Tony Cannistra, Ph.D.

Global Change Researcher

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Experience

**Sep 2016 –
June 2020**
Doctoral Researcher, *Buckley Lab*, University of Washington, Seattle, WA.
Machine Learning-based spatial forecasting and analysis of **ecological responses to climate change** for informed decision making.
- Characterized the influence of species' traits on **climate-driven range shifts** via nonlinear modeling (Python, scikit-learn, Juypter)
- Developed **remotely-sensed snow cover** identification method using **high-resolution satellite imagery** (Planet Labs), airborne lidar (NASA/JPL Airborne Snow Observatory), and **neural network-based statistical learning** for modeling climate-induced phenological shifts (AWS, PyTorch, GDAL/Rasterio).
- Developed a **planetary-scale analysis** of the ecological consequences of sea surface temperature anomalies (**marine heatwaves**) via **model-derived thermal stress predictions** of phytoplankton. (xarray, zarr, Jupyter, AWS)

**January 2020
- Present**
Senior Maps Engineer, *Gaia GPS / Outside Inc..*, Seattle, WA / Remote.
Geospatial data engineering to build the best backcountry map for recreationists and professionals.
- Data engineering support for a planet-scale vector base-map redesign based on OpenStreetMap, including vector processing and data harmonization in PostGIS, raster layer development (Python), and pipeline infrastructure design and implementation on AWS.
- Design and development of a **near-real-time, high performance** satellite imagery layer (Sentinel-2, Landsat, rasterio, AWS ECS, AWS Lambda)
- Designed and developed **multi-source spatial vector data harmonization** software and infrastructure (PostGIS, OpenStreetMap, Mapbox Vector Tiles, Python)
- Sourcing and development of various operational data layers for mapping projects at **continental to global scale**.

**June 2018 -
August 2018**
Data Analyst Intern, *Vulcan Inc. & Paul G. Allen Family Foundation*, Seattle, WA.
Member of Skylight Global (http://www.skylight.global) team, working to enhance enforcement and documentation of illegal, unreported, and unregulated fishing in our oceans with **remotely-sensed SAR observations, gridded oceanographic datasets, spatial analysis, and statistical learning techniques**.

Education

**Sep 2016 -
June 2020**
Ph.D., Biology, *University of Washington*, Seattle, WA.
Dissertation: *A Grain Carried by the Flood: methods and data for global change ecology amidst a data deluge. Advised by Dr. Lauren Buckley (Biology).*
Selected Coursework: Public Land Law, Machine Learning, Big Data Management Systems, Fundamentals of Climate Change, Knowledge Brokering in Climate Change Research, Snow Hydrology

**Sep 2011 -
May 2015**
B.S., Biology and Computer Science, *Tufts University*, Medford, MA .
GPA:3.55/4.0

Technologies, Skills and Tools

Python Jupyter, Pandas, Dask, xarray, scipy/numpy, matplotlib, conda, multiprocessing

Geospatial GDAL, PostGIS, Mapbox, Cloud-optimized GeoTIFFs, STACs, rasterio, shapely, pyPROJ, cartopy, GeoPandas

Web HTML, CSS, React, GitHub Pages, S3 Website Hosting

Cloud AWS: ECS/ECR, EC2, S3, Lambda, SageMaker, IAM. GCP: Storage, Compute

Teaching + Outreach

Nov. 2018–Present — **Avalanche Awareness Instructor & Trailhead Outreach Volunteer**, *Northwest Avalanche Center*.
Delivered avalanche forecast information and resources to **diverse groups of winter recreators** as a member of a **course-based and field-based outreach** and education team for local avalanche forecasting center.

Nov. 2016–Sep. 2020 — **Co-Producer, Editor**, *Topophilia Podcast*, Seattle, WA.
Co-produced ongoing podcast covering issues of place at the **landscape scale**. Engaged community with long-form narrative and shorter stories on **conservation, recreation, public lands, and policy**.

2015–2016, Summer 2019 — **Naturalist Intern, Mentor Naturalist**, *Aspen Center for Environmental Studies*, Aspen, CO.
Led daily nature hikes, ski tours, and snowshoe tours for a diverse range of folks in the Aspen, Colorado area. Independently researched and developed content and delivery strategies intended to foster a deep respect and curiosity for place and ecology in a diverse group of participants.

March 2017-March 2021 — **Outdoor School Instructor**, *REI Puget Sound*, Seattle, WA.
I taught paddling, climbing, snowshoeing, and navigation to diverse participants. Employed best practices for group risk management, first-principles skills education, first aid response, and customer communication.

September 2017-December 2019 — **Organizer & Instructor**, *GeoHackWeek UW*.
Participated in organization and teaching of **geospatial data analysis workshop**. Focused on **geospatial data visualization in Python**. Fall 2017, 2018, and 2019.

Publications

Cannistra, A.F, Shean, D.E., Cristea, N.C. 2021. High-resolution CubeSat imagery and machine learning for detailed snow-covered area. Remote Sensing of Environment. DOI: **10.1016/j.rse.2021.112399**

Cannistra, A.F, Buckley, L.B. 2020. Improving range shift predictions: enhancing the power of traits. Ecology. *In Prep.*

Buckley, L.B., **Cannistra, A.F.**, John, P.A. 2018. Leveraging organismal biology to forecast the effects of climate change. Integrative and Comparative Biology. DOI: **10.1093/icb/icy018**

Buckley, L.B., Arakaki, A.J., **Cannistra, A.F.**, Kharouba, H.M., Kingsolver, J.G. 2017. Insect Development, Thermal Plasticity and Fitness Implications in Changing, Seasonal Environments. Integrative and Comparative Biology icx032. DOI: **10.1093/icb/icx032**

Presentations (§ = award)

Talk — **Cannistra, A.F.,** 2019. Assessing High-Resolution CubeSat Imagery and Machine Learning for Detailed, High Resolution Snow-Covered Area. American Geophysical Union Fall Meeting, San Francisco, CA.

Invited Talk — **Cannistra, A.F.** 2019. Welcoming Ecology into the Big Data Age. MIDAS Data Science Consortium, University of Michigan, Ann Arbor, MI.

Poster — **Cannistra, A.F.** 2018. Assessing High-Resolution CubeSat Imagery to Infer Detailed Snow-Covered Areas for Studying Changes in Mountain Ecosystems. Mountain Climate Meeting, Rocky Mountain Biological Laboratory, Gothic, CO.

Lightning Talk (§) — **Cannistra, A.F.** 2018. Assessing High-Resolution Satellite Imagery for Detailed Snow Cover Estimation: An Ecological Perspective. UW Data Science Summit. Honorable Mention.

Tutorial — **Cannistra, A.F.,** Levesque, R.J. 2017 and 2018. Tools for Visualizing Geospatial Data in Python: A Hands-On Tutorial. GeoHackWeek, eScience Institute, University of Washington, Seattle, WA.