

**GEOSPATIAL
EVALUATION AND
OBSERVATION
LAB**

ANNUAL REPORT

JAN 2020 - DEC 2020
COVID-19 EDITION

GEOLAB.WM.EDU

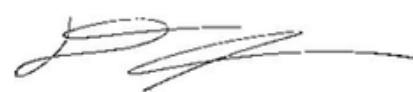
a years' overview

GEOLAB IN 2020

2020 - the best year in the books. That's right! While the rest of the world took a deep breath, we started a sprint - and looking back on the year, it's really quite incredible what we've accomplished. geoData students have contributed to reports and projects for the FAO, GEF, DHS and more, and the data dashboard is ready-to-go and will be launched next year alongside geoBoundaries 4. gB itself has made huge progress, and we are now working with the UN, Gates, CIESIN and many other partners to make the dataset soar (if you haven't, go take a peek at geoboundaries.org). The geoDev team has been working on the roadRunner project - satellite imagery + road quality - with over 30 undergraduates across six other universities within the Commonwealth. And geoParsing had it's first big public blogs go live over at tearline.mil; building on that, we just had a new request for satellite tasking go in a few days ago for the next round of articles. We had our first Ph.D. - Dr. Goodman - graduate, and have welcomed a new Ph.D. (Ethan) into the fold. And all of that is just the tip of the iceberg!

Headed into 2021, we have even more to look forward to. The new version of geoBoundaries is going to see a huge shift in the lab, as geoData's portal and geoBoundaries merge to form - megazord? We have a number of papers on computer vision and satellite imagery coming down the pipeline, so I look forward to adding to the nearly 20 published undergraduates this year! geoDev is headed into the home stretch of the roadRunner project (with a data poisoning competition), and gP is swinging for the fences with it's next round of publications and datasets (looking at you, TRACAR). 2020 was good - 2021 is going to be great.

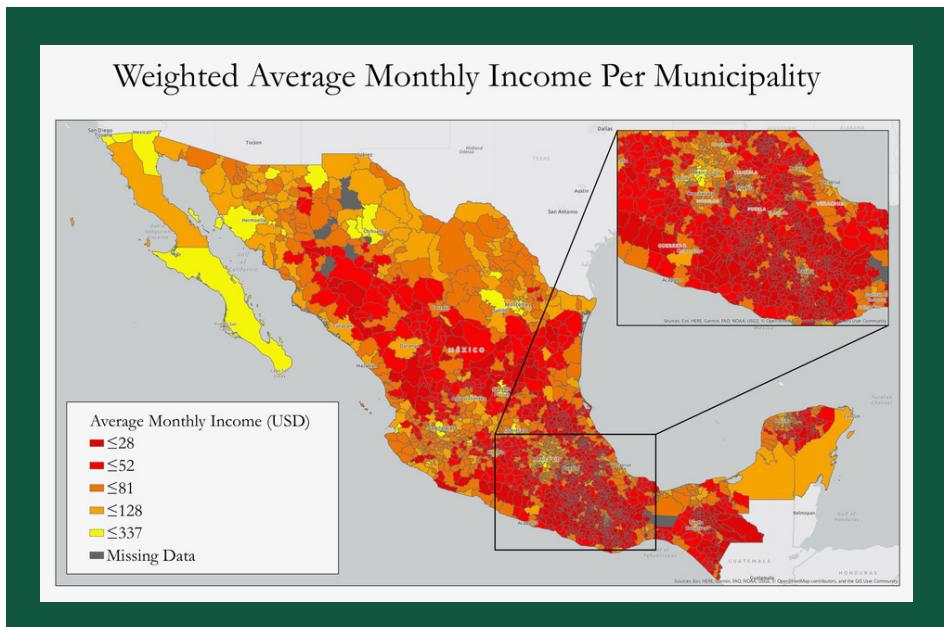
Onward to 2021,



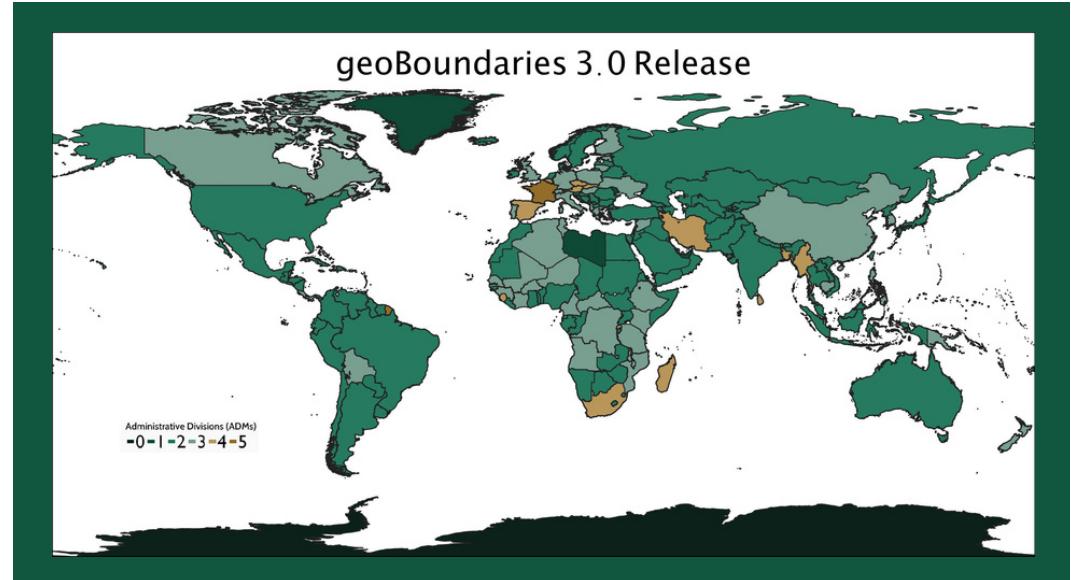
Dan Runfola



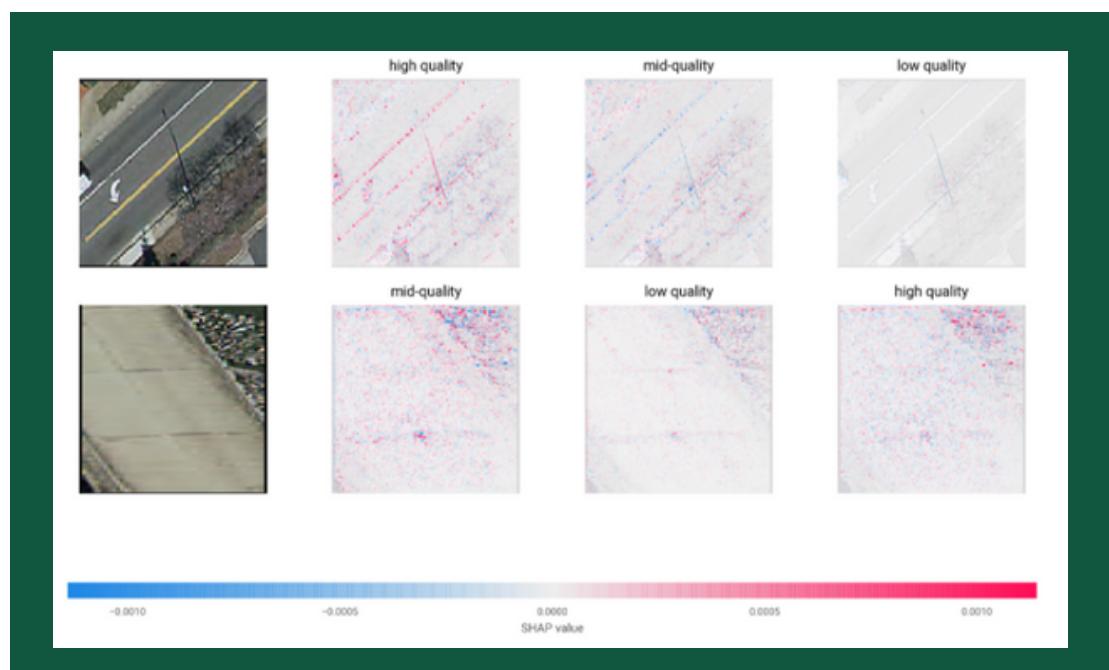
The **geoData** team rebuilt their structure to include two sub-teams that search for and catalogue SDG data as well as a data analytics branch. The Analytics team used deep learning modules and satellite imagery to work with several NGOs and government partners. The geoData dashboard release is coming in 2021!



The **geoDev** team is working on the RoadRunner Project—we brought together 30 students to collect 53,686 images of various quality roads using an app developed last year. The qualities of roads were divided into three classes and were differentiated through an IRI (International Roughness Score). Outside of RoadRunner, our geoDev consultants have been working with geoParsing to build the SCOPE Data dashboard and web scrapers to gather sources. Consultants also worked with the GEO Project on geoData to make their website functional. More django than anyone wanted!



The **geoBoundaries** team released geoBoundaries 3.0 during the summer. This semester geoBoundaries moved all files to GitHub and began work on three separate release types for its upcoming 4.0 release. The team also continued work with CIESIN out of Columbia University and conducted a project for Verified Voting.



The **geoParsing** team's BRIGHT Project published two papers on the front page of NGA's Tearline resource detailing the BRI's work in seven Caribbean ports and energy infrastructure in Cuba. The TRACAR Project continued to collect data concerning activities in CAR, Sudan, and the DRC. The INNOVATION team worked on developing SCOPE, the public facing geoParsing dashboard.

GEOLAB GRADUATES

Keeping Track of What Everyone Does Next



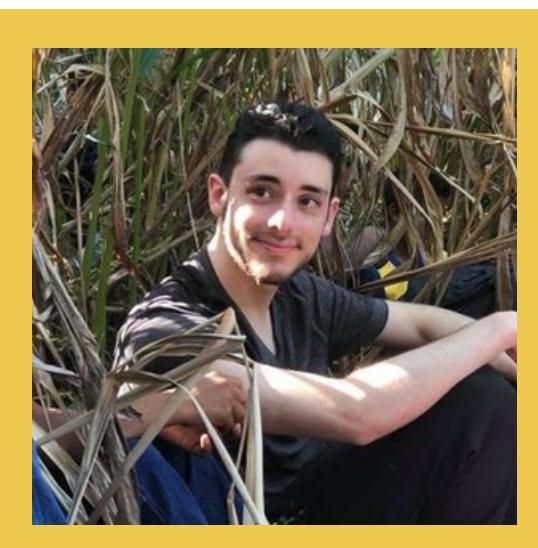
Joshua Panganiban
Accounting at Deloitte. Who's surprised.



Heather Baier
Working at LMI for now but she'll be back in February!



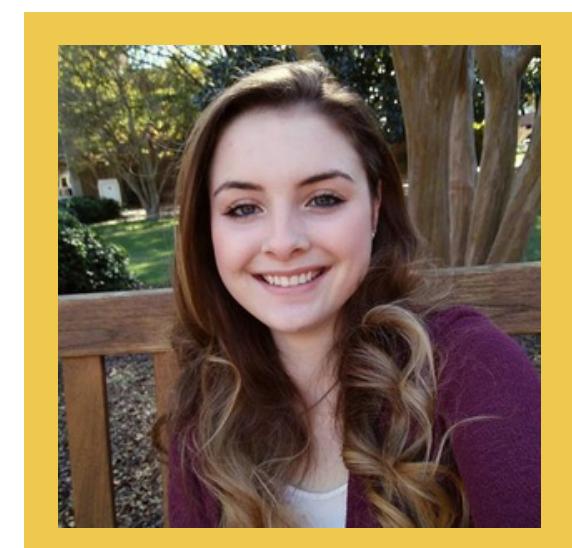
John Napoli
Building some cool models at the Brattle Group!



Nicolas LaGamma
Academic Coach in California!



Greyson Pettus
Working in sustainability!



Audrey Way
Associate at Lafayette Group



Elizabeth Dowker
Consulting at Booz Allen Hamilton



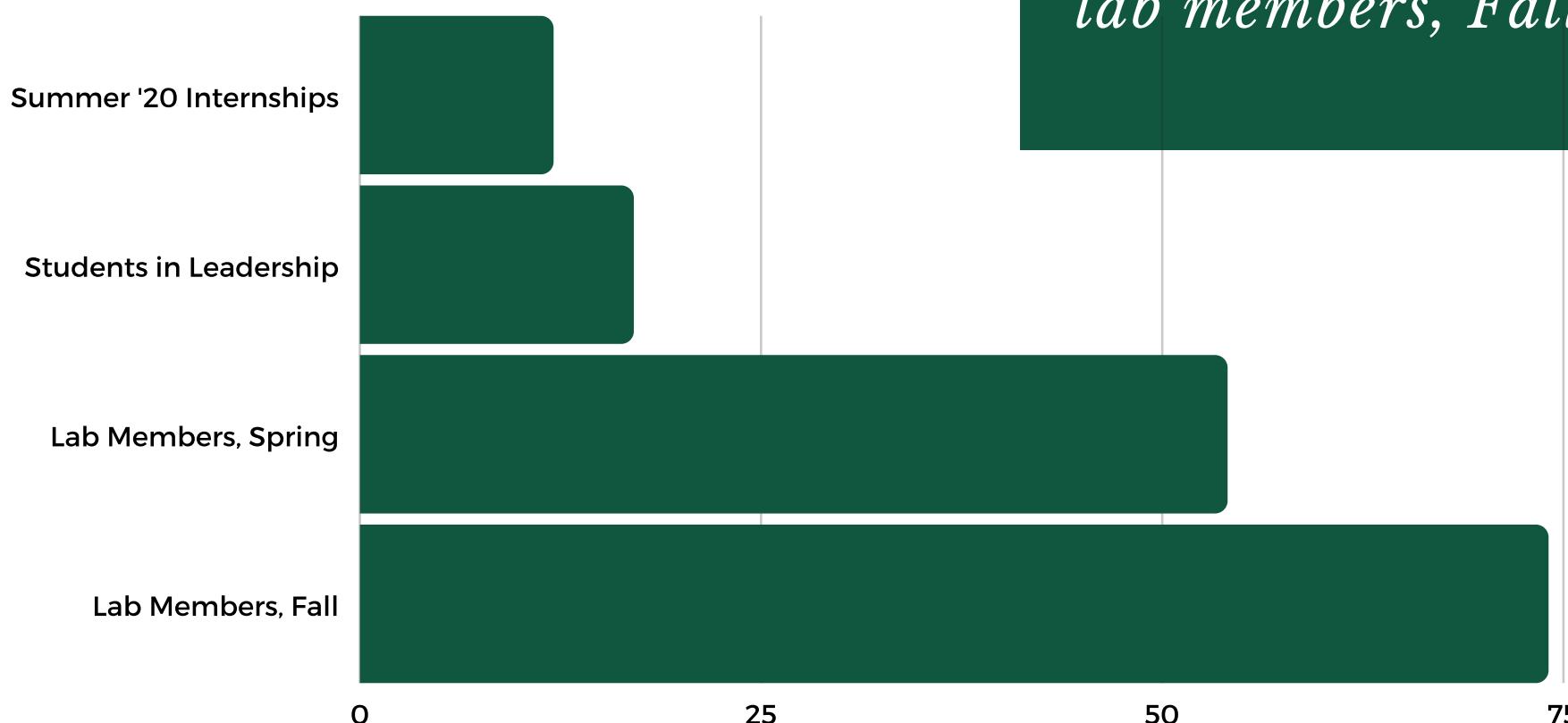
Eric Nubbe
Developing software at Leidos

100%

The geoLab aims to have 100% of its students employed in a field they love post-graduation; we work towards this goal by involving students in applied projects with external practitioners. Have a good project and want to collaborate? Email us: danr@wm.edu.

NUMBERS & STATISTICS

In the past year we have undergone massive growth—we had 31 members last fall and this fall we had 74! As we grow, we are focused on making sure we can continue to provide many leadership opportunities and meaningful work.



14

sponsored internships

74

lab members, Fall '20

GEOLAB DURING COVID-19

COVID-19 has certainly presented its challenges, but the geoLab found fun and creative ways to keep itself alive. From Zoom games to socially distanced picnics outside, we tried a lot of new things to help keep our community strong. We played Kahoot with baby photos, Among Us, Pictionary, and so many io games. We can't wait to be able to pack the Loud Lab with people again!



Students on the BRIGHT team have a picnic (outside and socially distanced, of course!) because not even COVID-19 can ruin BRIGHT team spirit! Just don't look close enough to read what's on Matt's shirt.

LAB TEAM MEMBERS

Acknowledging all of the contributions that make the geoLab go, these are all of the students currently in the lab (Fall '20).

GeoData

Coyote Farrell (Team Lead)

Laura Opsahl-Ong (Analytics Lead)

Jane Siwek (Catalogue Lead)

Joe O'Brien (Search Lead)

Laura Mills

Caroline Edwards

Elias Wolman

Olivia Wachob

Ali Reynolds

Naomi Levin

Laura Kirk

John Hennin

Suditi Shyamsunder

Sebastian (Zak) Zeldon

Fatima Pate

Niraj Patel

Maeve Naughton-Rockwell

GeoBoundaries

Sydney Fuhrig (Director)

Sylvia Shea (Managing Director)

Austin Anderson

Andrew Peck

Hannah Slevin

Maddy Mulder

Sidonie Horn

Sean Murphy

Hadley Day

Lydia Troup

Dominick Fornatora

Natalie Spage

McIhael Roth

Joshua Habib

Dorian Miller

Carolina Rivera

Neel Simpson

Lindsey Rogers

Helena Buckman

Sam Updike

James Turner

Kristina Pukiewicz

GeoDev

Grace Lee (Team Lead)

Jason Lin (RoadRunner Project Lead)

Chengzhuo Nolan Ma

Yaw Ofori-Addae

Jiaying (Tina) Chen

James Yao

Calvin Bertoncini

Kerry Wang

Jacob Somer

Langston Lee

Linda Ma

Robert West

GeoParsing

Matt Crittenden (Sr Program Manager)

Kate Munkacsy (INNOVATION Prog. Man.)

Celia Metzger (TRACAR Proj. Man.)

Caroline Morin (BRIGHT Proj. Man.)

Emily Maison (Asst. BRIGHT Proj. Man.)

Monica Alicea

Monica Sandu

William Weston

Erin Horrigan

Remington Fritz

Garrison Goetsch

Cole Spiller

Katerina Viyella

Amelia Grossman

Rachel Li

Yiwen (Wendy) Sun

Landon Clime

Asha Silva

Kaitlyn Wilson

Tara McLaughlin

A memory from pre-COVID times
—we had a geoLab barbecue at John and Austin's house to kick off the semester! We got on the roof and hung chips from the trees. Also, if you were lucky you got to meet the chickens!

Lab Support Staff

Olivia Hettinger (Lab Director)

Elizabeth (Lulu) Dawes (Journalist)



Publications, Presentations, News and Datasets

- Sidman, G.; Fuhrig, S.; Batra, G. The Use of Remote Sensing Analysis for Evaluating the Impact of Development Projects in the Yellow Sea Large Marine Ecosystem. *Sustainability* 2020, 12, 3628.
- Goodman, S., BenYishay, A., Runfola, D.. 2020. A Convolutional Neural Network Approach to Predict Non Permissive Environments from Moderate Resolution Imagery. *Transactions in GIS*.
<https://doi.org/10.1111/tgis.12661>
- Runfola, Daniel, Austin Anderson, Heather Baier, Matt Crittenden, Elizabeth Dowker, Sydney Fuhrig, Seth Goodman, Grace Grimsley, Rachel Layko, Graham Melville, Maddy Mulder, Rachel Oberman, Joshua Panganiban, Andrew Peck, Leigh Seitz, Sylvia Shea, Hannah Slevin, Rebecca Yougerman, Lauren Hobbs. "geoBoundaries: A global database of political administrative boundaries." *Plos one* 15, no. 4 (2020): e0231866.
- Runfola, D.; Batra, G.; Anand, A.; Way, A.; Goodman, S. 2020. Exploring the Socioeconomic Co-benefits of Global Environment Facility Projects in Uganda Using a Quasi-Experimental Geospatial Interpolation (QGI) Approach. *Sustainability*, 12, 3225. <https://doi.org/10.3390/su12083225>
- Dr. Seth Goodman (Applied Science, Computational Geography, Ph.D.). Dissertation Title: Filling in the Gaps: Applications of Deep Learning, Satellite Imagery, and High Performance Computing for the Estimation and Distribution of Geospatial Data. 2017 - 2021.

Summer '20 Internship Destinations

Splunk (Grace Lee), Council on Open Building (Austin Anderson), Independent Evaluation Office (IEO) of the Global Environment Facility (Sydney Fuhrig, Emily Maison, Jiaying Chen, Laura Mills, Josh Panginaban), Lateral Innovation (LI) team of the Office of the Director of National Intelligence (ODNI) (Sydney Fuhrig), VidMob Inc (Sylvia Shea), NOAA (Andrew Peck), GRID-3 (Austin Anderson, Natalie Spage, Coyote Farrell, Lydia Troup, Sean Murphy, Sidonie Horn), FAO (Emily Maison, Jiaying Chen, Laura Mills)

Notable Accomplishments & Awards, 2020

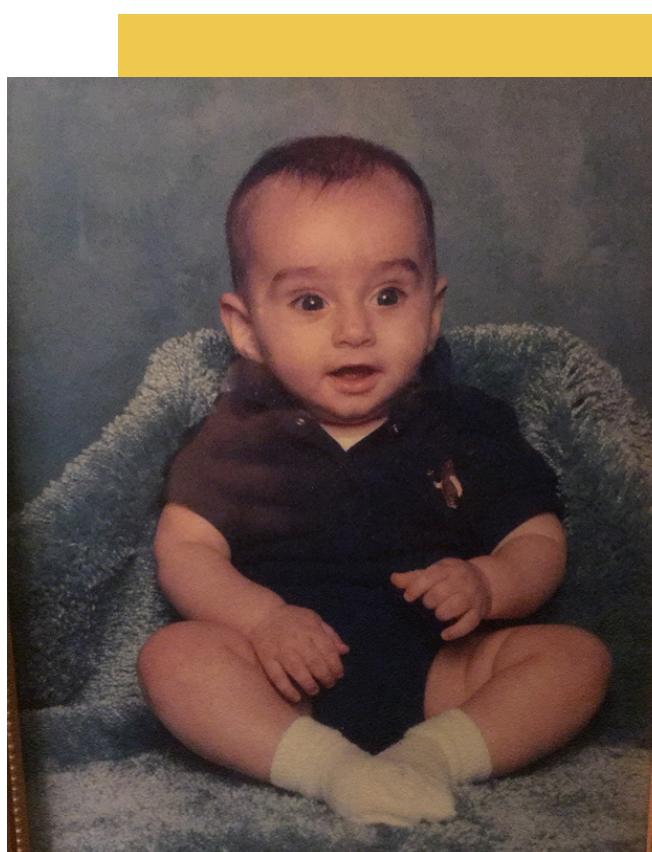
Finalist—Rhodes Scholarship, J. Binford Walford Scholarship, Donald B. Irwin Memorial Scholarship, Mortar Board Senior Honor Society, Pi Sigma Alpha Political Science Honor Society, Creative and Critical Thinker in People of W&M Campaign, 1693 Scholar, Sharpe Community Scholar, Monroe Scholar, Dobro Slovo Russian Honors Society, Honorable Mention—National Russian Essay Contest

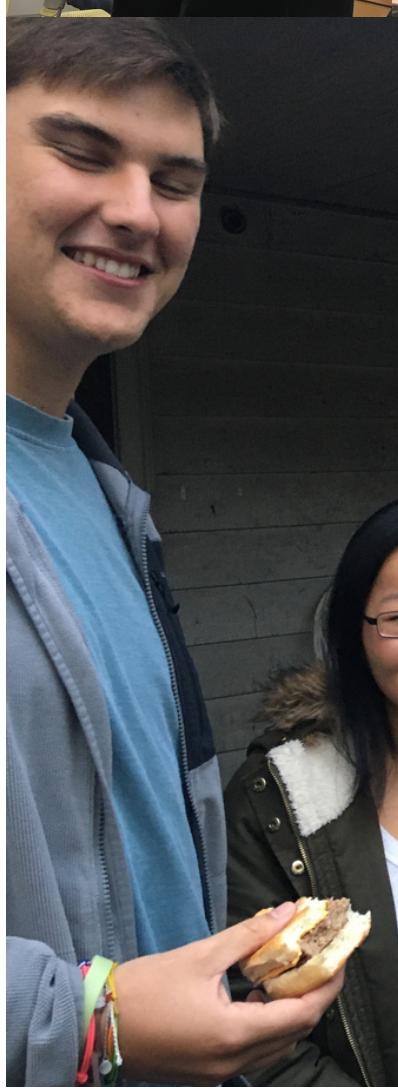
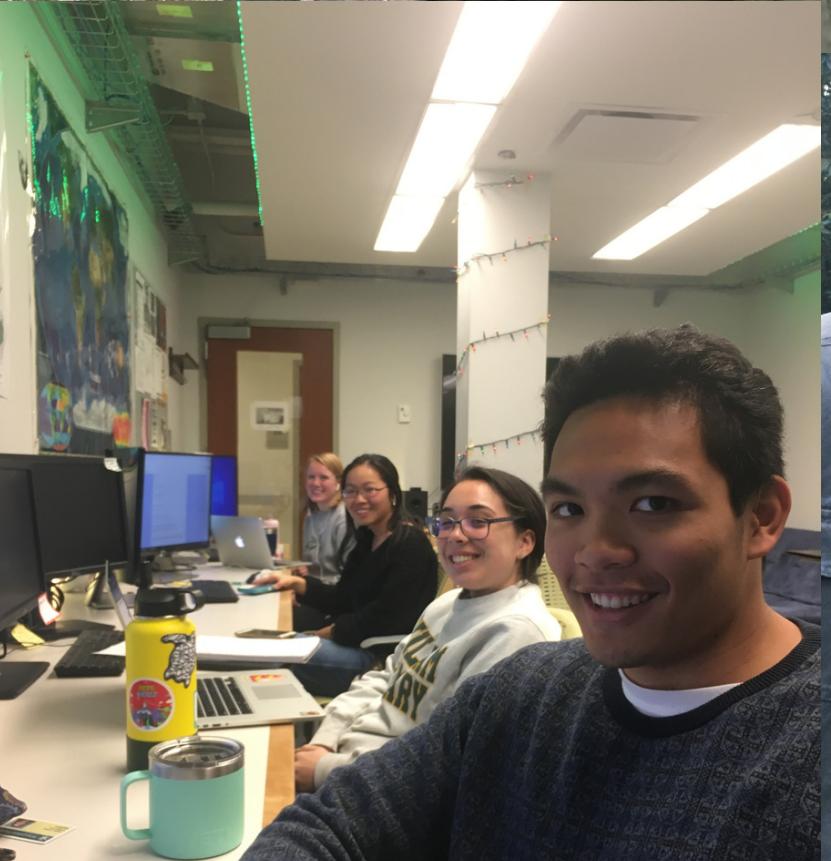
Double Platinum Level Donors (>0.01 USD)

Heather ('20), Jack ('19), Dan Runfola (Donated a Keurig Machine), Anonymous (Left their Fridge)

Best geoLab member Baby Photo: John Napoli

THE WALL OF FAME





The geoLab works to build a more secure, sustainable and vibrant world through AI, machine learning, and geospatial data. Somewhere along the way we got distracted and also started disrupting how education happens at William and Mary. Learn more about us or give to the lab by visiting geolab.wm.edu.