Kyle MacRitchie, Ph.D.

Meteorologist turned Data Scientist

I am an experienced data scientist with over fifteen years of experience analyzing meteorological, satellite, and other geospatial datasets. I am passionate about weather, technology, and machine leaning. Over a decade ago, I developed, and continue to maintain, a weather website focused on forecasting and diagnosing subseasonal weather patterns. It remains active, updated daily, and used by hundreds of people worldwide. Professionally, I have experience applying these skills across industry, government, and academia.

💼 Work History

Jun 2021 - present

Applied Scientist

Descartes Labs, Inc., Remote

- Employed a tech stack (scikit-learn, PyTorch, boto3) on AWS to develop, train, backtest, and deploy ML models and pipelines for forecasting yield and production of key crops (e.g., soybeans, sugar, robusta & arabica coffee) throughout the growing season.
- Designed advanced weather prediction models with PCA regression, vision transformers, and attention techniques in PyTorch, producing accurate subseasonal to seasonal forecasts crucial for crop modeling.
- Created a tropical cyclone prediction system that delivers calibrated probabilistic forecasts for rain and wind impacts from tropical cyclones over specific regions, up to four weeks in advance.
- Worked directly with clients to understand their needs, incorporate feedback, and ensure maximum benefit from our products.
- Led pivotal projects, including the development of an internal weather API, to improve access to weather data across the company.

Jan 2018 - Jun 2021

Meteorologist

Climate Prediction Center, College Park, MD

- Expanded daily weather pipelines that I created as a contractor.
- Developed forecast models predicting climate features using recurrent neural networks in a TensorFlow framework.
- Designed and implemented statistical techniques to bias correct and calibrate ensemble model forecasts.
- Created several ArcPy scripts enabling the application of ArcMap in our operational products.
- Led and mentored a team of contract scientists, fostering a supportive and growth-oriented environment.

May 2016 - Jan 2018

Atmospheric Scientist

Innovim, LLC, College Park, MD

- I was a federal contract worker within the Climate Prediction Center charged with designing, implementing, and maintaining daily pipelines that ingested and analyzed meteorological data needed for the National Weather Service's round-the-clock forecast operations.

👤 Contact Me

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🎓 Education

Sep 2009 - Dec 2014

Atmospheric Science, Ph.D.

University at Albany, Albany, NY

Aug 2005 - May 2009

Atmospheric Science & Mathematics, B.S.

University at Albany, Albany, NY

⚡ Skills

Statistics: Hypothesis testing, linear & non-linear regressions, random forests, bootstrap methods, time series analysis, Bayesian statistics, quantification of uncertainty, dimensionality reduction (PCA/EOF, LDA, etc.), FFT analysis and decomposition, k-means clustering

May 2015 - May 2016	**Data Support Scientist // Deputy Task Lead** *ADNET Systems, Inc., Greenbelt, MD*

- Served as a contract worker at NASA Goddard Space Flight Center, managing the transition of metadata for thousands of NASA data products to a new system.
- Developed multiple Python programs to interface with EarthData's RESTful API, benefiting both personal tasks and team collaborations.

Mar 2013 - Jun 2016	**Consulting Research Meteorologist** *RiskPulse (formerly EarthRisk), Remote*

- Improved predictions using intraseasonal and interannual atmospheric and oceanic variability, while working directly with clients to understand their needs.
- Spearheaded a number of projects to assess model skill and bias under different atmospheric regimes. Created website with this info for clients.
- Worked with team to refine ideas and incorporate into other projects as appropriate.

Aug 2013 - May 2015	**Lecturer (Full Time)** *SUNY Oneonta, Oneonta, NY*

- Created and taught undergraduate classes in tropical meteorology, introduction to meteorology, thermodynamics.

Peer-Reviewed Publications

- **MacRitchie, K**., and C. Schreck. 2021: Tropical intraseasonal variability [in "State of the Climate in 2020"]. Bull. Amer. Meteor. Soc., 102 (8), S210–S213
- L'Heureux, M., E. Becker, M. S. Halpert, Z.-Z. Hu, **K. MacRitchie**, and M. Tippett. 2021: ENSO and the tropical Pacific [in "State of the Climate in 2020"]. Bull. Amer. Meteor. Soc., 102 (8), S205-S210
- **MacRitchie, K.**, and P.E. Roundy. 2016: The two-way relationship between the Madden Julian oscillation and anticyclonic wave breaking. Quart. J. Royal Meteor. Soc., 142, 2159-2167.
- Roundy, P.E., N. Sakaeda, **K. MacRitchie**, L. Gloeckler, 2017: Weather-climate interactions and MJO influences. Climate Extremes: Patterns and Mechanisms, S.-Y.S. Wang et al., Eds., Amer. Geophys. Union, 139-163,
- **MacRitchie, K.**, and P. E. Roundy, 2012: Potential vorticity accumulation following atmospheric Kelvin waves in the active convective region of the MJO. J. Atmos. Sci., 69, 908-914.
- Roundy, P. E., **K. MacRitchie**, J. Asuma, T. Melino, 2010: Modulation of the global atmospheric circulation by combined activity in the Madden–Julian oscillation and the El Niño–Southern oscillation during boreal winter. J. Climate, 23, 4045–4059.

Python Data Stack: NumPy, SciPy, ArcPy, Pandas, GeoPandas, xarray

Machine Learning: PyTorch, TensorFlow, Keras, Scikit-Learn

Data Formats: csv, txt, netCDF, GRIB, pickle, JSON, etc.

Data Visualization: matplotlib, Seaborn, Plotly, Dash, Altair

Technical: Docker, SQL, AWS, GCP, Agile development, APIs

AWS Tools: S3, batch, Fargate, DynamoDB, Athena, boto3, AWS CDK, EC2, etc.

Other: MATLAB, ensemble forecasting, weather and climate modeling

Familiarity with: FORTRAN, C++, PHP, NCL, IDL (can read and modify as needed)

Weather Models: GFS/GEFS, ECMWF, JMA, CANM, CFS, etc.