ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: IJAR- 58956

Title: Facies, depositional environment, geodynamic setting, and climatic implications of the Como Formation (lower Aptian) from the Gabonese interior basin.

Recommendation:
Accept as it is .....
Accept after Major revision.....
Accept after Minor revision
Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity			✓	
Significance			✓	

Reviewer Name: **ANAPANA GOPAL**

Reviewer's Comment for Publication.

General Comments

The manuscript, titled **"Facies, depositional environment, geodynamic setting, and climatic implications of the Como Formation (lower Aptian) from the Gabonese interior basin,"** presents a sedimentological and palaeoenvironmental investigation of the lower Aptian Como Formation in the Gabonese interior basin. The study is based on **five outcrop sections and two boreholes** and identifies **14 elementary lithofacies grouped into seven Facies Associations (FA1–FA7)**. The manuscript integrates sedimentology, sequence stratigraphy, palaeocurrent analysis, structural interpretation, Rock-Eval geochemistry, and regional comparison with South Atlantic basins.

The topic is scientifically relevant because the Como Formation provides important information on the transition from rifting to post-rift thermal subsidence and on the development of lacustrine depositional systems associated with South Atlantic opening. The manuscript also has potential significance for understanding lacustrine petroleum systems. However, substantial revision is required, particularly concerning methodological details, sequence-stratigraphic interpretations, geochemical evidence, internal consistency, and language/presentation.

Content and Originality

The manuscript has a clear scientific objective and combines several complementary approaches. The recognition of seven Facies Associations—from alluvial-fan and braided-fluvial systems through floodplain, deep anoxic lacustrine, shallow lacustrine, deltaic, and evaporitic environments—is one of the major strengths of the study.

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

The regional comparison with the **Bucomazi, Mundeck, Lagoa Feia, and Itapema formations** provides a broader South Atlantic context and potentially strengthens the palaeogeographic interpretation.

The study also presents useful petroleum-system implications. The reported Rock-Eval values include **TOC of 0.45–25.5 wt.%, HI of 270–764 mg HC/g TOC, and Tmax of 427–448 °C**, and the authors interpret the organic-rich lacustrine intervals as potential source rocks.

However, the manuscript should more clearly establish **what is genuinely new compared with previous studies of the Como Formation and equivalent South Atlantic formations**. The novelty should be stated explicitly at the end of the Introduction rather than inferred from the extensive regional comparisons.

Technical Quality

The geological observations are detailed, but several methodological issues require clarification:

1. **Field methodology needs to be described in greater detail.** The study uses five outcrop sections and two boreholes, but the manuscript should clearly state the thickness measured at each section, sampling density, stratigraphic logging procedure, and criteria used for selecting representative intervals.
2. The locations and coordinates of the investigated sections are provided, which is useful; however, the geographical table should be formatted more clearly and consistently.
3. **Lithofacies classification should be presented systematically.** The manuscript states that Miall's classification and the Bohacs et al. framework were used, but a table summarising each lithofacies, diagnostic sedimentary structures, grain size, geometry, and interpretation would significantly improve reproducibility.
4. The palaeocurrent analysis reports directions ranging from **N240° to N340°**, with a dominant NW–NNW trend. However, the manuscript should provide the **number of measurements at each locality, measurement method, statistical treatment, and dispersion parameters** before making regional conclusions about drainage organisation.
5. The structural analysis reports several fault orientations and dips, but the method used to measure and distinguish depositional structures from later tectonic structures is not adequately explained.
6. **The Rock-Eval methodology is insufficiently documented.** The manuscript reports TOC, HI and Tmax values, but the number of analysed samples, analytical laboratory, instrument/procedure, sample preparation, calibration, and criteria used for kerogen classification and maturity interpretation should be provided.
7. The geochemical data are restricted to the Cocobeach region. The manuscript itself acknowledges that this limitation prevents assessment of lateral variability in petroleum potential across the basin. This limitation should be emphasized more clearly when drawing basin-scale petroleum-system conclusions.

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

8. The claim that the Como Formation represents a **"complete and functional lacustrine petroleum system"** should be expressed cautiously. The manuscript identifies potential source rocks, reservoirs, and seals, but demonstration of a fully functional petroleum system normally requires stronger evidence concerning generation, migration, accumulation, reservoir quality, seal effectiveness, and timing. The wording should therefore distinguish **petroleum-system elements identified from the present data** from a fully demonstrated functioning petroleum system.
9. The climatic interpretation requires careful qualification. The manuscript links varves, anoxia and conglomeratic intervals to climatic fluctuations, but these features may have multiple controls. The authors should clearly distinguish **observations from interpretations** and avoid presenting climatic forcing as uniquely demonstrated where alternative controls remain possible.

Sequence-Stratigraphic Interpretation

This is one of the most important aspects requiring revision.

The manuscript states that **two complete third-order sequence-stratigraphic cycles** are identified. However, later in the Discussion, the composite **L8 succession is described as announcing the degradational phase of a "third cycle."**

This creates an **internal inconsistency** that must be resolved. The authors should clearly define:

- how many complete cycles are actually recognised;
- whether L8 represents the beginning of a third cycle or the final part of the second cycle;
- the precise sequence boundaries;
- the maximum flooding/flooding surfaces;
- the systems tracts associated with each cycle; and
- the evidence supporting the proposed third-order hierarchy.

A summary sequence-stratigraphic diagram would greatly improve the manuscript.

The interpretation of major erosional surfaces as sequence boundaries is interesting, but the criteria used to distinguish sequence boundaries from ordinary channel erosional surfaces should be explained more rigorously.

Palaeoenvironmental Interpretation

The seven Facies Associations provide a coherent depositional framework. FA1 records alluvial-fan and proximal braided-river conditions, FA2 represents meandering fluvial/alluvial-plain conditions, FA3 represents floodplain/distal settling, FA4 deep anoxic lacustrine conditions, FA5 shallow mesoxic lacustrine conditions, FA6 deltaic/fluvio-shoreline conditions, and FA7 confined evaporitic/carbonate conditions.

This framework is one of the strongest components of the manuscript.

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

Nevertheless, several interpretations are relatively strong compared with the observational evidence. For example, interpretations involving **Milankovitch-scale orbital forcing, marine eustatic propagation, and specific climatic states** should be supported by more direct evidence or presented as working hypotheses rather than definitive conclusions. The manuscript currently moves quickly from sedimentary observations to regional climatic and eustatic interpretations.

Geochemical and Petroleum Implications

The reported organic-geochemical results are potentially significant. The high TOC and HI values, together with Tmax values, support the interpretation of organic-rich lacustrine intervals and potential source-rock quality.

However, the geochemical section would be substantially improved by providing:

- the number and location of Rock-Eval samples;
- individual analytical values rather than only ranges;
- TOC–HI and Tmax relationships;
- kerogen classification plots, if available;
- maturity interpretation;
- identification of anomalous samples; and
- a clear explanation of how the source-rock interpretation was derived.

The petroleum-system discussion should also be separated into **demonstrated observations, interpreted potential, and regional analogy**.

Figures, Tables and Presentation

The manuscript contains useful figures and a location table. The table provides coordinates for the two boreholes and five investigated outcrop sections.

However, the graphical presentation could be strengthened considerably. In particular:

1. A **composite stratigraphic correlation panel** linking all five outcrop sections and the two boreholes would be highly valuable.
2. The seven Facies Associations should be shown clearly on the stratigraphic logs.
3. Sequence boundaries, flooding surfaces, maximum flooding surfaces, and systems tracts should be marked consistently.
4. A **palaeogeographic reconstruction** showing the proposed fluvio-lacustrine ramp would strengthen the depositional interpretation.
5. Rock-Eval results should be presented graphically rather than only as numerical ranges.
6. Figure captions should contain sufficient information to understand each figure independently.

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

Language and Editorial Quality

The manuscript requires **substantial English-language and copy-editing revision**.

There are numerous formatting problems, including words that have been incorrectly joined together, for example expressions such as "thermal subsidence," "post-rift," and author names appearing without spaces in several locations. The text also contains grammatical constructions that reduce readability.

Examples include phrases such as:

- "The stratum under consideration here is approximately 50-100 m thick…"
- "The present study is based on the sedimentological analysis…"
- "Thiswill contributeto improving…"
- "complexpolyphasicpalaeoenvironmental evolution…"

The scientific content is generally understandable, but the manuscript should undergo **professional English editing before publication**.

Scientific terminology, abbreviations, degree symbols, hyphenation, author citations, and geological time terminology should also be standardised throughout.

References and Citations

The manuscript contains a substantial and generally relevant bibliography covering sedimentology, lacustrine systems, sequence stratigraphy, basin evolution, and petroleum geology.

However, the reference list needs detailed editorial checking. Issues include inconsistent formatting of author names, journal information, book references, punctuation, spacing, and citation style. For example, some author names appear joined together, while the formatting of book editions and publication details is inconsistent.

The authors should carefully verify:

- every in-text citation against the reference list;
- every reference-list entry against the text;
- author spelling;
- publication year;
- journal title;
- volume and issue;
- page numbers;
- DOI information where required by the target journal; and
- consistent reference style.

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

Strengths of the Manuscript

The major strengths are:

- Important geological study area and stratigraphic interval.
- Integration of **outcrop and borehole data**.
- Recognition of **14 lithofacies and seven Facies Associations**.
- Detailed sedimentological descriptions and interpretations.
- Integration of palaeocurrent and structural observations.
- Useful sequence-stratigraphic framework.
- Inclusion of Rock-Eval geochemical information.
- Comparison with equivalent Aptian successions across the South Atlantic.
- Clear potential relevance to lacustrine petroleum-system studies.

Minor Issues to Be Addressed

Before publication, the authors should particularly address the following:

1. Clarify the **novel contribution** of the study.
2. Expand the **Materials and Methods** section.
3. Provide detailed information on **Rock-Eval sampling and analytical procedures**.
4. Quantify and document the **palaeocurrent dataset**.
5. Clarify the basis for the **third-order sequence-stratigraphic interpretation**.
6. Resolve the inconsistency between **two complete cycles** and the statement identifying the beginning of a **third cycle at L8**.
7. Moderate conclusions concerning **climatic and eustatic forcing** where direct evidence is limited.
8. Reconsider the wording **"complete and functional petroleum system"** and distinguish potential from demonstrated functionality.
9. Improve figures, stratigraphic correlation, and sequence-stratigraphic illustrations.
10. Undertake comprehensive **English-language and formatting revision**.
11. Standardise and verify all references.

Overall Recommendation

The manuscript presents a potentially valuable contribution to the understanding of the **Early Aptian Como Formation and the evolution of the Gabonese interior basin within the South Atlantic geodynamic framework**. The integration of sedimentology, palaeoenvironmental reconstruction, sequence stratigraphy, geochemistry, and regional comparison is a significant strength. The conclusions concerning the transition from fluvial systems through anoxic lacustrine environments to evaporitic confinement are well aligned with the facies framework developed in the manuscript.

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

However, the manuscript in its present form requires **Minor revision**. The principal concerns are methodological completeness, quantitative support for several interpretations, sequence-stratigraphic consistency, the strength of the petroleum-system claims, and substantial language/editorial problems.

Final Decision: Minor Revision

Recommendation: Minor Revision

The manuscript has good scientific potential and contains important geological observations, but the authors should undertake a **substantial revision before the manuscript can be considered for publication**. The revised version should specifically strengthen the methodology, resolve the sequence-stratigraphic inconsistencies, provide fuller geochemical evidence, moderate unsupported interpretations, improve figures and tables, and undergo thorough English-language editing.