

Curriculum Vitae

Kwesi A Quagraine

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Current Affiliations:
National Center for Atmospheric Research (NCAR), Boulder CO

EDUCATION

University of Cape Town | Cape Town, South Africa

Ph.D. 2021 **Department of Environmental & Geographical Sciences** (with a Ph.D. in Climatology) [*Evaluated as the equivalent of a U.S. Doctoral degree by Educational Credential Evaluators (ECE) Evaluation, January 2024*]
Advisor: Bruce Hewitson
Committee: Bruce Hewitson, Christopher Jack, Christopher Lennard

University of Cape Coast | Cape Coast, Ghana

M.Sc. 2014 **Physics** (with a major in Meteorology and Atmospheric Physics)
B.Sc. 2011 **Physics**

PROFESSIONAL EXPERIENCE

2023 – Pres. **Postdoctoral Research Fellow** | NCAR, Boulder, CO
2020 – ‘23 **Lecturer** | Department of Physics, University of Cape Coast, Ghana
2020 – ‘23 **Postdoctoral Research Fellow** | University of Cape Town, Climate System Analysis Group, Department of Environmental and Geographical Science, South Africa
2016 – ‘21 **Graduate Teaching Assistant** | University of Cape Town, Climate System Analysis Group, Department of Environmental and Geographical Science, South Africa
2013 – ‘21 **Senior Research Assistant** | Department of Physics, University of Cape Coast, Ghana
2016 **Junior Research Fellow** | Centre National de Calcul et Centre National D’Analyses, University of Felix Houphouet-Boigny, Cote D’Ivoire
2012 – ‘13 **Teaching Assistant** | Department of Physics, University of Cape Coast, Ghana

PUBLICATIONS

Quagraine, K. A., Hewitson, B., Nkrumah, F., Quagraine, K. T., & Egbebiyi, T. S. (2024). A Simple Subtropical High-Pressure System Index over the South Atlantic. *Atmospheric Science Letters*.
Odoulami, R. C., Hirasawa, H., Kouadio, K., Patel, T. D., **Quagraine, K. A.**, Pinto, I., Egbebiyi, T. S., Abiodun, B. J., Lennard, C., and New, M. G. (2024). Africa’s Climate Response to Marine Cloud Brightening Strategies is Highly Sensitive to Deployment Region. *Journal of Geophysical Research - Atmospheres*.
Klutse, N. A. B., Abiodun, B. J., **Quagraine, K. A.**, Nkrumah, F., Abatan, A., Adekoke, J., Sylla, M. B., Berkoh-Oforiwaa, R., Koffi, H. A., Essien, P. (2024). Projected changes in rainfall extremes over West African Cities under specific global warming levels using CORDEX and NEX-GDDP datasets. *Earth Systems and Environment*.
Nkrumah, F., Klein, C., **Quagraine, K. A.**, Berkoh-Oforiwaa, R., Klutse, N. A. B., et al. (2023). Classification of Large-Scale Environments that drive the formation of Mesoscale Convective Systems over Southern West Africa. *Weather and Climate Dynamics Discussions*, 1-8.
Essien, P., Figueiredo, C. A. O. B., Takahashi, H., Klutse, N. A. B., Wrasse, C. M., Afonso, J. M.

- D. S., ... & **Quagraine, K. A.** (2022). Intertropical Convergence Zone as the Possible Source Mechanism for Southward Propagating Medium-Scale Traveling Ionospheric Disturbances over South American Low-Latitude and Equatorial Region, *Atmosphere*, **13**(11), 1836
- Nkrumah, F., **Quagraine, K. A.**, Quagraine, K. T., Wainwright, C., Quenum, G. M. D. L., Amankwah, A. & Klutse, N. A. B. (2022). Performance of CMIP6 HighResMIP on the Representation of Onset and Cessation of Seasonal Rainfall in Southern West Africa. *Atmosphere*, **13**, 1–20.
- Klutse, N. A. B., **Quagraine, K. A.**, Nkrumah, F., Quagraine, K. T., Berkoh-Oforiwaa, R., Dzrobi, J. F. & Sylla, M. B. (2021). The climatic analysis of summer monsoon extreme precipitation events over West Africa in CMIP6 simulations. *Earth Systems and Environment*. **17**.
- Quagraine, K. A.**, Nkrumah, F., Klein, C., Klutse, N. A. B. & Quagraine, K. T. (2020). West African Summer Monsoon Precipitation Variability as Represented by Reanalysis Datasets. *Climate*, **8**(10), 111.
- Quagraine, K. A.**, Hewitson, B., Jack, C., Wolski, P., Pinto, I. & Lennard, C. (2020). Using Co- Behavior Analysis to Interrogate the Performance of CMIP5 GCMs over Southern Africa. *Journal of Climate* **33**(7), 2891–2905.
- Quagraine, K. A.**, Hewitson, B., Jack, C., Wolski, P., Pinto, I. & Lennard, C. (2019). A Methodological Approach to Assess the Co-Behavior of Climate Processes over Southern Africa. *Journal of Climate* **32**(9), 2483–2495.
- Egbebiyi, T., Lennard, C., Crespo, O., Mukwenha, P., Lawal, S. & **Quagraine, K. A.** (2019). Assessing Future Spatio-Temporal Changes in Crop Suitability and Planting Season over West Africa: Using the Concept of Crop-Climate Departure. *Climate*, **7**(9), 102.
- Klutse, N. A. B., Ajayi, V. O., Gbobaniyi, E. O., Egbebiyi, T. S., Kouadio, K., Nkrumah, F., **Quagraine, K. A.**, Olusegun, C., Diasso, U., Abiodun, B. J., Lawal, K., Nikulin, G., Lennard, C. & Dosio, A. (2018). Potential impact of 1.5 deg.C and 2 deg.C global warming on consecutive dry and wet days over West Africa. *Environmental Research Letters*, **13**, 055013.
- Quagraine, K. A.**, Klutse, N. A. B., Nkrumah, F., Adukpo, D. C. & Owusu. K. (2017). Changes in rainfall characteristics in Wenchi and Saltpond farming areas in Ghana. *International Journal of Geosciences* **8**, 305–317.
- Nkrumah, F., Klutse, N. A. B., Adukpo, D. C., **Quagraine, K. A.**, Owusu, K. & Owusu, A. & Gutowski, W. (2014). Rainfall variability over Ghana: Model versus Rain gauge observation. *International Journal of Geosciences*, **5**, 673–683.
- Klutse, N. A. B., Owusu, K., Adukpo, D. C., Nkrumah, F., **Quagraine, K. A.**, Owusu, A. & Gutowski, W. (2013). *Research Journal of Agriculture and Environmental Management*, **2**(12), 394–402.

- Under review

- Quagraine, K. A.**, Tye, M. R., Quagraine, K. T., Tilmes, S., Simpson, I. R., Nkrumah, F., Egbebiyi, T. S., Odoulami, R. C. & Klutse, N. A. B., Impact of Stratospheric Aerosol Injection on Precipitation Extremes Across Africa. Submitted to *Geophysical Research Letters*.
- Nkrumah, F., **Quagraine, K. A.**, Quenum, G. M. L. D., Visoni, D., Koffi, H. A. & Klutse, N. A. B., Assessing Regional Climate Trends in West Africa Under Geoengineering: A Multi-model Comparison of UKESM1 and CESM2. Submitted to *Journal of Geophysical Research-Atmospheres*.
- Nkrumah, F., Quenum, G. M. L. D., **Quagraine, K. A.**, Tilmes, S., Klutse, N. A. B., Dommo, A., Koffi, H. A., Essien, P. & Bediako, R., Climate Response to Stratospheric Aerosol Injection During the Harmattan Season in West Africa. Submitted to *Environmental Research: Climate*.
- Egbebiyi, T. S., Lennard, C., Pinto, I., Odoulami, R. C., Abiodun, B. J., Wolski, P. & **Quagraine,**

K. A., Investigating the Impact of Stratospheric Aerosol Injection on Cereal Crop Suitability in Southern Africa. Submitted to *Environmental Research: Climate*.

Egbebiyi, T. S., Lennard, C., **Quagraine, K. A.**, Odoulami, R. C., Abiodun, B. J., & Tilmes, S., Potential Impact of Stratospheric Aerosol Injection on Horticultural Crop Suitability in Africa. Submitted to *The Geographical Journal*.

Tang, W., Kumar, R., ..., **Quagraine K. A.**, et al., Unlocking the Potential of Collaborative Research on Africa's Environmental Challenges: Perspectives on Air Quality and Health, Climate and Weather, Land and Water, and Society. Submitted to *Bulletin of American Meteorological Society*.

- In Preparation

Quagraine, K. A. et al., An Index to Characterize the South Indian Ocean High-Pressure System and its Variability.

Quagraine, K. A. et al., Assessing the Impact of South Indian Ocean High-Pressure System using a novel index.

Quagraine K. T., & **Quagraine, K. A.** et al., Impacts of Stratospheric Aerosol Injection on Global Precipitation and Moisture Transport.

SERVICE

2016 – Pres. Recycle Up! Ghana | Technik Ohne Grenzen e. V., Germany

In conjunction with Technik Ohne Grenzen, I have trained the youth in Ghana on the benefits of reducing, reusing and recycling plastics for the benefit of the climate.

Notable Outcomes:

- 6 Summer Camps in Accra, Cape Coast and Kumasi, Ghana.
- Lead training workshops on recycling
- 10 Established recycling youth groups in Senior High Schools across Ghana.

2016 – Pres. Teaching Computer Basics | Technik Ohne Grenzen e. V., Germany

In conjunction with Technik Ohne Grenzen, I have trained the youth in Ghana on the use of computers in learning.

Notable Outcomes:

- 2 Schools resourced with a Computer Laboratory for improved learning.

2018 Hospital solar back up power | Technik Ohne Grenzen e. V., Germany

In conjunction with Technik Ohne Grenzen, I sought funding and helped set up a back-up solar power generator for the Ekwe Catholic Hospital.

Notable Outcomes:

- Provision of back-up solar power to Hospital that serves Over 5000 people.

2014 – Pres. BarCamp Cape Coast & Cape Coast Connect | GhanaThink Foundation

In conjunction with GhanaThink, I have mentored young people and organized networking events for tertiary students in and around Cape Coast, Ghana.

Notable Outcomes:

- Over 3000 students reach over the past 10 years.

PRESENTATIONS – selected talks, abstracts, and meetings participant

Kwesi A Quagraine: Introduction to Solar Radiation Management. Green Africa Youth Organization, Spring 2024 – invited talk.

Kwesi A Quagraine: Short course on Solar Radiation Management and Carbon dioxide removal. Green Africa Youth Organization & Department of Physics, University of Ghana, Summer 2024 – invited talk.

Kwesi A Quagraine: Short course on Solar Radiation Management and Carbon dioxide removal. Green Africa Youth Organization & Department of Atmospheric & Climate Science, University of Energy and Natural Resources, Ghana, Summer 2024 – invited talk.

Kwesi A Quagraine: Short course on Solar Radiation Management and Carbon dioxide removal. Green Africa Youth Organization & University of Environment and Sustainable Development (UESD), Somanya, Ghana, Summer 2024 – invited talk.

Kwesi A Quagraine: Wildfires. Metropolitan State University, Denver CO. Autumn 2024 – invited talk.

Kwesi A Quagraine, M. R., Tye, S. Tilmes, K. T. Quagraine, I. R. Simpson: Examining the impact of Stratospheric Aerosol Injection on future African precipitation extremes. AGU Fall Meeting, 2024

Kwesi A Quagraine, B. Hewitson, F. Nkrumah, K. T. Quagraine: A simple subtropical high pressure system index. AGU Fall Meeting, 2022.

Kwesi A Quagraine, C. D. Jack, B. Hewitson, P. Wolski, I. Pinto, C. J. Lennard: Evaluation of the co-behavior of regional climate drivers in CMIP5 ensemble over Southern Africa. AGU Fall Meeting, 2020.

Kwesi A Quagraine, C. D. Jack, B. Hewitson, P. Wolski, I. Pinto, C. J. Lennard, G. Nikulin: The dynamics of co-behavior of climate processes. AGU Fall Meeting, 2018.

PEER REVIEWER

Journal of Climate, International Journal of Climatology, Weather and Climate Extremes, Frontiers Climate

TEACHING

Faculty | University of Cape Coast, Physics Department

2020 – Pres. **Applications of physics in meteorology (MET 301)**

Course objective is cover in an elementary manner the basic concepts of meteorology and illustrates the application of physical and mathematical techniques to meteorological problems.

Introduction to satellite and radar meteorology (MET 302)

This is an introductory course where the physical principles underlying the operations of earth satellites and their sensors and the Radar are treated.

Dynamic meteorology (MET 305)

Course objective is to explore basic concepts of dynamic meteorology to help students better understand the geophysical fluid dynamics phenomena ranging from the physical laws governing atmospheric motion to forces acting on a fluid element.

Mesoscale weather systems (MET 406)

Course objective is to review atmospheric scales of motion and the equations of motion applicable to meso-scale motions.

General Physics

An introductory course in physics for freshman year.

Graduate Teaching Assistant | University of Cape Town, SA

2016 – '21 **Atmospheric Science (EGS 3012S)** | instructor: Babatunde Abiodun

Guided weekly discussions, graded weekly homework and essays

RESEARCH SCHOLARSHIPS & GRANTS

- 2024 – '26 **The DEGREES Solar Radiation Management Governance Initiative: Socio-Political Research Fund** | Ghana
Assessment of knowledge and governance towards Solar Radiation Modification across Ghana: Implications for more efficient Ethical, Policy and Social Practices (Co-Investigator).
- 2023 – '26 **The DEGREES Solar Radiation Management Governance Initiative: Modelling Research Fund** | Ghana
Solar Radiation Management with Stratospheric Aerosol interactions with Harmattan and associated impacts on climate variables over Southern West Africa (Côte d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon) (Co-Investigator).
- 2016 – '23 **National Research Foundation (NRF) South Africa Research Chair in Climate Change (SARCHI) Scholarship** | University of Cape Town, SA
- 2016 – '21 **Future Resilience for African Cities And Lands (FRACTAL)** | University of Cape Town, SA
Advance scientific knowledge about regional climate responses to human activities and work with decision-makers to integrate this knowledge into climate-sensitive decisions at a city & regional scale (Worked on the regional climate understanding package).
- 2017 **Newton Research Fellow** | Climatic Research Unit, University of East Anglia, UK

CONSULTANCIES

- 2022 – '23 **UNEP-Green Climate Fund; Ghana National Adaptation Plan** | Environmental Protection Agency, Ghana
Enhancing multi-sector planning and capacity for effective adaptation in Ghana.
- 2020 **User Interface Project (UIP)** | World Meteorological Organization (WMO)
Developing of a UIP framework for worldwide use in climate services.
- 2021 – '22 **Regional Climate Projection Information** | ICLEI Local Government for Sustainability
Development of climate change projections for Bo City, Sierra Leone and Cape Coast, Ghana

COLLABORATION

I currently work with Simone Tilmes and Isla Simpson on geoengineering modeling and impacts (extremes) at the Atmospheric Chemistry Observations and Modeling (ACOM) and Climate and Global Dynamics (CGD) labs at NCAR. While at the University of Cape Town, I worked with Bruce Hewitson and his colleagues at the Climate System Analysis Group. During graduate school, I worked with Bruce Hewitson (University of Cape Town) and our collaborators on FRACTAL. I have also worked with Nana Ama Klutse on understanding West African climate variability.

TRANSFERABLE SKILLS

- Python
 - NumPy
 - Pandas
 - Xarray
 - Dask
 - Matplotlib
- R programming
- Linux OS
- Jupyter Notebook
- GitHub
- Shell Scripting
- NCL
- NCAR CESM Climate Models
- PyFerret

HONORS & AWARDS

- 2023 – '25 **NCAR CISL Allocation Recipient** | NCAR, Boulder, CO
Supercomputing resources to improve CESM-SAI models using regional refinement for improved impact analysis.
- 2022 **German Academic Exchange Service (DAAD) Networking Tour Fellow** | Germany
- 2017 – '21 **International/Refugee Grant** | University of Cape Town, SA
- 2018, '20 **Fall Meeting Student Travel Grant** | American Geophysical Union (AGU)
- 2018, '22 **Travel Grant** | University of Cape Town, SA

PROFESSIONAL DEVELOPMENT

- 2023 **CESM Tutorial** | NCAR, Boulder, CO
Focused on the use and components of the Community Earth System Model
- 2019 **Advance Science on Ocean Interdisciplinary Research** | Sao Paulo, Brazil
Focused on climate and ocean dynamics to influence regional climate variability
- 2018 **R for Environmental Science Workshop** | University of Kent, UK
Focused on Bash scripting and R-programming for science professionals
- 2018 **Introduction to Scientific Computing for Environmental Scientists Workshop** |
National Center for Atmospheric Science (NCAS), UK
Focused on Python programming for Environmental science professionals
- 2016 **Coordinated Regional Downscaling Experiment Workshop** | Cape Town, SA
Focused on improving global climate models for regional analysis
- 2015 **Coordinated Regional Downscaling Experiment Workshop** | Cape Town, SA
Focused on improving global climate models for regional analysis

REFERENCES

Dr. Simone Tilmes
ACOM
NCAR, Boulder, CO
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Prof. Nana Ama Klutse
Vice-Chair
IPCC WGI
nklutse@ug.edu.gh

Dr. Scott Landolt
ASP Science Advisor
NCAR, Boulder, CO
landolt@ucar.edu