

Jonathan Brunton

Contact for Location

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jahbrunton@gmail.com (Primary, preferred)

EDUCATION

MSc, Environmental Data Science and Machine Learning

November 2022

Imperial College London, London (UK)

- *Skill Progression*: Modern & Advanced Programming Methods (Python/C++), Computational Mathematics/Numerical Methods, Environmental (Geospatial) Data, Inversion & Optimization, Big Data Analytics, Deep Learning, Master's Thesis Project
- *Awards*: Merit Distinction (Top 25% of Graduates)

BS, Planetary Sciences

Purdue University, West Lafayette, IN (USA)

May 2021

- *Awards*: *Presidential Scholarship, Paul & Linda Krishna Scholarship in Earth, Atmospheric, and Planetary Sciences, 6x Dean's List Placement, 6x Semester's Honors*

WORK HISTORY

Atmospheric Data Scientist, Environmental Protection Agency

October 2023-May 2025

Oak Ridge Associated Universities (National Student Services Contract)

Research Triangle Park, NC

Primary Duties

- Perform model evaluation for the EPA's Community Multiscale Air Quality (CMAQ) scientific development team by investigating the impact of gridded inputs on CMAQ Ozone outputs with historical data. Analyze and package results visually and in writing to project leadership to deliver to State and Local organizations attempting to reach ozone attainment.

- "Evaluating the impact of modeled meteorology and ozone bias using Random Forest Regression"

- Lead-developer of a Python-based workflow that provides a spatiotemporal analysis of the relationship between trends in modeled (NCAR's Weather Research & Forecasting Model; WRF) meteorology and modeled (EPA's Air Quality Time Series; EQUATES) ozone bias.

- Perform big data wrangling, preprocessing of twenty model years of data in a High-Performance Computing environment; leveraged EPA's Atmospheric Model Evaluation Tool (AMET) for WRF data acquisition, QA/QC of scientifically relevant data.

- Trained and optimized a Random Forest model suite to perform feature permutation for quantifying the relative importance of meteorological and non-meteorological potential drivers of CMAQ MDA8 Ozone Bias.

- Relay results to internal CMAQ development teams, agency groups with CMAQ model interests, and spoke at CMAS Conference 2024

(https://jbrunto.github.io/Jonathan_Brunton_Portfolio/ozone_proj.html).

- Design investigation within the scope of physical regions in model domain, as well as the administrative regions that govern air quality and emissions.

Additional Duties

- Develop public-facing notebook tutorials for analyzing cloud-based CMAQ/EQUATES data hosted on AWS Open Data Registry by reading and compressing the S3 bucket data (>1 TB) into local and SageMaker Jupyter servers.

- Contributor to CMAQ's Github through documentation upkeep and Github Actions workflows.

- Lead developer of multi-language (Python, HTML, Markdown Flavor) workflow for building and deploying CMAQ's Github Pages hosted documentation website (https://jbrunto.github.io/CMAQ_Docs_v55/).

- Active member of internal Center for Environmental Measurement and Modeling's Data Science development community; led demonstrations and discussion of Pythonic data science and machine learning techniques and software configuration.

- Developed an internal tool for directly querying and reading CMAQ's SQL held data into a Python environment as interactive datasets.

- Consult generally on adjacent projects exploiting geospatial data with Python/SQL software and machine-learning techniques.

Academic Employment

- Substitute Teacher, Scoot Education, Austin TX **November 2022-April 2023**
- Python Tutor, Self-Employed **April-September 2023**
- Undergraduate Research Assistant **May 2018-April 2021**
Purdue University, West Lafayette, IN
- Undergraduate Teaching Assistant **August 2020-December 2020**
Purdue University, West Lafayette, IN

Additional Employment

- Clerk Assistant **May 2017-January 2018**
Miller, Hall, and Triggs LLC., Peoria IL
- Youth Coordinator **January 2018-May 2020**
First United Methodist Church, West Lafayette, IN

RESEARCH EXPERIENCE

"Developing screening tools to assess CO₂ storage", Master's Thesis **April-November 2022**

Sole developer of an unsupervised computer vision network created to extract the locations of geologic faults from a large, 3D seismic reflectivity volume. Upon applying a numerical interpretation of images and model evaluation, a KMeans clustering model for semantic image segmentation was selected and trained. Combining the model output of predicted fault

locations with Full-Waveform Inversion velocity data into a single volume allowed for interpretation of a given fault's ability to store low-density fluids. Software product deployed internally and Thesis successfully defended from Faculty and External Experts.

Applied Computational and Data Science, Imperial College London

Client-driven "Sprint" Projects; Small (4-6), Interdisciplinary Teams

Hurricane Forecasting with Computer Vision

May 2022

Lead developer of image preprocessing workflow, co-developer of convolutional LSTM created for predicting Hurricane evolution from a time series of satellite imagery.

Wildfire Forecasting and Correction

March 2022

Lead developer of PCA model, co-developer of data assimilation workflow created for training a neural network on low-resolution satellite imagery and ground sensor data to predict Wildfire evolution.

Flood Evolution and Cost-of-Damage Prediction

December 2021

Lead developer of KNN regressor, lead data preprocessing developer of project framework created for assessing flood risk and projecting local cost of damage using historical flood, rainwater, and property value estimates of each Postal Code in England.

Undergraduate Research Assistant, Purdue University

Early Solar System/Late Heavy Bombardment Dynamics

May-December 2019

Conducted n-body simulations on a Purdue University supercomputer by using Python program-generated data on planetesimals and planetary embryos. Big data interpretation.

Large Lunar Basin Impact Cratering

May-December 2020

Reconstructed the Hertzprung lunar basin morphology using the multirheological shock-physics code iSALE, and visualized data using Python programming.

Analyzing Mid-Latitude Atmospheric Dynamics

January-May 2021

Creating a two-layer quasi-geostrophic model to analyze weather patterns and jet stream dynamics by translating and building upon a MATLAB code into Python.

LEADERSHIP, COMMUNITY SERVICE, & PROFESSIONAL MEMBERSHIPS

Imperial College Union, American Football Society

August 2021-April 2022

Purdue University College of Science Ambassadors

Spring 2018-May 2021

Ambassador for Earth, Atmospheric, and Planetary Sciences

Gimlet Leadership Honorary

Spring 2019-May 2021

Executive Board Member, Secretary

Planetary Science Society of Purdue, Member
Purdue Astronomy Club, Member

2018-2021
2019-2021

LABORATORY AND TECHNICAL SKILLS

- **Linguistics:**
 - English (native) - skilled in technical writing/demonstration, public speaking
 - German (limited)
 - ASL (elementary - learning)
- **Programming Languages:**
 - **Python:**
 - *Advanced (7 years):* Statistical, Visualization, and Fundamental Machine Learning libraries (NumPy, SciPy, Matplotlib, Plotly, Pandas, Sci-kit Learn)
 - *Proficient (2 years):* Deep-learning and Machine Learning libraries (Tensorflow, PyTorch, OpenCV)
 - *Advanced Proficient (3 years):* Geospatial Data analysis libraries (Geopandas, xarray, netCDF4, GDAL)
 - **SQL, Git:** *Competent*
 - **C++, R:** *Familiar*
 - Experienced in using custom-scripting languages to deploy hosted geospatial tools (Google Earth Engine, Remote Sensing applications)
- **Operating Systems:** Proficient in command line operations. Experienced with software development and deployment in Unix, Linux, and Windows OS; trained in ensuring software sustainability across OSs throughout continuous integration. Adept in High-Performance Computing and cloud-based (AWS, Azure) development environments.
- **Remote Sensing:** Experienced in data analysis/retrieval, mapping, and application development using IDL, ENVI, Petrel, ERMapper, ArcGIS, MASTER, CRISM
- **Laboratory Experience:** Adept with using Spectrometry in small-scale (Mineralogy, Chemistry) and large-scale (Geologic mapping, Land-Use) applications; Competent in mineralogic determination through physical and chemical features.

REFERENCES - Contact for references.