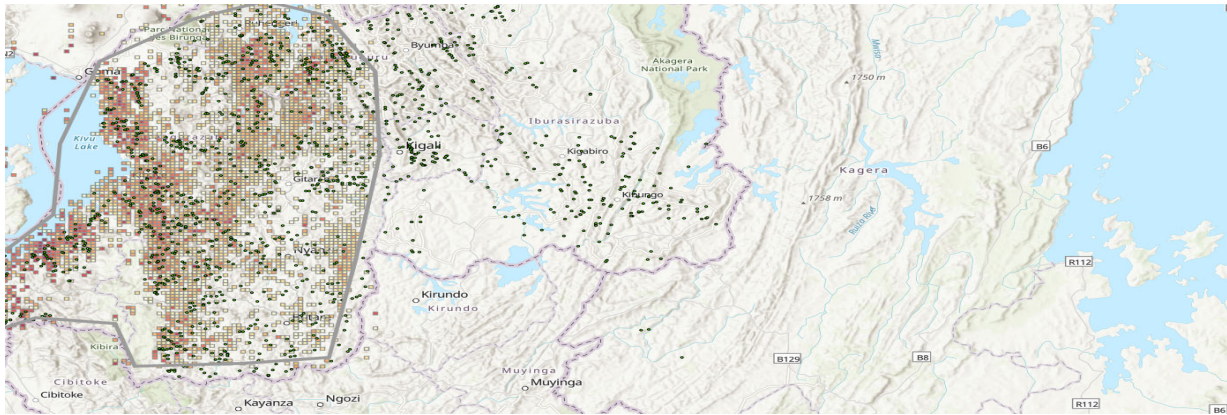# CU Boulder Earth Lab
## Remote Sensing and Machine Learning Graduate Research Assistant



An exciting opportunity is available for a graduate research assistant (GRA) to work jointly with a non-profit Bridges to Prosperity (B2P) and University of Colorado Boulder, Earth Lab to research and develop Python-based tools to assist B2P in assessing locations for footbridge construction. We are looking for an independent and highly motivated student who loves working with data, has programming skills in Python, is interested in machine learning and impactful environmental research, and would appreciate the opportunity to improve and hone their skills through working side-by-side with B2P and Earth Lab experts. The student will work closely with the Earth Lab Analytics Hub and B2P to develop tools which will be deployed in real-world scenarios which directly impact communities in east African nations.

This GRA will work on a project identifying suitable locations for footbridge locations from high resolution satellite imagery in the form of Bing basemap imagery. B2P will be providing existing footbridge locations in the form of spatial data which can be used as training data to aid in building a classifier for image tiles in locations where B2P does not have this information. This has been an extremely difficult task due to the volume of imagery an analyst needs to sift through in order to identify suitable locations. Recent efforts from Earth Lab have demonstrated convolutional neural networks to be successful in classifying basemap image tiles as suitable or not suitable, and the GRA would build upon these efforts by incorporating new training data from unexplored geographies, as well as additional data layers as appropriate and depending on availability. The successful applicant will support the research and development of these tools and production of data layers for B2P to evaluate in the field which provides a feedback loop to further improve the tools and data layers.

The position will be from summer 2021 through spring 2022, for 20 hours per week in spring/fall and 40 hours per week in summer. The position will begin as fully remote but the candidate should be prepared to shift to in person when conditions allow, with 80% time (16 hours/week) working in the Earth Lab offices in the SEEC Building on the CU Boulder East Campus.

**Examples of Tasks Performed**
- Explore Bing maps API and imagery and document any challenges with finding, accessing, and using it (e.g. data structure, metadata).
- Create an open, reproducible workflow in Python that allows non-experts to provide an area of interest (AOI) and process image tiles through a machine learning model to produce a spatial data layer representative of the AOI.

- Create a GitHub repository that serves as a public landing page to guide B2P personnel in identifying candidate areas for further investigation.
- Produce a manuscript and/or conference proceedings on methods and results.

**Minimum Qualifications**
- Current University of Colorado Boulder graduate student majoring in geography, computer science, applied math, environmental science, engineering, or related discipline.
- Ability to commit to working for 40 hours/week in summer 2021 and 20 hours/week in fall 2021 and spring 2022.
- Strong programming skills, ideally in Python, and desire to improve them.
- Strong skills in working with scientific data.
- An interest in earth, environmental, and data science.

**Preferred Qualifications**
- Experience with GIS and remote sensing.
- Experience with the Python programming language.
- Experience with machine learning packages in Python.
- Experience using GitHub.
- Previous research experience.

**What We Offer**
CIRES/Earth Lab follow the policies set by the CU Graduate School for salary and benefits for graduate students.

**Salary:**
CIRES/Earth Lab graduate students on a 50% effort GRA appointment (20 hours/week) are paid on the following schedule for FY21:
W/O Masters = $2,649.00/month
Pre-comps = $2,649.00/month
Post-comps = $2,790.00/month
Students on GRA appointments are paid once/month on the last business day of the month.

At 100% effort (40 hours/week), the pay schedule for FY21 is :
W/O Masters = $5,298.00/month
Pre-comps = $5,298.00/month
Post-comps = $5,580.00/month
Students on GRA appointments are paid once/month on the last business day of the month.

**Tuition remission:**
At 50% effort during the academic year (20 hours/week, spring/fall), students on a GRA appointment receive tuition remission for 9-18 credit hours of tuition. The student must use the tuition remission in the semester in which they hold the position.
Tuition for summer courses is **not covered** for students working at 100% effort (40 hours/week) as students are expected to be working full time and not taking courses.

**Insurance:**
a. Graduate assistant appointments of 20% or greater receive a university contribution to insurance benefits if enrolled in the Student Health Insurance Plan*.
b. Graduate assistant appointments of 20% or greater receive Dental Insurance at no cost to them.

c. Students who select the Buff Value insurance plan will not receive an insurance benefit contribution.
d. Students who are not enrolled for insurance in the spring and add it in the summer term will not be covered. If the hiring department wants to pay the insurance cost, they will need to contact the student health center directly to arrange payment.

*The insurance plan is the Gold Comprehensive Plan. The total plan cost for FY21 is $1948.00/semester. The insurance benefit covers $1,773.00 of the total cost/semester.

**Fees:**
a. Students are responsible for all mandatory fees each semester.
b. The total amount will vary depending on graduate status and the number of credit hours being taken.
c. For more information refer to http://bursar.colorado.edu/tuition-fees/fees-description/student-fees/

**About Earth Lab**
Earth Lab capitalizes on the data deluge from space and other platforms to accelerate science, reduce environmental, and train a new generation of earth data scientists. Earth Lab is a part of the CIRES institute at the University of Colorado - Boulder.

**About Bridges to Prosperity**
Bridges to Prosperity (B2P) creates safe access to critical destinations through partnerships with local governments to build trailbridges over impassable rivers. Currently, B2P identifies sites where trailbridges are needed through a systematic, field-based needs assessment process that relies on requests from government leaders at multiple administrative levels. While the existing process is effective in that it produces a reliable catalogue of need in a given geography and leverages local knowledge, it is time-and resource-intensive and limits the ability of B2P and its government partners to assess the scope and cost of required trailbridges at a regional or national level. Because an estimate of trailbridge needs is critical for long-term rural infrastructure planning, B2P is working to develop digital tools that will assess barriers to opportunities and services in rural low-income communities to locate where bridges are most needed.

**How to Apply**
Email joseph.mcglinchy@colorado.edu with a resume and cover letter as one pdf format document. Priority will be given to applications received by April 14th, 2021, but we will continue to review applications until the position is filled.