



# AAPG

## Research LAUNCHER Program

### About You

First Name: Chibuzo Valeria Last Name: Ahaneku

Company / University: Nnamdi Azikiwe University, Awka

Check which apply to you:  Student  Non Student  Independent Researcher  Professor  Corporate Researcher  Other

Primary Phone: (+234)7065970070 Secondary phone: ( )

Address: Geological Sciences Department, Nnamdi Azikiwe University

City: Awka State: Anambra Zip Code: 5025

Country: Nigeria

Email: ahaneku.valeria@gmail.com Fax: ( )

Short Bio: (250 words or less)

Ahaneku, Chibuzo received a B.Sc. (2009) in Geology from Anambra State University, Uli Anambra State Nigeria. He is currently a Masters student of Petroleum Geology at Nnamdi Azikiwe University, Awka Anambra State, Nigeria. He is graduate (technical) assistant at Nnamdi Azikiwe University where he also serves as the assistant coordinator, NAU-Imperial Barrel Award Team. He was a member of the 2013 NAU-IBA team that represented the Africa Region at the Global finals of the American Association of Petroleum Geologists- Imperial Barrel Award Program held in Pittsburgh, USA. His research interests include sequence stratigraphy, seismic sequence stratigraphy, seismic sedimentology, seismic interpretation & attribute analysis, petroleum geology and reservoir characterization, play fairway analysis, prospect evaluation and risk assessment.

### Project Description

1. Name of project: Subseismic Clinoform Stratigraphic Interpretation of Shallow-Water Progradational Sequences: Case Study of "AB" Field Niger Delta Basin, Nigeria.
2. Brief synopsis / areas of geosciences or engineering (50 – 75 words)

Subseismic clinoform analysis involves interpretation of seismic data without visible seismic clinoforms. In environments having shallow water depth and less accommodation, the clinoforms are thinner and more difficult to identify using

seismic data. These subseismic clinoforms have received much less attention from seismic interpreters. Interpretation of deltaic deposits needs to go beyond the recognition of seismic clinoforms. This research aims to study the subseismic clinoforms of shallow-water deltas by integrating geological and geophysical data sets.

3. Bullet list of 5 – 7 main outcomes / goals.

- Better and detailed understanding of the geologic and seismic indications of shallow-water deltaic deposits.
- Modeling and characterization of reservoir distributions in subseismic clinoform facies
- Provide explorationists with the capability to discover, and evaluate new hydrocarbon plays and reduce the risk in management's decision making.
- A robust framework for extrapolating lateral depositional environments and lithologies away from the well sites.
- The diagnostic seismic geomorphologic patterns of the shallow-water deltas will be highlighted.
- Seismic detection limit ( $H_{min}$ ) of the seismic data will be presented.
- Valuable recommendations for further studies

4. In two or three sentences, describe why your research is important. Please mention who will benefit from your work.

Many thin deltaic sequences have probably been misinterpreted as other facies and they pose a challenge to exploration and production geologists using seismic data because they lack distinctive morphology of the seismic clinoforms. This ambiguity in seismic interpretation may have significant consequences. The most serious misinterpretation would be to drill a shallow-water delta play on the basis of a false impression about the continuity of shingled reservoirs that actually pinch out at multiple toplap points.

Those that will benefit from the research includes; Exploration and production geologists, Seismic Interpreters, Academic researchers, Undergraduate and post graduate students in the field of geology and geophysics, etc.

5. Timeline with milestones (12 month / 18 month).

- Review of all available data and previous studies – 2weeks
- Data collation, loading and quality checking (QC) – 2weeks
- Well log interpretation and correlation
  - Sequence stratigraphic and petrophysical analysis – 5weeks (+3weeks)
- Interpretation of cores
  - Interpretation of lithology, grain size trend and sedimentary structures for classifying depositional facies – 5weeks (+3weeks)
- Integration of available data set
  - synthetic seismogram and seismic-to-well tie – 1 weeks
- Calculation of the clinoform detection limit ( $H_{min}$ ) of the seismic data – 1 week (+1week)
- Seismic interpretation
  - Structural interpretation (Faults and horizon mapping) – 5weeks (+4weeks)
  - Seismic attribute analysis (amplitude stratal slices, RMS, phase, frequency, spectral decomposition, etc) – 5weeks
- Seismic Geomorphologic studies
  - Interpretation of amplitude stratal slices – 3weeks (+3weeks)
  - Interpretation of shoreline positions from channel terminations and amplitude zoning – 3weeks
- Interpretation of Gross depositional environments – 5weeks (+4weeks)

- Integration of all results from previous interpretations for reservoir prediction and characterization – 4weeks (+3weeks)
  - Progress report writing – interval of 2weeks
6. Funding amount needed to achieve first basic goals within 12 months. Please provide a brief summary overview of your budget. List costs of 5 – 10 main items.

The research will require an estimated amount of **\$US3,151**. The table below presents an overview of the budget;

ITEM	Quantity (numerical values only)	Units (hours, days, weeks, months, etc)	Unit cost (in local currency) Numerical values only	Total cost (in local currency) numerical values only	Exchange rate (\$US / \$local)	Total cost (\$US)	Additional details
<b>Subsistence</b>							
1. Shelter	10	Months	20000	200000	170	1177	Estimated amount for the estimated number of months I will be working in PortHarcourt to analyse and interpret my data
2. Food	10	Months	15000	150000	170	89	Estimated amount for the estimated number of days I will be working outside my school/institution
<b>Transportation</b>							
1. Vehicle	10	Months	9000	90000	170	530	Total cost of transportation to and from my university to portharcourt and internal transportation in Port Harcourt to access data and workstation
<b>Purchases</b>							
1. HP Core i7 Laptop computer	1		140000	140000	170	824	Cost of purchasing one HP laptop computer for offline data analysis and preparation of manuscripts
2. HP Deskjet Printer	1		40000	40000	170	236	Cost of purchasing one HP Deskjet printer for printing of vital materials for literature review and printing of manuscripts
3. Internet access	10	Months	5000	50000	170	295	Total cost of internet access for internet researches
<b>Total Budget</b>				<b>670000</b>		<b>3151</b>	

7. In the process of gaining background knowledge in the field of your proposed research, who did you find to be the top two or three researchers? What are the main concepts that are being explored? Please briefly describe.

The top two researchers are as follows;

- ✓ **DR. Okoro, Anthony U.** (Associate Professor of Petroleum Geology, Sedimentology and Stratigraphy)
- ✓ **Dr. Odoh, Bernard I.** (Senior Lecturer, Petroleum Geophysics and Hydrogeophysics)

The main concepts that are being explored in this research include:

1. Seismic geomorphology: interpretation of geomorphologic patterns on amplitude stratal slices which provide vital information for interpreting thin deltaic systems.
  2. Clinoform Detection Limit: clinoform detection limit for clinoform imaging is related to the predominant frequency of the seismic data and the velocity of the rock. The thickness of the seismic stratigraphic mapping unit is called clinoform detection limit ( $H_{min}$ ). Sequences thinner than  $H_{min}$  normally do not show as clinoforms on seismic profiles. Shallow-water deltas would fall below  $H_{min}$  because they developed in water depths shallower than tens of meters.
  3. Subseismic clinoform stratigraphy: used to recognize progradational depositional sequences by interpreting thin deltas and prograding depositional systems below seismic detection power
  4. Seismic Sequence Stratigraphy: Involves interpretation of seismic reflection terminations, continuity, geometry, etc. The interpretation of seismic facies and calculation of sand/shale ratio provides vital information for reservoir characterization.
8. Please provide a photo of yourself and a photo related to your proposed project. It will be very helpful in publicizing your project and potentially securing funding.



9. Who will benefit?

- Exploration and production geologists
- Seismic sedimentologists
- Seismic Interpreters
- Academic researchers
- Undergraduate and post graduate students in the field of geology and geophysics

**AAPG Research LAUNCHER supporters receive**

The opportunity to work directly with you and receive reports, information, and findings, depending on the level of support.

**The Deal**


The researcher agrees to:

- ❖ Develop a brief public presentation on the research to be made available to AAPG
- ❖ Share an annotated bibliography and review of relevant published articles
- ❖ Present research findings on project at an AAPG Forum, GTW, or Research Symposium
- ❖ Write a detailed report on the results of your research to be made available to LAUNCHER supporters
- ❖ Write a extended abstract on the results of your research to be made available to AAPG

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Thank you for submitting your research proposal to the AAPG Research LAUNCHER Program. Your proposal will be reviewed and upon acceptance you will be contacted by AAPG Education/Research. If your proposal is accepted, we will publicize your proposal and encourage funders to contact you directly. AAPG does not guarantee funds nor have any connection with the success or failure of the endeavor. The goal is to support scientific research in the petroleum geosciences and engineering and launch the next generation of geological advances.

<u>AHANEKU, CHIBUZO VALERIA</u>	<u>30/06/2014</u>	_____	_____
Research Candidate (print)	Date	AAPG Education / Research (print)	Date

	<u>30/06/2014</u>	_____	_____
Research Candidate (sign)	Date	AAPG Education / Research (sign)	Date