Ryan Avery

Department of Geography
University of California, Santa Barbara
Santa Barbara, California

Email: ravery@ucsb.edu
Web: http://caylor.eri.ucsb.edu/people/avery/
Phone: +1 916 897 7076

EDUCATION

M.A. Geography, University of California, Santa Barbara, 2020
Thesis: "Convolutional Neural Network Based Approaches for Instance Segmentation of Agriculture in Satellite Imagery"
Adviser: Kelly Caylor

B.S. Environmental Sciences: Biological Sciences Concentration, University of California, Berkeley, 2016

RESEARCH INTERESTS

Ecohydrological measurement and modeling and vegetation remote sensing

Coupled human-natural systems and water resources management

Classification, object detection, and segmentation of multispectral imagery

Spatial data science and machine learning

PUBLICATIONS

Published Manuscripts

2020 Elmes, Arthur, Hamed Alemohammad, Ryan Avery, Kelly Caylor, J. Ronald Eastman, Lewis Fishgold, Mark A. Friedl, et al. 2020. "Accounting for Training Data Error in Machine Learning Applied to Earth Observations." *Remote Sensing* 12 (6): 1034.

2019 Tuholske, Cascade, Kelly Caylor, Tom Evans, and Ryan Avery. 2019. "Variability in Urban Population Distributions across Africa." *Environmental Research Letters* 14 (8): 085009.

Manuscripts in Preparation

2020 Avery, R., K. Caylor "Field-Scale Segmentation of Center Pivot Agriculture using a Landsat time series and Mask R-CNN" Target: *Remote Sensing of Environment*, Fall 2020.

Reports

2017 "Detecting Changes in Nighttime Sky Brightness over Grand Teton National Park with the Suomi NPP VIIRS Sensor" Avery, R., V. Warda, S. Chu, S. Chao. 2017. NASA DEVELOP Technical Report.

2017 "Enhancements to Visualization of CALIPSO (VOCAL) through Case Studies of Saharan Dust" Pampalone, C. R. Avery, W. Turner. 2017. NASA DEVELOP Technical Report.

2017 "A Threshold-Based Decision Tree Approach to Mapping Landscape Disturbance in Glacier National Park" Avery, R., Mays, C., Alvarado A. 2017. NASA DEVELOP Technical Report.

2016 "Mapping Invasive Species to Efficiently Monitor Southwestern National Park Areas" Avery, R., K. Landesman, T. Whaley. 2016. NASA DEVELOP Technical Report.

Conference Presentations

2018 Avery, R., "A Convolution Neural Network Approach for Segmenting Center Pivot Agriculture" American Geophysical Union Fall Meeting. Washington D.C. Dec 10–14.

GRANTS AND AWARDS

Grants and Fellowships

2019 Honorable Mention, National Science Foundation Graduate Research Fellowship Program.

2019 Scipy 2019 Scholarship Award, Full Conference Scholarship ($1903).

2019 Travel Scholarship to attend Isocamp 2019 ($1000).

2019 Travel Scholarship to AI for Earth Summit 2019 ($1500 approx.).

2018 National Geographic and Microsoft AI for Earth Innovation research grant ($100,000). Role: Primary Author and Project Member.

RESEARCH EXPERIENCE

January 2020 – June 2021
Earth Research Institute, Graduate Research Assistant. University of California, Santa Barbara.

January 2019 – January 2020
National Geographic AI for Earth Fellowship, Primary Researcher and Project Team Member. University of California, Santa Barbara.

January 2018 – January 2019
Clark Labs, Graduate Research Assistant. Worcester, Massechusetts;

September 2016 – August 2017
NASA DEVELOP National Program, Geoinformatics and Project Coordination Fellow. NASA Langley Research Center, Virginia.

June 2016 – August 2016
NASA DEVELOP National Program, Team Lead and Researcher. NASA Langley Research Center, Virginia.

May 2015 – December 2015
Berkeley Energy and Climate Institute, Undergraduate Research Fellow. University of California, Berkeley.

September 2014 – April 2015
Kelly Research and Outreach Lab, Undergraduate Researcher. University of California, Berkeley.

TEACHING EXPERIENCE

University of California, Santa Barbara

Oceans and Atmosphere, Teaching Assistant. (Winter '19)

Oceans and Atmosphere, Teaching Assistant. (Fall '18)

SERVICE

Service Workshops

Introduction to Raster and Vector Data with Python, NASA JPL, February 6th-7th, 2020

The Unix Shell, Git/Github, Python, Center for Scientific Computing, May 11–12, 2019

Jupyter Notebooks and Python for Ecologists, EcoDataScience at UCSB, November 13, 2018

The Unix Shell, Git/Github, R for Reproducible Scientific Analysis, Old Dominion University, October 25–26, 2018

The Unix Shell, Git/Github, Python, CSU Monterey Bay, January 19–20, 2018

The Unix Shell, Git/Github, Batch Processing with GDAL, NASA JPL, September 18–19, 2017

The Unix Shell, Git/Github, Python, NASA DEVELOP at Wise County, June 12–13, 2017

The Unix Shell, Git/Github, Python, NASA Langley Research Center, June 8–9, 2017

Programming with Python, NASA Langley Research Center, January 26–27, 2017

Departmental Service

Geography Ph.D. program faculty representative, University of Santa Barbara, 2018–19

Computing Resources Committee, University of Santa Barbara, 2017–2018

PROFESSIONAL AFFILIATIONS

American Geophysical Union

The Carpentries (Software and Data Carpentry)

National Geographic Explorers

CREDENTIALS

Certified Instructor for Software and Data Carpentry, including geospatial data science lessons

SELECTED MEDIA COVERAGE

2019 *The UCSB Current*. "Eyes in the Sky: National Geographic awards geographer Kelly Caylor an 'AI for Earth Innovation' grant" January 29, 2019.

2018 *southbigdatahub.org*. "Old Dominion University: A Melting Pot of Learners and Perspectives Creates an Impactful Workshop" October 27, 2018.

SKILLS AND METHODS

Statistical and Computational Methods

Computational statistics and machine learning, radiometric and atmospheric calibration of multispectral and hyperspectral imagery, evapotranspiration estimation (leaf to canopy scales), water balance modeling, isotope mixing models, Aquacrop simulation model for crop yield estimation

Data mining, data wrangling, Python (including numpy, scipy, pandas, matplotlib, statsmodels, scikit-learn, and scikit-image), deep learning (including pytorch, fastai, imgaug, and detectron2), Apache Spark, Amazon Web Services, Microsoft Azure, JavaScript, HTML, MySQL.

Geospatial Methods and Tools

ENVI, MODTRAN, geopandas, rasterio, rasterstats, rasterfames, geopyspark, rastervision, Planet Labs API, spatial analysis, QGIS, GRASS GIS, ArcGIS, Leaflet

Field Methods

Use of thermal radiometers, plot level plant morphology measurements, biomass weighing, and geolocating transect and point data. Tree coring, measuring leaf level transpiration and carbon assimilation with LI-COR instruments, collecting water samples from free water and tree cores for isotopic analysis, auguring for soil samples and taking soil moisture profile measurements.

Updated July 2020