MARGARET POWELL

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EDUCATION

COLUMBIA UNIVERSITY Fu Foundation School of Engineering and Applied Science — **New York, NY**
M.S./Ph.D Earth and Environmental Engineering — **Expected 2028**
- Advisor: Prof. Pierre Gentine
- Awards: Columbia University Presidential Fellowship

HARVARD UNIVERSITY Harvard College — **Cambridge, MA**
A.B. Honors in Earth and Planetary Sciences *summa cum laude* — **2019**
- Honors: Phi Beta Kappa; John Harvard Scholar
- Awards: Hoopes Prize; Detur Book Prize; Martin McPeck Prize

TECHNICAL SKILLS

Programming: Python, R, Bash, SQL, MATLAB; **Libraries:** xarray, keras, tensorflow, sklearn, geopandas, numpy, pandas; **Database Tools:** PostgreSQL, PostGIS; **Computing:** dask, spark; **Platforms:** Git, Docker, AWS (ECR, ECS, S3), Airflow

PROFESSIONAL EXPERIENCE

COLUMBIA UNIVERSITY — **New York, NY**
Graduate Researcher — **2023 – present**
- Researching improvement in parametrization of subgrid-scale cloud processes in Earth System Models (ESMs) as part of the Learning the Earth with Artificial Intelligence and Physics (LEAP) NSF center
- Investigating the importance of turbulence and mesoscale dynamics on cloud cover using large eddy simulation data and machine learning methods for dimensionality reduction (VAEs)
- Collaborating with group members on particle trajectory modeling (superdroplet method) for cloud microphysics

GRO INTELLIGENCE — **New York, NY**
Climate Impact Data Scientist — **2021 – 2023**
- Assessed physical climate risk to populations, assets, commodities, and infrastructure using CMIP6 ensemble projections and other climate indicators; considered uncertainty of projections and exposure of assets to contextualize risk metrics
- Built model prototypes for climate indicators including tropical cyclone impact risk (using IBTrACS historical data and Climada synthetic storm tracks) and heavy precipitation events (95th percentile of daily precipitation using CMIP6 ensemble model), resulting in the improvement of client-facing products
- As tech lead, oversaw the design, implementation, and monitoring of robust data pipelines for updating risk indices on a daily to monthly basis, leveraging Airflow, AWS ECS, and Docker to ensure efficient deployment and maintenance
- Leveraged high performance computing tools such as python multiprocessing and dask to produce analysis-ready, cloud-optimized climate data series
- Created dynamic and insightful visualizations and dashboards using Dash, Plotly, React, and Mapbox that effectively communicated complex analyses to clients in both public and private sectors, contributing to improved decision-making processes

INDUSTRIAL ECONOMICS, INC. — **Cambridge, MA**
Research Analyst — **2020 – 2021**
- Conducted research and performed quantitative analyses on high-profile environmental and public policy problems for clients to produce health impact and natural resource damage assessments
- Determined burden of vehicle emissions on air quality and human health for a South American city using vehicle emissions inventory model, locally-calibrated satellite pollutant data, and health impact functions for client at U.S. federal agency
- Developed spatial model to estimate statewide natural resource damages due to pollutant contamination in waterways for Midwestern environmental state agency, identifying damages exceeding 10 million
- Presented on air quality management and data analysis at workshops with 50+ global participants from South America, Central Asia, and Southeast Asia

HARVARD UNIVERSITY DEPARTMENT OF EARTH AND PLANETARY SCIENCES — **Cambridge, MA**
Research Assistant, Wofsy Lab — **2018 – 2019**
- Investigated the seasonality and spatial distribution of growing season methane emissions from Alaska and the western Canadian Yukon using in-situ methane concentration measurements from the Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) 2012-2015 aircraft campaigns and footprints of surface influence from the Stochastic Time-Inverted Lagrangian Transport (STILT) model
- Found that October and November methane fluxes were significant for all years and ecoregions, showing that cold-season methane emissions, previously thought to be negligible, play an important role in the Arctic carbon budget. Results presented at the 2018 AGU Fall Meeting

RESEARCH, PUBLICATIONS, AND POSTERS

Ludwig, S. M., Natali, S. M., Schade, J. D., **Powell, M.**, Fiske, G., Schiferl, L. D., & Commane, R. (2023). Scaling waterbody carbon dioxide and methane fluxes in the arctic using an integrated terrestrial-aquatic approach. Environmental Research Letters, 18(6), 064019.

Russotto, R.D., Caffrey, M., **Powell, M.**, Lepore, C., Schneider, E., Dwyer, J.G., Qaddoumi, A., Dinh, L. and Simonetti, M., 2022, December. Global Calculations of Tropical Cyclone Return Periods and an ACE-like Risk Metric. In AGU Fall Meeting Abstracts (Vol. 2022, pp. A22G-1762).

Ludwig, S.M., Natali, S.M., Mann, P.J., Schade, J.D., Holmes, R.M., **Powell, M.**, Fiske, G. and Commane, R. (2022). Using Machine Learning to Predict Inland Aquatic CO2 and CH4 Concentrations and the Effects of Wildfires in the Yukon-Kuskokwim Delta, Alaska. *Global Biogeochemical Cycles*, *36*(4). https://doi.org/10.1029/2021GB007146

Dabrowski, J.S., Charette, M.A., Mann, P.J., Ludwig, S.M., Natali, S.M., Holmes, R.M., Schade, J.D., **Powell, M.** and Henderson, P.B., 2020. Using radon to quantify groundwater discharge and methane fluxes to a shallow, tundra lake on the Yukon-Kuskokwim Delta, Alaska. *Biogeochemistry*, 148(1), pp.69-89. https://doi.org/10.1007/s10533-020-00647-w

Powell, M., Commane, R., Ludwig, S., Mann, P.J., Schade, J.D., Natali, S., Wofsy, S.C. and Fiske, G., 2018, December. Integration of Ground-based and Airborne Measurements Shows Substantial Methane Emissions from Freshwater Ecosystems in the Yukon-Kuskokwim Delta, Alaska. In *AGU Fall Meeting Abstracts* (Vol. 2018, pp. B31F-2547)

RELEVANT COURSEWORK

- **Programming & Computation:** Machine Learning for Environmental Engineering; Environmental Modeling and Data Analysis
- **Mathematics:** Introduction to Numerical Methods; Ordinary and Partial Differential Equations; Linear Algebra; Multivariable Calculus
- **Atmospheric Science:** Geophysical Fluid Dynamics; Turbulence Theory and Modeling; Introduction to Atmospheric Science; Atmospheric Chemistry