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REVIEWER'S REPORT

Manuscript No.: IJAR- 56440

Title: Studying and Analysis of the pollutant distribution trajectory from Ethiopian volcano using HYSPLIT Code.

Recommendation:
Accept as it is ………………………………
Accept after minor revision………
Accept after major 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.

1. General Comments

The manuscript investigates the atmospheric transport of volcanic plume emissions from an Ethiopian volcano using the HYSPLIT atmospheric dispersion model. The topic is relevant because volcanic eruptions can significantly influence regional air quality, climate systems, and transboundary environmental pollution. The use of trajectory modeling to study plume dispersion is scientifically appropriate and widely applied in atmospheric science.

However, the manuscript requires substantial revision before it can be considered for publication. Several sections contain grammatical errors, unclear scientific explanations, repetition of ideas, and insufficient methodological detail. The results section mainly provides descriptive interpretations of figures rather than analytical or quantitative evaluation. Additionally, there are formatting inconsistencies and duplicate references.

Overall, the study has potential but needs minor improvements in scientific clarity, methodological transparency, and language quality.

2. Content and Originality

The research topic—modeling volcanic plume dispersion using the HYSPLIT model—is well established in atmospheric sciences. The manuscript attempts to connect volcanic plume transport with frameworks used in radiological dispersion analysis (UNSCEAR and IAEA), which could provide an interesting interdisciplinary perspective.

However, the novelty of the study is not clearly articulated. The authors do not explicitly state:

- What specific scientific gap the study addresses
- How this analysis differs from previous HYSPLIT volcanic dispersion studies
- Whether new meteorological data, eruption parameters, or modeling approaches were applied

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The study appears largely descriptive rather than analytical, as it mainly interprets trajectory patterns without quantitative validation or comparison with observations.
To improve originality, the authors should:

- Clearly define the research objectives and hypotheses
- Compare their findings with previous volcanic dispersion studies
- Provide quantitative analysis of plume transport characteristics

3. Technical Quality

The manuscript uses the HYSPLIT atmospheric transport model, which is a widely accepted tool for studying pollutant dispersion.
However, several important methodological details are missing, including:

- Meteorological data source (e.g., GDAS, GFS, ERA5)
- Spatial and temporal resolution of meteorological inputs
- Simulation period and duration
- Injection height assumptions
- Number of trajectories or particles used
- Model configuration parameters
- Validation or uncertainty analysis

The equation describing particle motion is incomplete and contains formatting errors. The stochastic turbulence equation is also poorly presented.
Furthermore, the results lack quantitative analysis, such as:

- Travel distances
- Dispersion rates
- Vertical transport analysis
- Deposition estimates
- Model uncertainty

Without these details, reproducibility and scientific reliability are limited.

4. Language and Presentation

The manuscript contains numerous grammatical and stylistic errors. Many sentences are long, repetitive, and difficult to understand.
Examples of issues include:

- Inconsistent capitalization (e.g., "the results validate", "This all are because")
- Incorrect sentence structure
- Repetition of similar explanations
- Improper punctuation
- Typographical errors

Additionally:

- Several paragraphs repeat similar explanations of plume dispersion.
- Some sentences appear incomplete or poorly translated.
- Mathematical expressions are improperly formatted.

The manuscript requires extensive English language editing and proofreading.

5. Structure and Organization

The overall structure follows a typical scientific format:

- Abstract
- Introduction
- Methodology

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- Results and Discussion
- Conclusion
- References

However, several structural issues remain:

Introduction

- Contains excessive background information about Ethiopia that is not directly relevant to the study.
- The research objectives are not clearly defined.

Methodology

- Insufficient technical details for model setup.

Results and Discussion

- Overly descriptive.
- Repetitive explanations of plume movement.
- Figures are referenced sequentially but lack deeper interpretation.

Figures

- Sixteen figures are included, but their scientific contribution is unclear.
- Some captions are vague and do not explain the significance of the results.

A clearer structure with concise interpretation of results would significantly improve readability.

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6. References and Citations

The manuscript includes a relatively good number of references related to:

- Volcanology
- Atmospheric transport
- HYSPLIT modeling

However, several problems were identified:

- **Duplicate references** (e.g., Chorowicz 2005 appears twice)
- Some citations lack complete information
- Inconsistent citation formatting
- Several references appear to be incomplete or improperly formatted
- Some statements in the text lack citations

The reference list should be carefully reformatted according to the journal's citation style, and duplicates should be removed.

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7. Overall Recommendation

The manuscript addresses an important topic related to atmospheric transport of volcanic emissions using the HYSPLIT model. However, the current version has minor shortcomings in methodology description, scientific analysis, language quality, and structural clarity.

Significant revisions are necessary to improve:

- Methodological transparency
- Quantitative analysis of results
- Clarity of objectives and novelty
- Language and formatting
- Reference consistency

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8. Final Decision
Minor Revision Required
The manuscript has potential but requires substantial revision before it can be considered for publication. The authors should carefully revise the methodology, improve scientific interpretation of results, correct language issues, and ensure proper formatting of references and figures.