University of Reading

Department of Meteorology

Using machine learning to predict the intensification and propagation of East African storms

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A report submitted in partial fulfilment of the requirements of
the University of Reading for the degree of
Master of Science in *Climate Change and Artificial Intelligence (AI)*

August 8, 2025

Declaration

I, Sean Kelley, of the Department of Meteorology, University of Reading, confirm that this is my own work and figures, tables, equations, code snippets, artworks, and illustrations in this report are original and have not been taken from any other person's work, except where the works of others have been explicitly acknowledged, quoted, and referenced. I understand that if failing to do so will be considered a case of plagiarism. Plagiarism is a form of academic misconduct and will be penalised accordingly.

I give consent to a copy of my report being shared with future students as an exemplar.

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Sean Kelley
August 8, 2025

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Abstract

Keywords: a maximum of five keywords/keyphrase separated by commas

Word count: 100

Report code: https://github.com/seangtkelley/uor-msc-dissertation-xai-african-storms

Acknowledgements

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Nomenclature

c Speed of light in a vacuum

h Planck constant

Glossary

Mesoscale Convective System A group of thunderstorms organised into a single cloud system that lasts several hours, often resulting in extreme rainfall, flash flooding and hail.

Acronyms

MCS Mesoscale Convective System. 1

Chapter 1

Introduction

Gebrechorkos et al. (2019) Mesoscale Convective System (MCS)

1.1 Research Objectives

This section outlines the primary objectives of the research, which include:

- To investigate the factors contributing to the intensification and propagation of East African storms.

- To develop a machine learning model capable of predicting storm behavior based on historical data.

- To evaluate the performance of the proposed model against existing forecasting methods.

Chapter 2

Background and Literature Review

2.1 State-of-the-art

2.2 Critique of the review

2.3 Summary

Chapter 3

Methodology

Chapter 4

Results

4.1 Summary

Chapter 5

Discussion and Analysis

5.1 Significance of the findings

In this chapter, you should also try to discuss the significance of the results and key findings, in order to enhance the reader's understanding of the investigated problem

5.2 Limitations

Discuss the key limitations and potential implications or improvements of the findings.

5.3 Summary

Chapter 6

Conclusion

References

Gebrechorkos, S. H., C. Bernhofer, and S. Hülsmann, 2019: Impacts of projected change in climate on water balance in basins of east africa. *The Science of the total environment*, **682**, 160–170, https://doi.org/10.1016/J.SCITOTENV.2019.05.053.

Appendix A

An Appendix Chapter