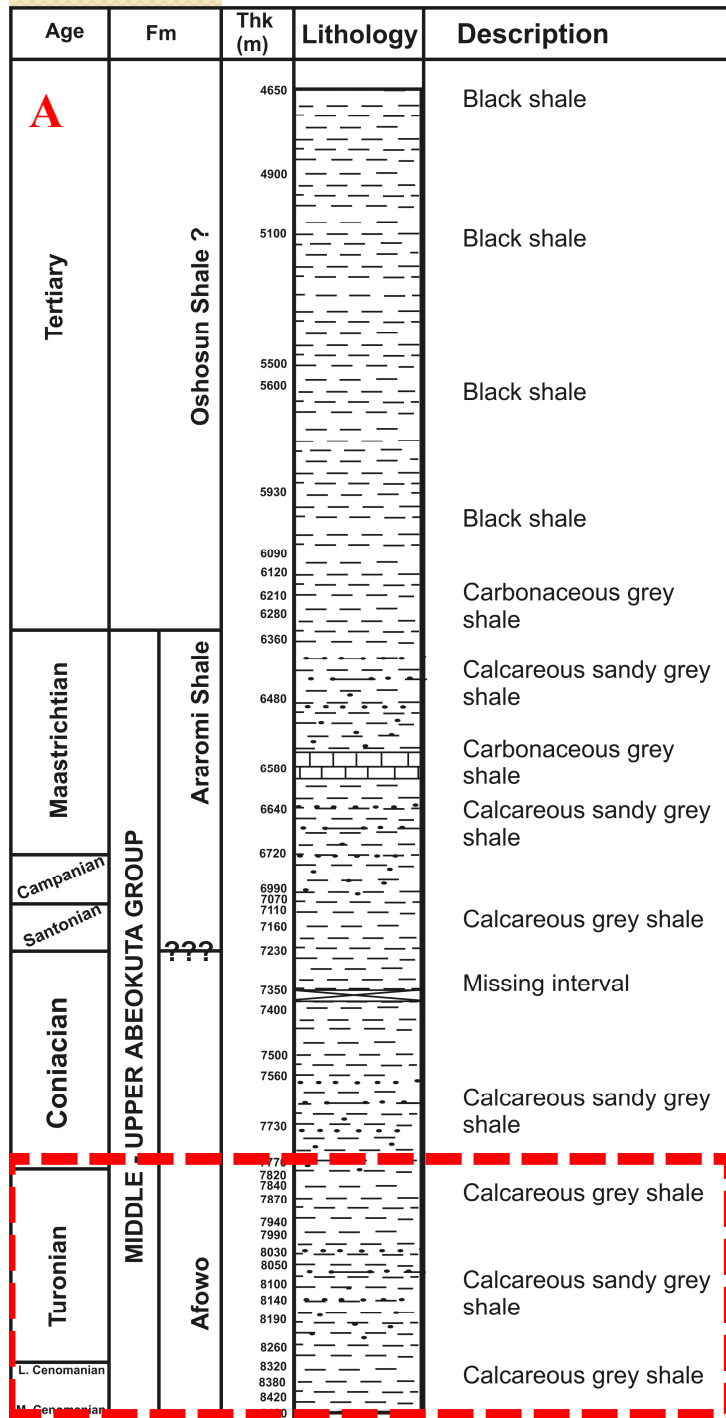
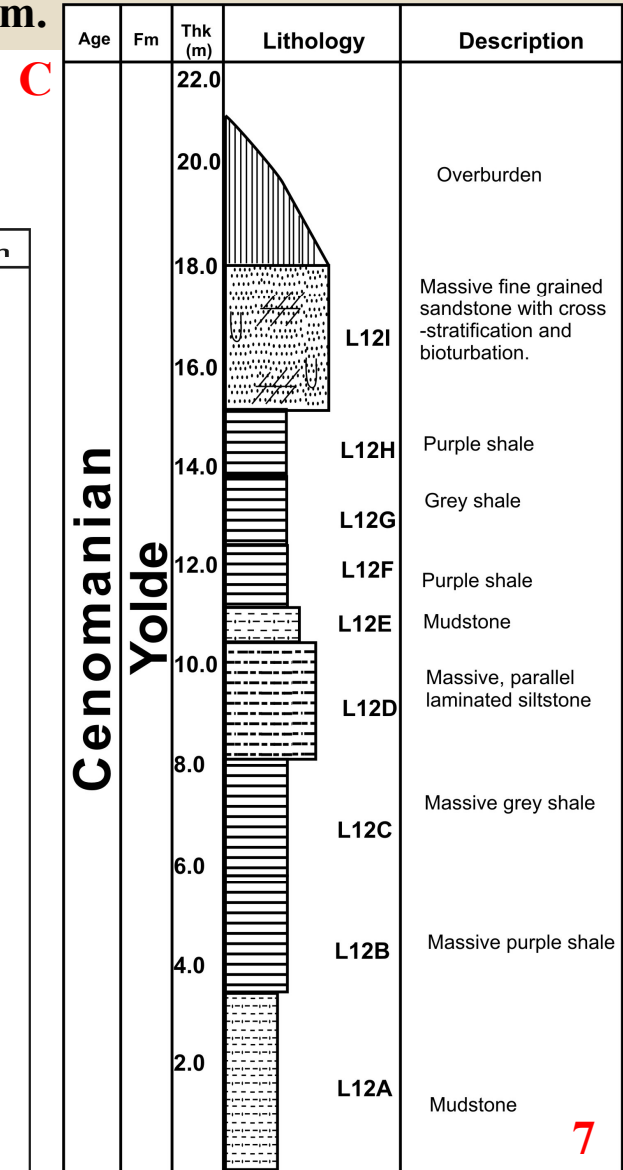
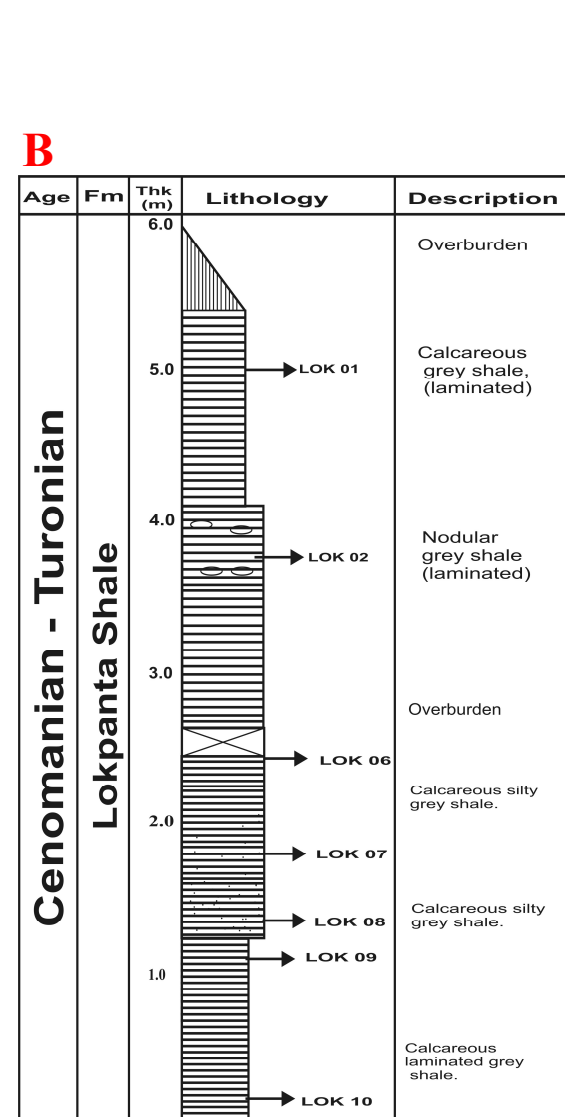


Fig. 3: The lithologic section of (A) the X-well Dahomey Basin (B) the Eze-Aku Formation at Lokpanta and (C) the Yolde Formation, at Bambam.



RESULT - Rock-Eval

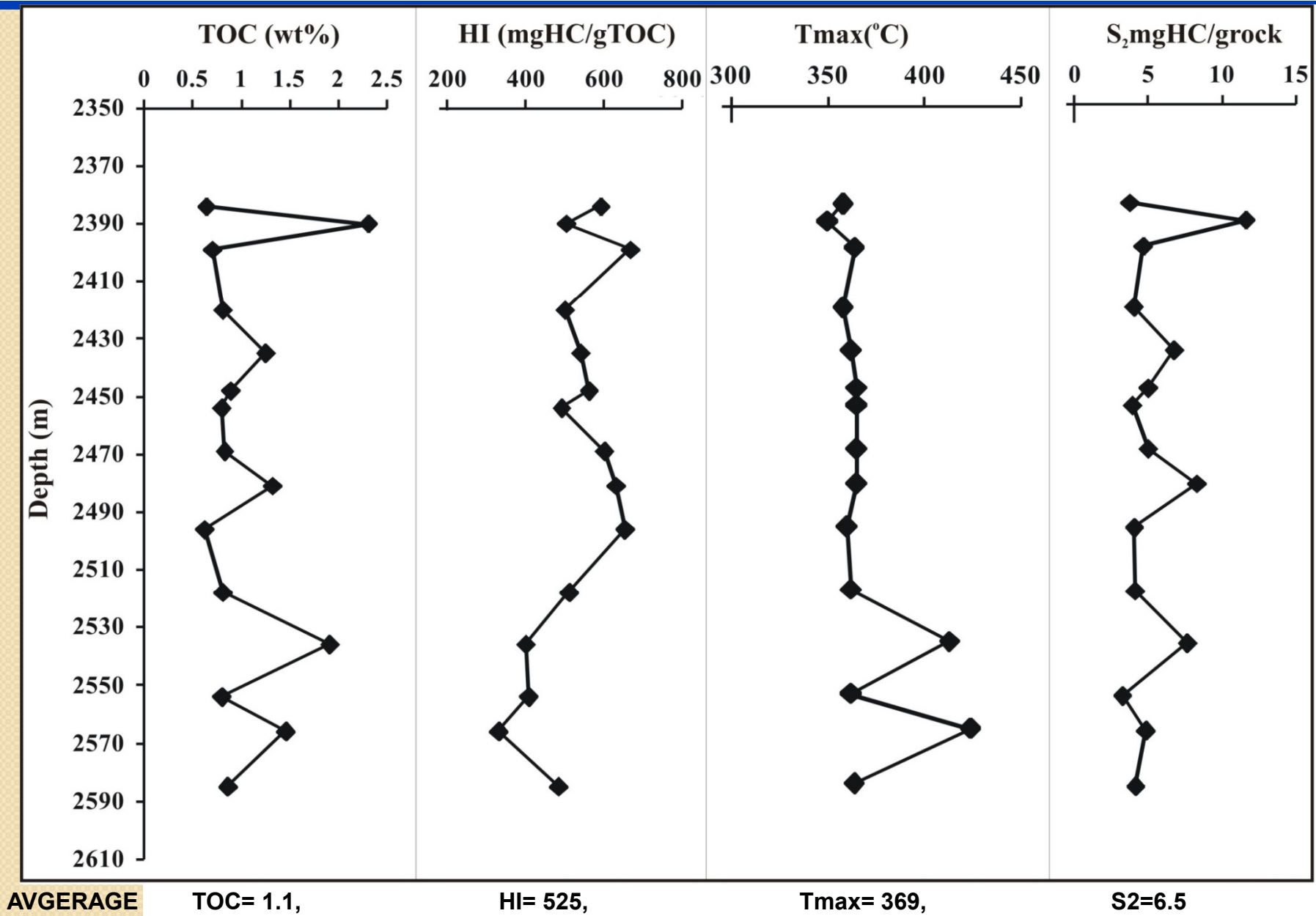


Fig. 4: The geochemical log of the Afowo Formation

RESULT - Rock-Eval

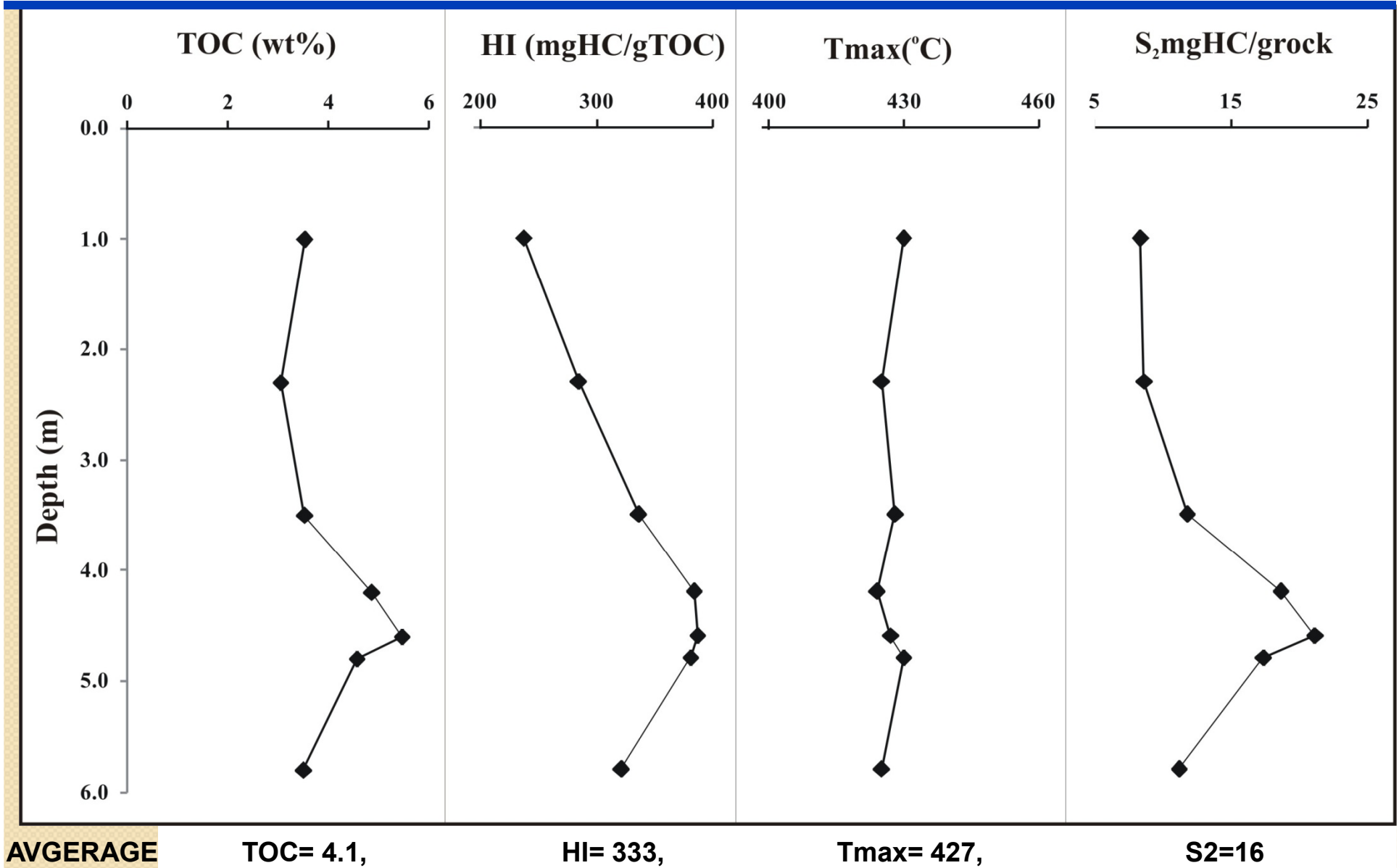
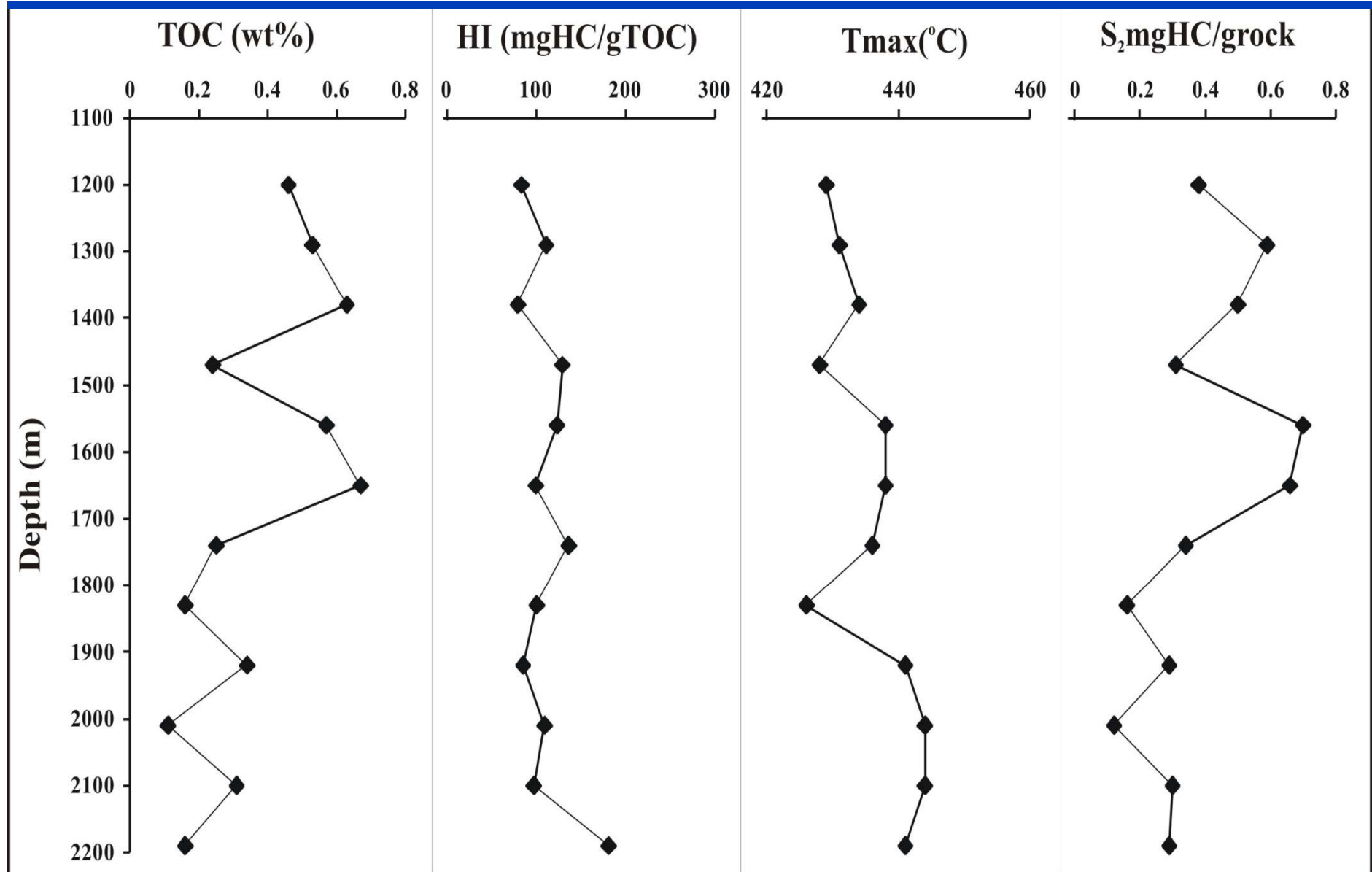


Fig.5: The geochemical log of the Eze-Aku Formation

RESULT - Rock-Eval



AVGERAGE TOC= 0.4, HI= 111, Tmax= 436, S2=0.4

Fig.6: The geochemical log of the Yolde Formation

RESULTS – MACERAL

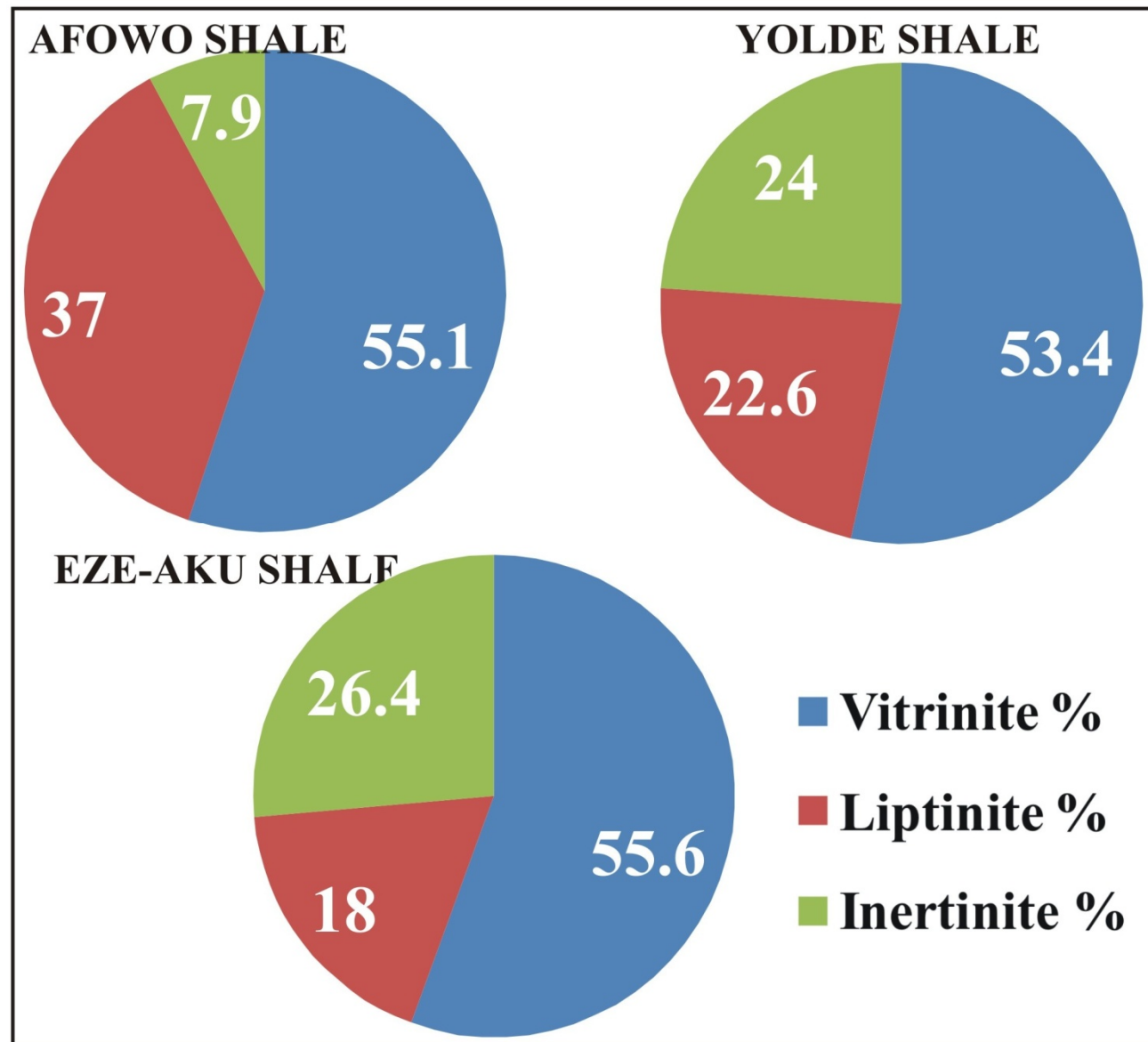


Fig. 7: Pie Chart representing the average maceral percentages present in the Afowo, Lokpanta and Yolde shales

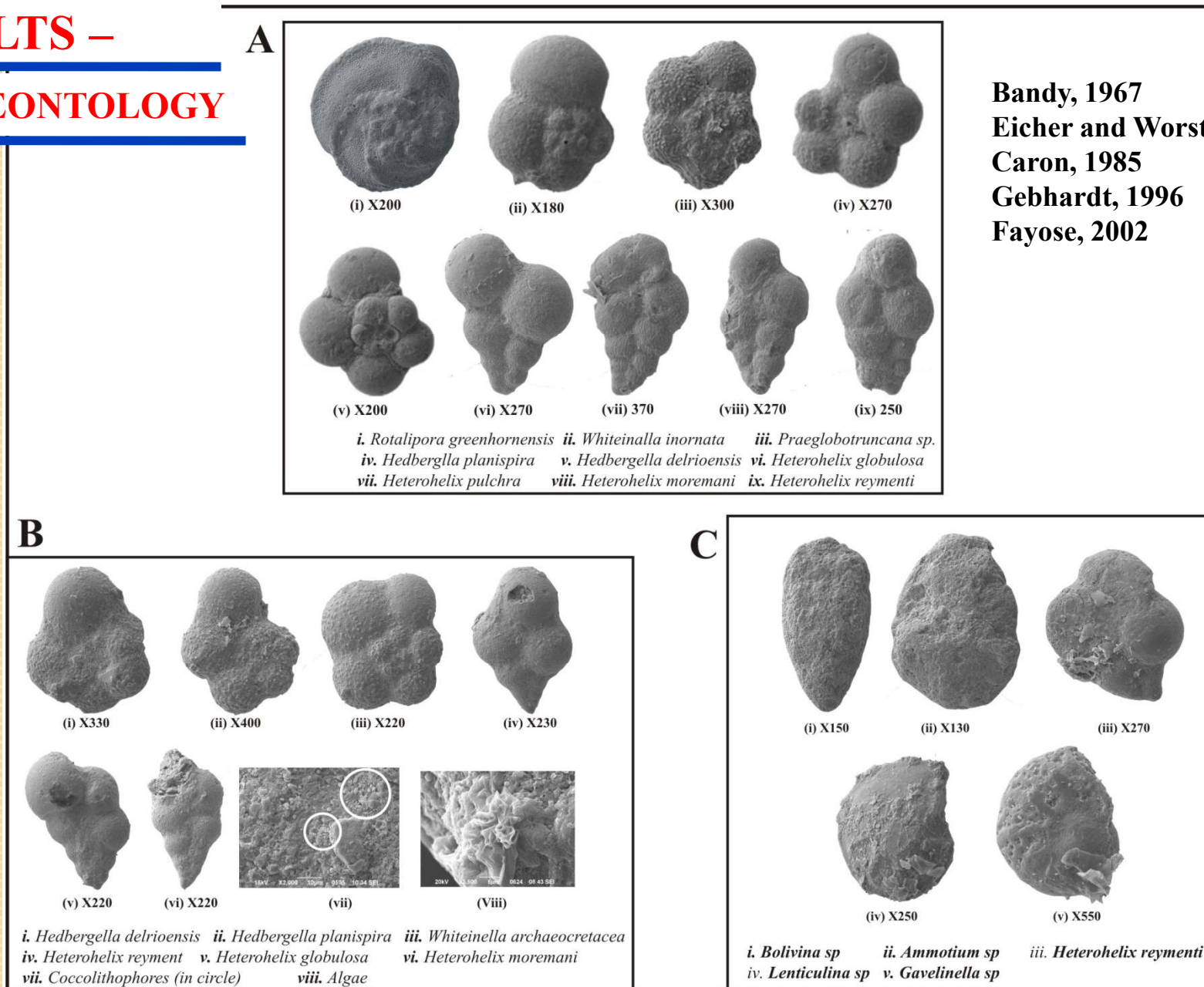


Fig.8: Photographs of Planktonic and Benthic foraminifera identified in (A) the Afowo Formation, Dahomey Basin (B) the Eze-Aku Formation, Abakaliki Basin and (C) the Yolde Formation, Upper Benue Basin.

DISCUSSIONS - DEPOSITIONAL ENVIRONMENTS MODEL

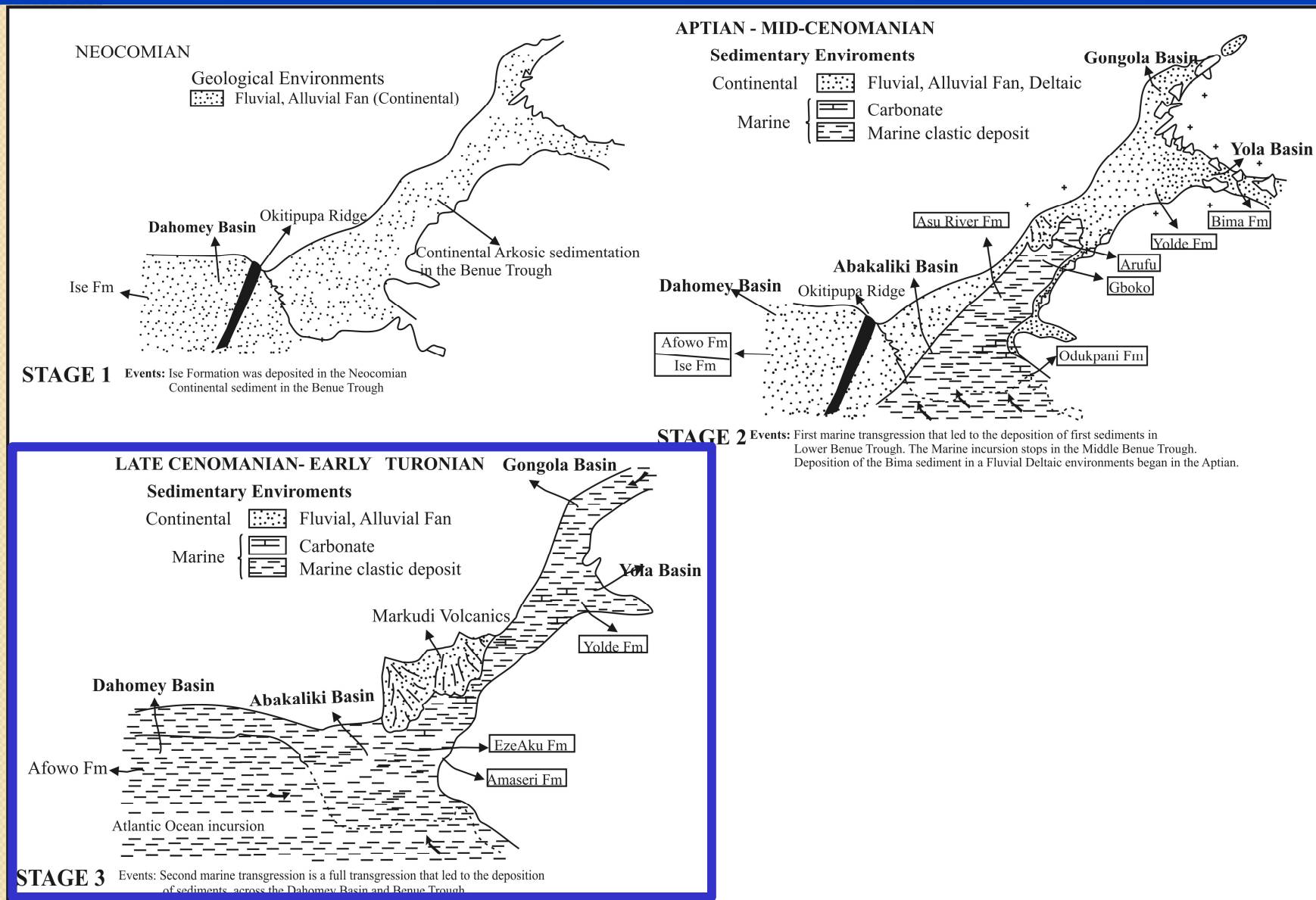


Fig. 9: Palaeogeographic reconstitutions and facies distribution during the Neocomian to Turonian in Dahomey, Basin and Benue Trough. (Modified after Benkhelil, 1986)

DISCUSSIONS – ORGANIC MATTER TYPE

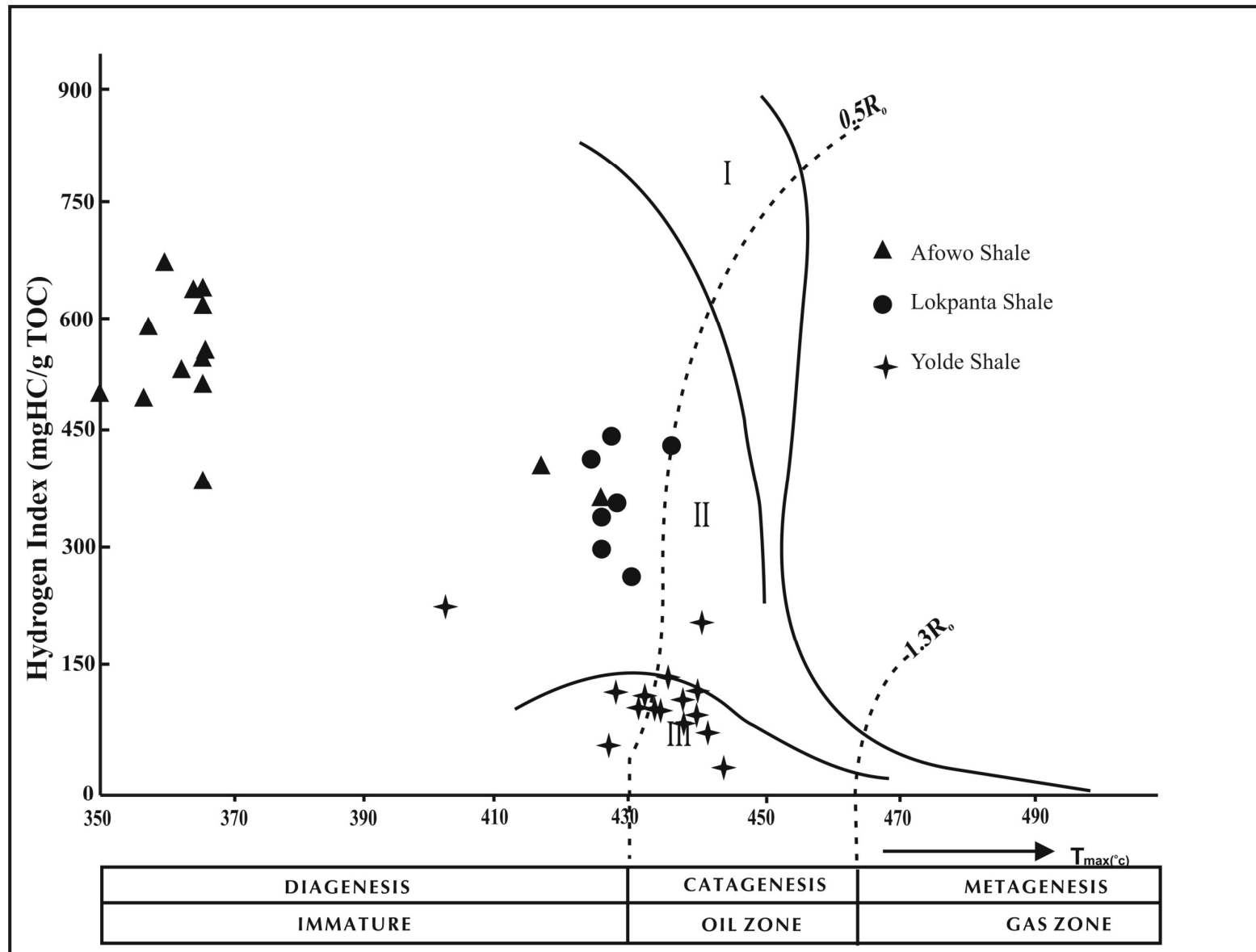


Fig. 10: HI against T_{max} (°C) diagram for the interpretation of kerogen types and maturity of the Afowo and Lokpanta Shales.

DISCUSSIONS – PETROLEUM POTENTIAL

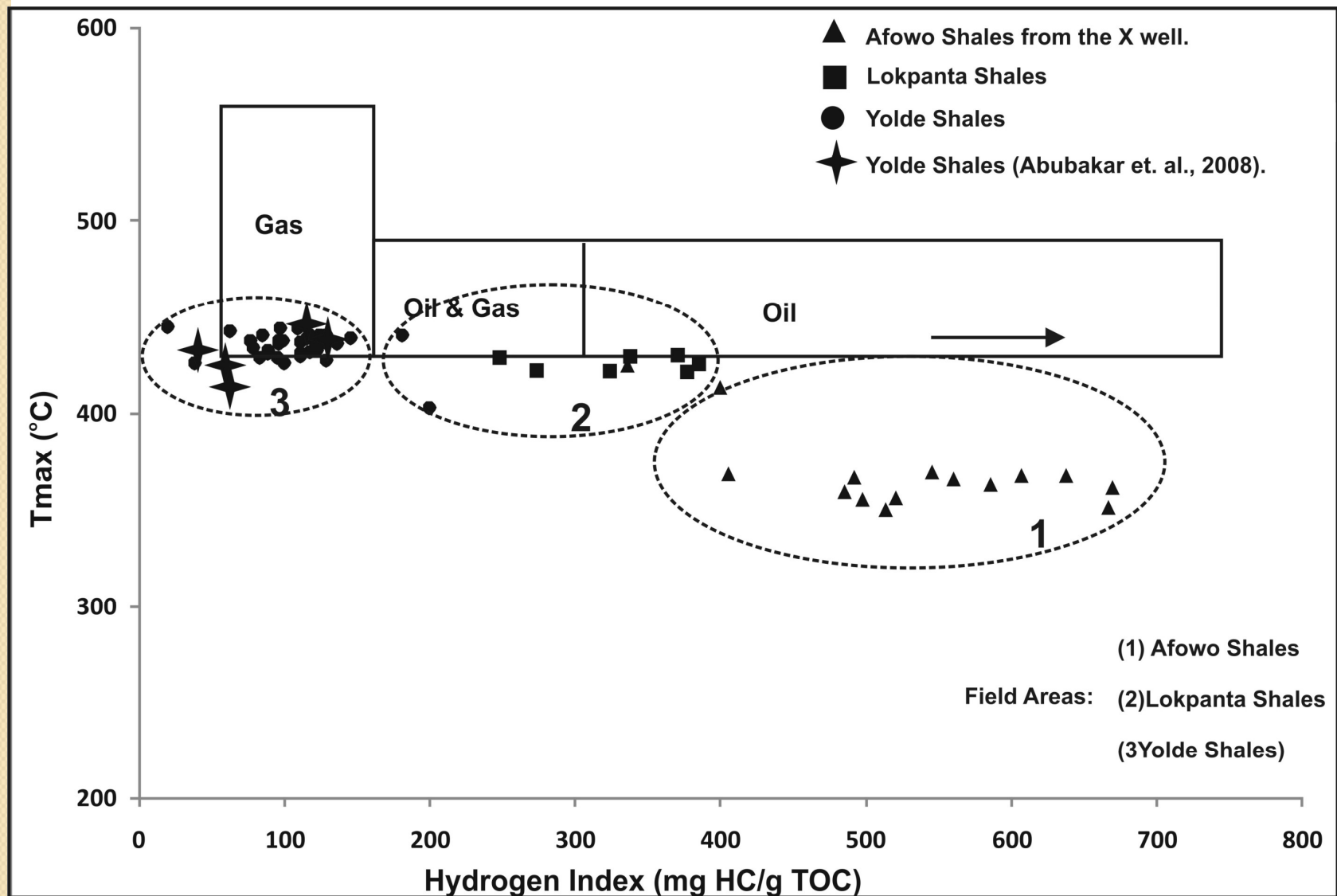


Fig. 11: Tmax versus HI plots of Afowo, Lokpanta and Yolde Shales showing their relative hydrocarbon potentials level.

CONCLUSIONS

- In this study, the worldwide Cenomanian – Turonian Oceanic Anoxic Event-2 that led to high productivity and deposition of organic matter in deep marine environment of worldwide basins is traceable in the Eastern Dahomey and Abakaliki basins but not sustained in the Upper Benue Trough.
- There is a Cretaceous Petroleum System in Nigerian Dahomey Basin and Benue Trough with potential for oil and gas.

RECOMMENDATIONS

- We recommend that the oil company operating in the Dahomey basin should make relevant seismic data available for further detail study in the future.

ACKNOWLEDGEMENTS

1. **PTDF**
2. **DPR, Lagos.**
3. **Alexander von Humboldt Foundation – Organic Petrology/
Fluorescence studies – TU Berlin**
4. **Colorado State University – Organic Petrology.**
5. **Weatherford Laboratories, Shenandoah, Texas, USA.**
6. **German Academic Exchange Service (DAAD), Germany.**



Thanks for Listening