## Savannah Cooley

savannahcooley@gmail.com | 805-252-8837

## Education

*Columbia University* – New York, NY
• Ph.D. student, Department of Ecology, Evolution, and Environmental Biology        **2020 - present**


*Clark University* – Worcester, MA
• M.S. Geographic Information Science                                                                          **2017**
• B.A. Economics (High Honors), Minors in Geography and Mathematics                          **2016**
                              Concentration in Computational Science
Traina Scholar: Full-tuition scholarship for students in the sciences                          **2012-2016**
First Honors Dean's List: recognizes GPA of 3.8 or above for academic achievement    **2013-2017**


*Rotary Youth Exchange Student*, Escola Paulo Freire (high school) – Campo Grande, Brazil   **2010-2011**
*Santa Barbara City College & Midland School* (high school) – Santa Barbara, CA         **2008-2012**

## Current Work Experience

**Applied Science Systems Engineer,** Instrument Software and Science Data Systems Section
*NASA Jet Propulsion Laboratory (JPL) | Columbus Technologies, Inc.* — Pasadena, CA        **2018 - present**


**Co-Investigator**, NASA-USAID SERVIR Amazonia Hub (https://servirglobal.net/)        **2019 - present**
• SERVIR, a joint initiative of NASA and the U.S. Agency for International Development (USAID), fosters applications of Earth observations to help developing countries assess environmental conditions and improve their planning and actions.
• My work supports a Zero Deforestation Supply Chain initiative and climate mitigation planning in Peru. I investigate how canopy structure and aboveground carbon in primary and secondary forest as well as in agroforestry cocoa systems relate to biogeochemical cycling. I use data from NASA's Global Ecosystem Dynamics Investigation (GEDI) mission, a light detection and ranging (LiDAR) laser mission comprised of 3 lasers each covering a 25 m footprint on Earth's surface over which 3D canopy structure is measured.


**Working group member,** United Nations Global Risk Assessment Framework, (https://www.undrr.org/)
NASA Disasters Program, Earth Science Division (https://disasters.nasa.gov)        **2020 - present**
• As a NASA-JPL representative on the working group for the United Nations Office for Disaster Risk Reduction's Global Risk Assessment Framework (GRAF) initiative, my primary responsibility involves synthesizing scientific knowledge into actionable information and policy guidance for climate mitigation, adaptation and disaster risk reduction at regional, national and international scales.
• My work informs the NASA Disaster Risk Reduction Program's strategic planning efforts for stakeholder engagement, solicitation development, and applied research prioritization.

**Researcher / Data Scientist**, ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) mission (https://ecostress.jpl.nasa.gov/)                                        **2019 - 2020**
• ECOSTRESS is a thermal radiometer that launched on the International Space Station in June 2018 and produces an evapotranspiration (ET) data product at 70-m pixel resolution.
• My work addresses one of ECOSTRESS' key science objectives: to assess water use efficiency (WUE, the ratio of carbon gain quantified as Gross Primary Production (GPP) to water consumption quantified as ET) in regions where global climate models show the largest disagreement in WUE estimates.
• First author in resulting publication (see publications list below).

**Impact Lead**, NASA Western Water Applications Office, Applied Sciences Program
(https://wwao.jpl.nasa.gov)                                                                                                       **2018 - 2020**
• The NASA Western Water Applications Office (WWAO) aims to strategically (i) connect stakeholders with NASA data; (ii) develop custom solutions through applied science projects; and (iii) assist transition of promising applications to operations or to the private sector.
• As Impact Lead, I worked with WWAO project teams to refine technical deliverables, project outputs, stakeholder engagement and applications transition plans in order to enhance the likelihood of transition from research to operations and in doing so maximize the societal benefits that result from integrating NASA Earth observations into water management decision making in the Western U.S.

**Applied Science Data Products Lead,** Gravity Recovery and Climate Experiment Follow-on (GRACE-FO) mission (https://grace.jpl.nasa.gov)                                                                          **2018 - 2019**
• First author in the GRACE-FO Level 3 Data Handbook, published on NASA's Physical Oceanography Data Active Archive Center (PO.DAAC). The Level 3 Data Handbook goes into depth on the GRACE/GRACE-FO science data processing system architecture, featured data applications, as well as a set of reproducible use cases of GRACE-derived Terrestrial Water Storage anomalies.
• My second project with GRACE-FO aimed to combine three sets of spherical harmonic gravity field solutions (Level 2 data) to minimize the error and bias of the final solution. This involved implementing an iterative Variance Component Estimation algorithm to estimate weights of each solution over time.

**NASA-JPL Disasters Program Coordinator**, NASA Disasters Program, Earth Science Division
(https://disasters.nasa.gov)                                                                                                      **2018 – 2020**
• The NASA Disasters Program promotes the use of Earth observations to improve prediction of, preparation for, response to, and recovery from disasters.
• As a Disasters Coordinator at NASA-JPL, I connected JPL data and modeling capabilities with emergency preparedness leaders in support of developing mitigation approaches, such as early warning systems, and provided information and maps to disaster response and recovery teams.

**Researcher for ECOSTRESS Science and Applications Team (M.S. Thesis)**
*NASA - JPL and Clark University* — Pasadena, CA and Worcester, MA                                  **2016 - 2017**
• Funded by ECOSTRESS Applications team to apply simulated ECOSTRESS evapotranspiration (ET) data using the Priestly-Taylor Jet Propulsion Laboratory (PT-JPL) model to improve drought monitoring.
• Used multiple remote sensing-based indicators, including ET, potential ET and Evaporative Stress Index to estimate vegetation stress across forest, grassland and agricultural areas in case study of Guanacaste, Costa Rica.
• First author in publication in *Ecological Applications* journal (see publications section below).

**NASA DEVELOP Research Intern**

*NASA Jet Propulsion Laboratory and EARTH University* — Pasadena, CA          **Summer 2016**

• Simulated Level-2 land surface temperature ECOSTRESS data and delivered data product and presentation to project partner EARTH University in Guanacaste, Costa Rica.

• Created experimental design to demonstrate how ECOSTRESS data can inform precision agriculture irrigation practices and partially replace the need for costly in situ data collection.

**Researcher for Urban3 Consulting Firm (Honors Thesis in Economics)**

*Urban 3 and Economics Department, Clark University* — Ashville, NC and Worcester, MA      **2015-2016**

• Developed a spatial econometric model for Urban3 client Lafayette, LA government to predict land value per acre based on network centrality measures, environmental and economic factors. This work served to quantify the economic benefits of dense mixed-use urban development.

• Estimated infrastructure costs of different development patterns, including dense, mixed-use areas as well as suburban and "leap frog" development using Python. We applied this methodology to Urban3 client Lancaster, CA. Lancaster designed its policy of a development impact fee based on the results of this project.

**Research Intern at the UCSB Spatial Center**

*Geography Department, University of California, Santa Barbara* — Santa Barbara, CA      **Summer 2015**

• Worked closely with UCSB Map & Imagery Library to establish best practices and a beta implementation of an online graph database discovery portal that features geospatial data generated by UCSB researchers.

• Helped organize the Data Discovery Expert Meeting: facilitated break out group discussions and was the first author on the final report of the expert meeting.

• Co-author in the resulting publication.

**Remote Sensing Specialist**

*Iracambi Research Center* — Atlantic Rainforest, Minas Gerais, Brazil          **Summer 2014**

• Partnered with GIS team to create an interactive web mapping application (WMA) for two conservation protection areas. The WMA featured GIS and remote sensing data sets showing mining company's bauxite concession zones, water resources, landslide risk, and ideal reforestation areas.

• Met with the regional Brazilian Ministry of Environment and Agriculture to present the WMA and discuss the potential risks of bauxite mining to water resources and farmer livelihoods in Rosario da Limeira.

**Heat Transfer & Thermal Management Researcher**

*Physics Department, Clark University* — Worcester, MA          **2013 - 2014**

• Computed Monte Carlo simulations of heat transfer in binary mixtures of gasses traveling over small blocks in a tube, adjusting temperature, velocity and block shape variables to generate novel designs for efficient heat transfer surfaces.

**Skills and Technical Capabilities**

**Fluent in:**
*Spanish* – lived and studied in Mexico for 4 years from 2004-2008.
*Portuguese* – studied abroad for 10 months during junior year of high school in 2011 and did a 3-month summer internship as an undergraduate student in Brazil in 2014 (see Work Experience section above).

**Proficient in:** Python and R programming languages.
**Technical Expertise**: remote sensing, time series analysis, spatial econometric modeling, spatial statistics, evapotranspiration modeling, data interpolation, network modeling and analysis, drought assessment, land cover classification, post-classification analysis, accuracy assessment, data processing and analysis of optical, infrared and thermal imagery.

**Relevant Coursework:**
*Graduate Level* – Probability and Statistics (Vector Calculus requirement), Advanced Biostatistics (in R), Hydrology (Matlab), GIS & Accuracy Assessment (R), Advanced Vector GIS (ArcGIS and Geoda), Advanced Raster GIS (Idrisi Terrset and Python), Advanced Remote Sensing (Idrisi and R), Python Programming, Programming with GIS (Python).
*Undergraduate Level* – Multivariable Calculus, Linear Algebra, Discrete Math (Python), Electricity & Magnetism with Calculus, Data Structures (Java), Econometrics (Stata), Macroeconomics, Environmental and Resource Economics, Microeconomics with Calculus.

**Leadership and Community Engagement**
- Endorsement Lead for Pasadena-Foothills chapter of Citizens Climate Lobby (CCL)    **2017-present**
- Manager of successful multi-chapter campaign to pursue endorsement of Energy Innovation and Carbon Dividend Act (H.R. 763) from the LA County Board of Supervisors    **2019-present**
- Chief Financial Officer for CreateCommunity non-profit organization    **2018-present**
- Facilitator for Alternative to Violence Project workshops in Women's prison    **2018-present**
- Elected M.S. Student Representative, Clark University Geography Department Faculty    **Fall 2016**
- Elected Wright Hall Student Representative, Clark University Undergraduate Council    **2012-2013**

**Selected Publications**
- **Cooley, S.,** Williams, A., Fisher, J., Perret, J., Halverson, G., & Lee, C. (2019). Improving drought assessment by examining vegetation response with evapotranspiration: a case study in Guanacaste, Costa Rica. *Ecological Applications*. doi: 10.1002/eap.1834.
- **Cooley, S.** & Landerer, F. (2019). Gravity Recovery and Climate Experiment Follow-on (GRACE-FO) Level-3 Data Product User Handbook. *NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC)*. https://podaac-tools.jpl.nasa.gov/drive/files/allData/gracefo/docs/GRACE-FO_L3_Handbook_JPL-D-103133_20190327.pdf
- Lafia, S., Jablonski, J., Kuhn, W., **Cooley, S.,** & Medrano, F. A. (2016). Spatial discovery and the research library. *Transactions in GIS*, 20(3), 399-412.
- **Cooley, S.,** Lafia, S., Medrano, A., Stephens, D., & Kuhn, W. (2015). Spatial Discovery Expert Meeting, Final Report. *Spatial Center, University of California, Santa Barbara.*

## Selected Presentations

- **Cooley, S** (December 2019). (Invited talk for AGU Centennial Celebration). The Role of Scientists in Catalyzing Action on Climate Change [PowerPoint presentation]. *2018 Fall Meeting, American Geophysical Union.* San Francisco, CA.
- **Cooley, S.,** Fisher, J., & Halverson, G. (December 2019). A First Look at ECOSTRESS Water Use Efficiency [Poster presentation]. *2019 Fall Meeting, American Geophysical Union.* San Francisco, C.A.
- **Cooley, S.,** & Melton, F. (August 2019). NASA Earth Science Applications with Promising Potential for Technology Transfer [PowerPoint presentation]. *2019 NASA WWAO & Western States Water Council Workshop on Research to Operations (R2O) for water management in the Western U.S.* Irvine, C.A.
- **Cooley, S.,** Williams, A., Fisher, J., Perret, J., Halverson, G., & Lee, C. (December 2018). Improving drought assessment by examining vegetation response with evapotranspiration: a case study in Guanacaste, Costa Rica [PowerPoint presentation]. *2018 Fall Meeting, American Geophysical Union.* Washington, D.C.
- **Cooley, S.** (December 2018). Impact Assessment for Data-driven Water Resource Management in the Western U.S. [PowerPoint presentation]. *2018 Fall Meeting, American Geophysical Union.* Washington, D.C.
- **Cooley, S.** Reager J.T., Landerer, F., & Srinivasan, M. (October 2018). Experimental Development of Value-Added Data Products for GRACE and GRACE-FO [Poster presentation]. *GRACE-FO Science Team Meeting.* Potsdam, Germany.
- **Cooley, S.,** Williams, A., Fisher, J., Perret, J., Halverson, G., & Lee, C. (April 2017). Assessing variable landscape response to drought: a case study in Guanacaste, Costa Rica [PowerPoint presentation]. *NASA Land Cover Land Use Change Annual Meeting*. Washington, D.C.
- **Cooley, S.,** Williams, A., Fisher, J., Perret, J., Halverson, G., & Lee, C. (May 2017). Assessing variable landscape response to drought: a case study in Guanacaste, Costa Rica [PowerPoint presentation]. *ECOSTRESS Science Team Meeting*. Sacramento, CA.
- **Cooley, S.** & Lee, C. (October 2017). Applications of Thermal infrared and evapotranspiration data for improving agricultural water use and land stewardship practices [PowerPoint presentation]. *HyspIRI (Hyperspectral Infrared Imager) Science Team Meeting*. Pasadena, CA.