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Research Interests

Remote Sensing	Machine Learning	Geospatial Analytics
Soil Moisture	Hydrometeorological Hazards	Humanitarian Emergencies

Education

- 2024 **PhD, Geography and Environmental Studies (Remote Sensing)**, Clark University, USA
Thesis: topic currently under-development likely in AI for humanitarian emergencies (Hydrometeorological hazards)
- 2022 **MSc., Geo-Data Science**, University of South Brittany, France. (*Distinction*)
Thesis: The Transferability of Visual Language Pretrained Models to Remote Sensing Data
- 2021 **MSc., Earth Observation and Geo-informatics**, University of Salzburg, Austria. (*Distinction*)
- 2019 **B.Tech., Meteorology and Climate Science**, Federal University of Technology, (*First Class Honors*)
Thesis: Climate Variability and its implication on Vegetation Health in the Climatic Zones of Nigeria

Skillsets

Python Programming: Numpy, Pandas, Geospatial Libraries, xArray, Dask, PyTest
Remote Sensing/Geospatial Analysis: ArcGIS Products, QGIS, eCognition, Google Earth Engine, SNAP
Spatial Databases: SQL, Postgres/ PostGIS
Machine Learning: sklearn, pytorch, dvc, mlflow
Cloud/HPC: AWS, SLURM, GitLab CI, Linux/Bash, Docker/Kubernetes
Agile Project Management: G-Suite, Slack, Sprint Planning, Risk Management
Scientific Research and Documentation: LaTeX, Markdown/reStructuredText

Professional Experience

- Sept. 2024 – present** **Research Assistant**, Center for Geospatial Analytics, Clark University, Massachusetts, United States of America (USA)
 - Geospatial Analytics and Machine Learning application to downstream Earth Observation Processes
- Oct. 2022 – July 2024** **EO Data Science Researcher**, EURAC Research, Bolzano, Italy
 - **Open data and open science:**
 - o Generated STAC Collection JSON for different datasets within the InterTwin project (CERRA, CERRA Land, EOBSv8, Soil Grid, and MERIT Hydro),
 - o Contributed Data Processing, Data Sharing, and Data Validation Exercises (using [OpenEO API](#)) to the [ESA MOOC: Cubes and Clouds: Cloud Native Open Data Sciences for Earth Observation](#) available on [EO College Platform](#),
 - o Co-led the writing and contributions to the “Alpine Drought Observatory: an operational drought monitoring platform” paper; submitted and currently under review by the Journal of Environmental Modelling and Software ([preprint](#))
 - **Open-Source Software development:**
 - o Provided an automated approach for gap filling [the Alpine Drought Observatory](#) meteorological datasets and drought indicators during in-house Cluster (Kubernetes) shutdown,
 - o Co-maintained the [Raster2STAC](#) python library for generating STAC Collections from Raster datasets (Cloud Optimized GeoTIFFs and KerChunk) within the [InterTwin](#) project,
 - o Developed and maintained the [SMODEX Python Package](#) for understanding the evolution of soil moisture and soil moisture anomalies using climate datasets, maintained the [PYSMM](#) python package for generation of soil moisture from SAR using Gradient Boosting Regression Techniques

- **Data Analytics Pipeline Management and CI/CD:**
 - o Maintaining the data processing pipelines (CI/CD) and infrastructure for the Alpine Drought Observatory to ensure consistent time-series and daily production and deployment of drought indices on the [web portal](#),
 - o Soil moisture map generation from SAR using Google Earth Engine for the [Soil moisture Estimation optimized for Alpine areas \(SEA\)](#) project for United States Department of Agriculture, [BirdWatch Project](#), South Tyrol and other Areas of Interests,

Sept. – Oct. 2022 Geospatial Analyst, CDL GeoHUM Lab, Salzburg, Austria (Contract)

- Curated a [population spatial indicator](#) and preliminary research for assessing the status of IDP camps for potential initiation of a Mass Drug Administration (MDA) for Malaria in the East African Rift (Uganda, DRC, Burundi, and Rwanda),
- Analyzed and proposed different cost setups for setting up an ArcGIS Image Server on the AWS Cloud Platform using services like the RDS, EC2 and Application Load Balancer for effective Image cataloguing and mosaicking.

May 2020 – June 2022 Research Partner, The Sixth Avis, Ondo State, Nigeria

- Co-developed the methodological framework and ocean expert database for User Consultation for assessing priority coastal hazards for expert users and local users across 15 West African countries,
- Curated hydrometeorological datasets for flash flood and coastal flood vulnerability index computation for the [EARWAC Platform](#),
- Presentation at the Conference of Party (COP26), Glasgow, United Kingdom and the Living Planet Symposium, Bonn, Germany

July – Sept. 2021 Geospatial Analyst, Space4Good, The Hague, Netherlands (Internship)

- Implemented a workflow [for individual tree-top identification](#) and extracted their corresponding crowns from Aerial Imageries using the one-stage object detector, RetinaNet (*Remote work coordinated within an agile project management framework*)
- Provided technical documentation and analysis of results to project stakeholders during sprint reviews.

Jan. – Aug. 2020 Geospatial Data Analyst, Center for Space Research and Applications, Akure (CESRA), Nigeria

- Prepared [statistical analysis](#) (LOESS Regression, Correlation, Trend Testing – Mann Kendall and Sen's slope, and anomaly detection) of climate and remote sensing data across 8 Nigerian cities,
- Contributed to the center's annual training of university staffs and students on the use of GIS and Remote Sensing

June – Dec. 2018 Research Intern, National Space Research and Development Agency (NASRDA), Nigeria

- First introduction to practical remote sensing working with different teams of researchers on different thematic areas including malaria mapping, climate anomalies, urban heat islands and flood mapping.
- Taught and supported other professionals in the monthly remote sensing and GIS training hosted at the Space Application Department

Research Experience

Nov. 2021 – July 2022 Student Researcher, IRISA Group, University of South Brittany, France

- Researched and developed a methodological framework for evaluating the “*transferability of visual language models to remote sensing datasets with low versus high image resolutions*” using a visual question answering model framework,
- Developed and implemented a remote sensing visual question answering model using the elementwise and multi-modal tucker decomposition fusion strategy.
- Served as a project manager for a team of 8 international students participating in the [On Cloud N: Cloud Cover Detection Challenge](#).

Jan. – Aug. 2020 Geospatial Analyst, Center for Space Research and Applications, Akure, Ondo State, Nigeria

- Contributed to different research work including “*Climatic responses to NDVI variation in the Climatic Zones of Nigeria*”, “*Geospatial Assessment of Climate and its implications on Land Cover Dynamics in Ijebu Ode, Nigeria*”, and “*Spatiotemporal assessment of land cover changes and vegetation-climate dynamics in Ibadan, Nigeria.*”

March – Oct. 2019 Student Researcher, Department of Meteorology and Climate Science, Federal University of Technology, Akure (FUTA), Ondo State, Nigeria

- Thesis work on “*Climate Variability and its implication on Vegetation Health in the Climatic Zones of Nigeria*”

Contributed conference presentations.

- Zellner Peter James, Michele Claus, Tyna Dolezalova, **Rufai Omowunmi Balogun**, Jonas Eberle, Henryk Hodam, Robert Eckardt, Stephan Meißl, Alexander Jacob, Anca Angheloa. MOOC Cubes and Clouds – Cloud Native Open Data Sciences for Earth Observation. FOSS4G Europe, Tartu, Estonia. July 2024
- Zellner Peter James, **Balogun Rufai Omowunmi**, Eckardt Robert, Hodam Henryk, Dolezalova Tyna, Meißl Stephan, Eberle Jonas, Claus Michele, Callegari Mattia, Jacob Alexander, Angheloa Anca. [Cubes & Clouds – A Massive Open Online Course for Cloud Native Open Data Sciences in Earth Observation](#). The European Geoscience Union (EGU), Vienna, Austria, April 2024
- **Rufai O. Balogun**, Peter J. Zellner, Felix Greifeneder. [SMODEX: a python package to understand the evolution of soil moisture anomalies](#). The South Tyrol Free Software Conference (SFSCON), NOI Tech Park, Bolzano, Italy, November 2023
- Peter J. Zellner, **Rufai O. Balogun**, Thomas Iacopino, Luca Cattani, Mohammad H. Alasawedah, Michele Claus, Bartolomeo Ventura, Andrea Vianello, Bertoldi Giacomo, Alexander Jacob. [The Alpine Drought Observatory, how to organize and share data in a cross-national mountain region following the fair data principles](#). EuroGEO Workshop, Bolzano, Italy, October 2023
- Peter J. Zellner, Luca Cattani, Giacomo Bertoldi, Felix Greifeneder, Mohammad H. Alasawedah, Thomas Iacopino, Andrea Vianello, **Rufai O. Balogun**, Michele Claus, Bartolomeo Ventura, Konrad Mayer, Ziva Vlahovic, Alexander Jacob. [The Alpine Drought Observatory: An Alpine Wide Operational Drought Monitoring Platform](#). The Sixth Virtual Alpine Observatory Symposium, Grainau, Germany, March 2023
- A.D. Adebayo, **R.O. Balogun**, I. Adewunmi, S.O. Akande, O.C. Oghenechovwen, A. Giwa, [Enhancing Adaptation and Resilience against coastal multi-hazards along the West African Coasts \(EARWAC\)](#). ESA Living Planet Symposium, Bonn, Germany, May 2022
- **R.O. Balogun**, Ahmed Moussa, Margret Azuma, Meryeme Boumahdi, [Mapping burn severity using Sentinel-2 for 2020 California Wildfires](#). ISDE/GI Week, Salzburg, Austria, July 2021

Publications

- Zellner P.J., Claus M., Dolezalova T., **Balogun R.O.**, Eberle J., Hodam H., Eckardt R., Meißl S., Jacob A., Angheloa A (2024). MOOC Cubes and Clouds – Cloud Native Open Data Sciences for Earth Observation. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. XLVIII-4/W12-2024, 157–162. DOI: <https://doi.org/10.5194/isprs-archives-XLVIII-4-W12-2024-157-2024>
- Peter J. Zellner, **Rufai O. Balogun**, Konrad Mayer, Thomas Iacopino, Luca Cattani, Mohammad H. Alasawedah, Daniela Quintero, Michele Claus, Bartolomeo Ventura, Andrea Vianello, Alessio Salandin, Elisa Brussolo, Ziva Vlahovic, Christian Ronchi, Bertoldi Giacomo, Mariapina Castelli, Felix Greifeneder, Alexander Jacob (2023). [The Alpine Drought Observatory: an operational drought monitoring platform](#), Environmental Modelling and Software (under review-- preprint available [here](#))

Datasets

- **Balogun R.O.**, Zellner P.J., & Greifeneder, F. (2024). Soil Moisture Anomalies – ERA5_QM Version 2.0. EURAC Research. DOI: <https://doi.org/10.48784/ea665ca2-0ceb-11ed-86c5-02000a08f4e5>
- Zellner P.J., Dolezalova T., Claus M., **Balogun R.O.**, Eberle J., Hodam H., Eckardt R., Meißl S., Jacob A., and Angheloa A. (2024). [Data from Cubes & Clouds – Cloud Native Open Data Sciences for Earth Observation. Cubes and Clouds – Snow Cover STAC Collection](#). DOI: <https://zenodo.org/records/10513915>

Conferences and workshop participation

July 2024	International Geoscience and Remote Sensing Symposium (IGARSS), 2024, Athens, Greece
April 2024	European Geosciences Union General Assembly, 2024, Vienna, Austria
November 2023	The South Tyrol Free Software Conference (SFSCON), Bolzano, Italy
October 2023	EuroGEO/OEMC Workshop, 2023, Bolzano, Italy

July 2023	International Geoscience and Remote Sensing Symposium (IGARSS), 2023, Pasadena, California, USA
April 2023	European Geosciences Union General Assembly, 2023, Vienna, Austria
July 2022	GI Salzburg 2022, Salzburg, Austria
May 2022	ESA Living Planet Symposium, 2022, Bonn, Germany
July 2021	ISDE/ GI Week, 2021 Salzburg, Austria (<i>Hybrid</i>)
May 2021	Conflict Early Warning and Early Action Conference, 2021 (<i>remote</i>)

Leadership and Community Service

Sept. 2022 – present	Young Professionals Ambassador (Industry) , IEEE Geoscience and Remote Sensing Society (GRSS)
<ul style="list-style-type: none"> - Leading the <i>Chapter Industry Outreach</i> Initiative across the MENA region to activate local chapters involvement with industrial partners, - Co-developing the GRSS Educational Package for young professionals transitioning from Academia to Industry, - Co-developing young professional programs at the IGARSS conferences with other young professionals., - Leading the “IEEE GRSS Industry event: Building your professional network in the geoscience industry” outreach event at the European Geosciences Union since 2023 - Co-developing the GRSS virtual career fair for providing young professionals with relevant career opportunities. 	
2021 – July 2022	Member , UN MGCY Science Policy, Data Working Group
<ul style="list-style-type: none"> - Co-curated the virtual UN Youth Hackathon datasets with support from team members at the UNSD and global platform regional hubs of Rwanda, UAE, Brazil, and China 	
July 2018 – Aug. 2019	Project Mentor , Care About Climate
<ul style="list-style-type: none"> - Served as a mentor to 10 young environmental professionals to help them implement their environmental sustainability projects in an effective way. 	
July 2018 – July 2019	Advisory Council Member , World Oceans Day
<ul style="list-style-type: none"> - Led the trainings and organization of e-conferences on the use of the plastic pollution lesson plan. 	

Certifications

August 2024	Udacity Nanodegree in Agile Software Development
August 2022	Google Project Management Professional Certificate

Awards and Honors

2024	Next Generation Tech Booster Scholarship, Udacity (<i>Online</i>)
2023	Open Research Award, EURAC Open Research
2023	HDCRS Travel Grant, HDCRS Summer School, Reykjavik, Iceland
2022	ESA Living Planet Symposium Student Grant
2020	ESA-Future Earth Joint Program Grant (25,000 Euros)
2020	Erasmus Mundus Joint Master’s Degree Scholarship
2019	Best Graduating Student in Meteorology and Climate Science

Professional Membership

- European Geoscience Union
- IEEE Geoscience and Remote Sensing Society
- International Society for Photogrammetry and Remote Sensing