



Capacity Building Program Fall Intern Team Project

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CAPACITY BUILDING PROGRAM

NASA's Capacity Building Program (CBP) provides individuals and institutions with workforce development, training activities, and collaborative projects to strengthen understanding of Earth observations and expand their use around the world.

CAPACITY BUILDING INTERN TEAM

We are a team of five interns, and we set out this fall to create a virtual training for Groundwork USA Youth to teach them about NASA, remote sensing, careers in Earth Science, and more.

For the 16-week term, we collaborated virtually from California, New York, Virginia, and Minnesota.

The process of creating and implementing our training was split into three parts: Pre-Training, Implementation, and Post-Training.

CBP Intern Team

Ella Haugen



Monica Namo



Shilpa Kannan



Barri' Ragland-English



Rachel Chang



Mentors

Lauren Childs-Gleason & Mike Ruiz

White Papers

Exploration of ten topics of interest

- Barri' Ragland English: Types of Virtual Training and Pros/Cons for Each, CEOS Cove Tool
- Monica Namo: NASA's DAAC Pathfinders and Socioeconomic Data Center, GLOBE Observer App and Citizen Science Data Collection Apps
- Shilpa Kannan: Online Training Motivators and Competition-Based Learning, Culturally Responsive Teaching
- Rachel Chang: User Experience and User Interface Design for a Middle and High School Audience, Digital Credentials: Digital Badging and Certificates
- Ella Haugen: Groundwork USA Trust City Locations and Their Environmental Issues and Priorities, Effective Webinar and Microlearning Approaches



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Pre-Training: Research



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Pre-Training: Research

Review of Best Practices Documentation

ARSET Training:

Develop a training mission statement

Assess End-user needs

Build a network

Training promotion

Develop Training Material

Conduct Training

Evaluate the training

SERVIR Service Planning Toolkit:

Step 1: Preparation

Step 2: Identify impact

Step 3: Develop a pathway of change

Step 4: Operationalize impacts, outcomes and outputs by selecting indicators

Step 5: Define interventions

Step 6: Identify people and organizations, and their engagement in the service

Step 7: Articulate assumptions and conduct analysis of relevant issues

CEOS WGCapD Methods and Best Practices Document:

Analysis of needs, requirements, tasks

Design learning objectives, delivery format, activities and exercises

Develop a prototype, course materials

Implementation – Training implementation, tools in place, observation

Evaluate behavior, knowledge, results

Additional Resources: ESA Phi Week, Theory of Change research, CBP Overview and goals

Pre-Training: Research

Subject Matter Experts (SME) Interviews

DEVELOP: Dr. Kent Ross

- Choosing content with target audience in mind
- Relevant DEVELOP case studies to include
- Focus on urban flooding, canopy, urban heat islands
- Understanding what to look at to apply core issues

ARSET: Brock Blevins and Jonathan O'Brien

- Formulation of a training idea, objectives, and agenda
- From Idea to the Drawing Board/Storyboarding
- Scheduling
- Outreach Process, Materials, and Timeline
- Consistency and Branding
- Going Live/After the Fact
- Software and Platforms

White Paper

Types of Virtual Training and Pros/Cons for Each

Overview:

- The virtual training environment allows organizations the opportunity to appropriately complete training that requires collaboration and interaction amongst a particular group. Virtual training refers to training that is completed in an online or simulated environment.
- The goal of this research was to discover the common types of virtual training methods along with their perspective advantages and disadvantages to ensure that the Capacity Building Program can make Earth's data accessible to all in a virtual environment.
- This research highlighted the 6 common types of virtual training methods – Web-Based Learning, Webinars and Virtual Classrooms, Video-based Learning, Collaborative Learning and Microlearning

Outcome

Incorporated microlearning as part of a hybrid training format for the Groundwork youth

Findings

CBP could explore microlearning and collaborative learning approaches in DEVELOP and ARSET.

White Paper

Online Training Motivators and Competition-Based Learning

Overview:

- Focuses on defining online motivators as intrinsic and extrinsic, which allows further learning on how to best guide and encourage youth
- Importance is placed on understanding students through various assessments and applying motivators flexibly
- Ideal motivators for online learning include goal setting, rewards/praise, meaningful feedback, mentor involvement, and social connections
    - These lie in between the spectrum of intrinsic and extrinsic motivation, making it easier to tailor towards specific learner needs
- Finally, competition-based learning is expressed as a useful tool that allows multiple avenues to express motivators (e.g., goal-setting, rewards, and peer/mentor acknowledgement)

Outcome

Employed motivators such as social connections and a certificate in the Groundwork youth training

Findings

Surveying trainees to identify their motivational needs and restrictions, checking if mentor involvement is possible, creating rewards, planning out social/feedback opportunities

Keep track of how interactive trainees are and their responses to specific motivators

White Paper

Culturally Responsive Teaching

Overview:

- Focuses on the various applications of culturally responsive teaching in a virtual context, in addition to addressing the implementation methods needed to incorporate culturally responsive teaching in an online remote sensing data program for youth.
- In order to use culturally responsive teaching effectively, it is advised that uniting tools like surveys to gauge student interests, activities targeting social interaction, variations in learning expression, and the enablement of students to gain moments of leadership, will all help in developing a successful virtual course outline.
- Utilizing these means will create the best use of cultural differences of learners in order to best assist their potential, and will ultimately create an environment they can thrive in.

Outcome

Used pre-training surveys to understand trainees interests and preferences and designed the training format in response.

Findings

Offer online office hours to establish social connections

Provide offline support through a Google Form, discussion board assignments, shared drive with trainee introductions or other quick icebreakers

Let learners choose the presentation order and express what they would like to see going forward

White Paper

User Experience and User Interface Design for a Middle and High School Audience

Overview:

- Researched digital behavior, motivations, and interests of our training's target audience: middle school and high schoolers.
- Researched UX/UI design principles, effective methods to attract/increase usability for teens.
- Compared the pros/cons of current remote learning solutions such as Google Classroom, Duolingo, and NASA's Kid's Club, and gave suggestions for improvement so our training can learn from the information.
- Found that teens respond best to engaging and gamified experiences that will help them achieve their goals and be co-collaborators in creation. Due to attention spans, it is best to display information in segments or chunks, that are attractively designed with options to share their achievements on social media.

Outcome

Designed Groundwork trainings with short modules in response to short attention spans, employed video and written materials, used incentives for finishing, and enhanced the visual nature of the content

Findings

Conduct user testing by teens of different training materials that CBP makes available

White Paper

COES COVE Tool



Overview:

- Data from multiple satellite instruments must be utilized to help gain a better understanding of land surface processes at a variety of scales. The inter-calibration, comparison, and coordination of satellite instrument coverage areas are vital to international and domestic space agencies and organizations, such as NASA.
- The CEOS Visualization Environment (COVE) Tool allows users to visualize where and when different instruments can be used to observe a specific region.
  - This specific browser-based system enables users to leverage the capabilities of Google Earth, which displays satellite sensors coverage areas and coincidence scene locations.
  - Currently, COVE is being used by many countries including the United States, the United Kingdom, Russia, India, Italy, China, Brazil, Germany, Turkey, and many others

Findings

The CEOS COVE Tool can be helpful for CBP and partnering organizations to introduce a global community to visualizations of Earth observations.

The CBP should focus on the functionalities of the Acquisition Forecaster and Coverage Analyzer to implement into their trainings for the youth.

Both functionalities would enable students the opportunity to anticipate when a satellite can image and the ability to analyze historical coverage of a specific region.

White Paper

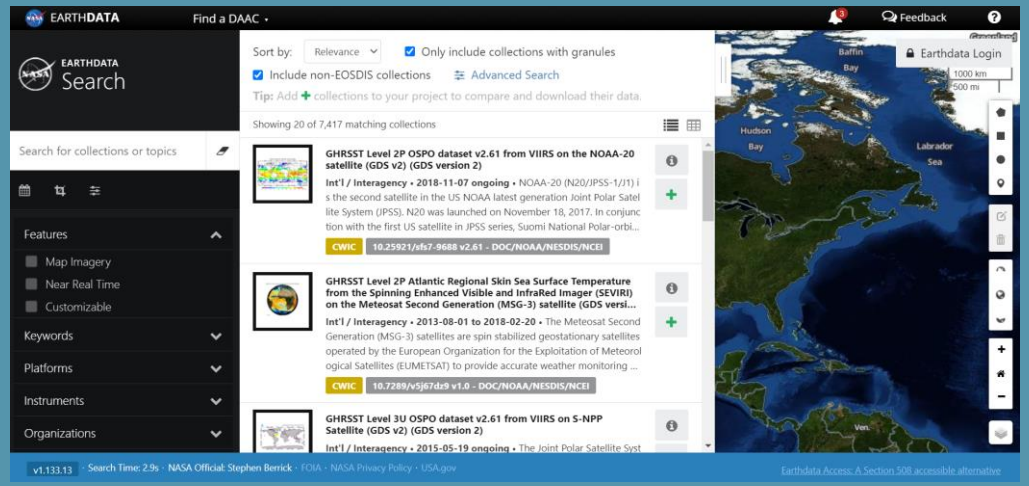
NASA's DAAC Pathfinders and Socioeconomic Data Center

Overview:

- Goal of the white paper focused on NASA's DAAC Pathfinders, Socioeconomic Data Center (SEDAC), and other datasets/toolkits to provide open-source materials and methods towards building capacity for high school and college students.
- Enabling a better understating of the statistical and technical skills needed to quantify and interpret data sets, an important skill in student's career.
- Whitepaper reflected on tools and open-source resources to help facilitate methodology on how data science methods can be used to allow more students in high school and college, to gain technical exposure to earth and life science observations.
- Making Earth observations more accessible than ever!

Findings

CBP should continue to incorporate SEDAC documentation, data sets, training materials, and tutorials into ARSET trainings and DEVELOP projects.



White Paper

GLOBE Observer App and Citizen Science Data Collection Apps

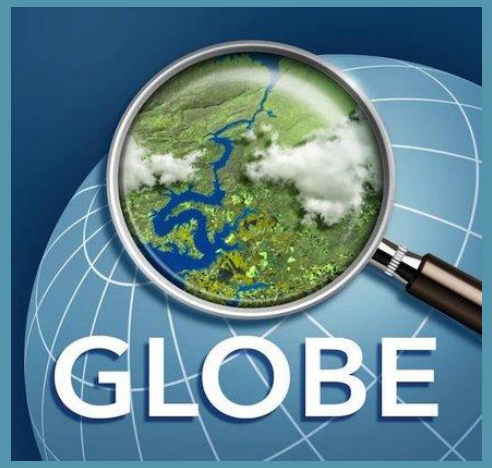
Overview:

- Researched both GLOBE and the Citizenscience.gov initiative to provide connections between their tools and resources towards the future of remote sensing trainings that will be held for high school students.
- GLOBE, an open-source platform to collect real-time data or retrieve datasets to conduct statistical analysis.
- Citizenscience.gov White House initiative, promotes youth STEM involvement and has amplified GLOBE in the past to increase student youth involvement in earth science related research.
- Many of the published case studies and projects conducted by both organizations has led to either new environmental policy initiatives or have made greater impact on the scientific research of earth science observations.

Findings

CBP could explore partnering with GLOBE on future trainings and emphasize real-time data collection.

Explore local organization partnership and the citizen science initiatives.



Pre-Training: Needs Assessment



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Pre-Training: Needs Assessment



Outreach

- Groundwork USA
- Boys and Girls Club
- The Urban Corps of San Diego County
- Tri-City Ecology Center
- Youth Environmental Academy
- And more!

Developing Questions

- What is the current knowledge level of environmental science and remote sensing of the youth that will be receiving the training?
- How have you been able to connect with students remotely due to COVID?
- What are the challenges that students face by participating in the program remotely?
- What career fields are the students participating interested in and what skills are they most looking forward to throughout their academic career?
- And more!

White Paper

Groundwork USA Trust City Locations and Their Environmental Issues and Priorities

Overview:

- Goal of building upon the needs assessment methods that are already in use by CBP and apply them to specific organizations such as Groundwork USA.
- Examination of Groundwork USA environmental issues and priorities through the lens of trust city locations.
- Emphasis Groundwork places on Youth Development through their green teams explored.
- Groundwork Milwaukee, WI, and San Diego-Chollas Creek, CA looked at specifically.
- Recommendation made to connect with Groundwork at the local level in order to create a training that targets youth.

Findings

The CBP-Groundwork USA relationship holds further opportunities for deeper engagement building off of/continuing with the Climate Safe Neighborhoods Project.

Youth across the Groundwork network are perfect recipients of CBP trainings.

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Pre-Training: Needs Assessment

Groundwork USA Meeting/Analysis

- Youth development: broad, depends on needs of community, most locations have Green Team Program
- Mode of Delivery for Training
- Content of Training
- Timeline
- Motivation
- Typical age: 14-18
- Trust range: 8-70 students (varies)
- Focusing on: own neighborhood, changeable circumstances (social justice, call to action)
- And more!

Student Pre-Training Survey

- How much experience do you have with Satellite Remote Sensing Data ?
- How do you feel overall about distance education ?
- Do you have access to a device for learning online ?
- What device do you use for distancing learning ?
- Which of the following assignment choices do you prefer ?
- Are you interested in quick challenges/competitions related to the online-training ?
- And more!

Pre-Training: Development



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White Paper

Effective Webinar and Microlearning Approaches

Overview:

- Took available resources and synthesized them to make a recommendation for the structure and format of our training, while taking the target audience into consideration.
- Compiled the team's research (past white papers), online articles, and best practices from capacity building organizations.
  - Live vs. Pre-recorded instruction
  - Competitive vs. Collaborative learning
  - Microlearning
  - SERVIR's Service Planning Toolkit
  - ARSET Training Methods
  - CEOS Training Methods and Best Practices Guidelines

Findings

Create a best practices document specifically for youth trainings with recommendations based on the outcome of this training

Creating more trainings for youth

Pre-Training: Development

Structure and Design

Microlearning

- Google Forms
- Shorter Assessments
- Applied Assignments

Webinars and Tutorials

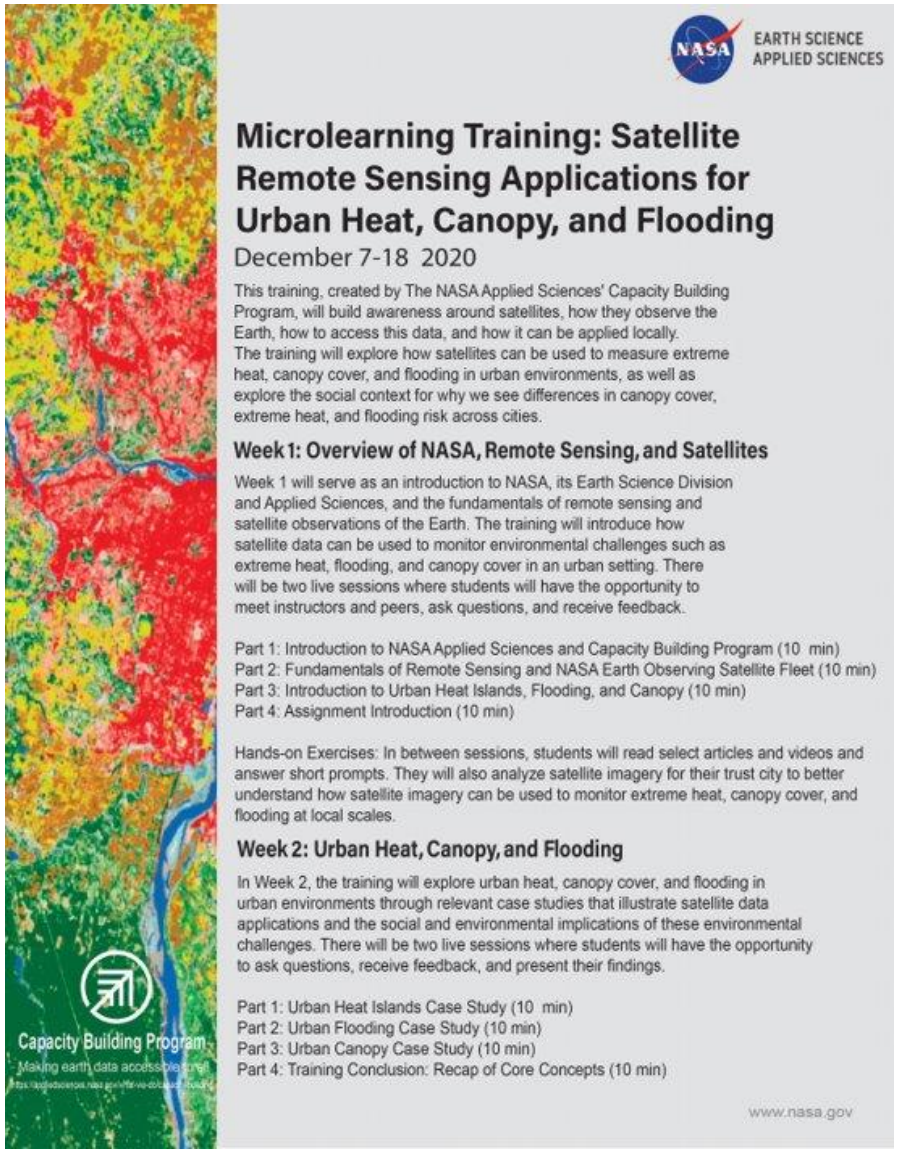
- Pre-recorded
- YouTube videos
- PowerPoint presentation with speaker
- Lots of images, cohesive colors and themes

Office Hours/Live Sessions

- Monday and Friday (4:30-5:30 pm EST)
- Guest Speakers
- Q&A's
- Homework Assistance
- Ice Breakers

Pre-Training: Development

Agenda and Storyboard



Time	Week 1		
	Length	Topic	Person In Charge
0:00	10 min	Introduction to Training, Introduction to NASA, Applied Sciences, CBP, and Intro to GLOBE	Shilpa
0:10	3-5 min	Guest Speaker	Guest Speaker
0:15	10 min	Fundamentals of Remote Sensing and NASA EO Fleet	Barri'
0:25	3-5 min	Call out topic/NASA fun facts	Monica
0:30	10 min	Intro to Urban Heat Islands, Urban Flooding, and Urban Canopy	Ella
0:35	3-5 min	Introduce Social/Environmental Context	Ella
0:40	10 min	Info about GLOBE and Introduction to Assignment: Project Information	Monica
Monday 4:00	30 min	Orientation: Introductions, Program Q&A, Project Questions, Professional Development Questions, etc.	TBD
Friday 4:00	30 min	Meet and Greet and Office Hours: Q&A with Dr. Ross, Project Questions, Professional Development Questions, Feedback, etc.	TBD

Time	Week 2		
	Length	Topic	Person In Charge
0:00	10 min	Urban Heat Islands Case Study	Barri'
0:10	3-5 min	Guest Speaker	Guest Speaker
0:15	10 min	Urban Flooding Case Study	Shilpa
0:25	3-5 min	Professional Development: Building a Resume	Barri'
0:30	10 min	Urban Canopy Case Study	Monica
0:35	3-5 min	Professional Development: Interview Tips	Shilpa
0:40	10 min	Program Conclusion: Recap of Core Concepts	Ella
Monday 4:00	30 min	Meet and Greet and Office Hours: Project Questions and Feedback	TBD
Friday 4:00	30 min	Presenting Findings	TBD

Technical Development

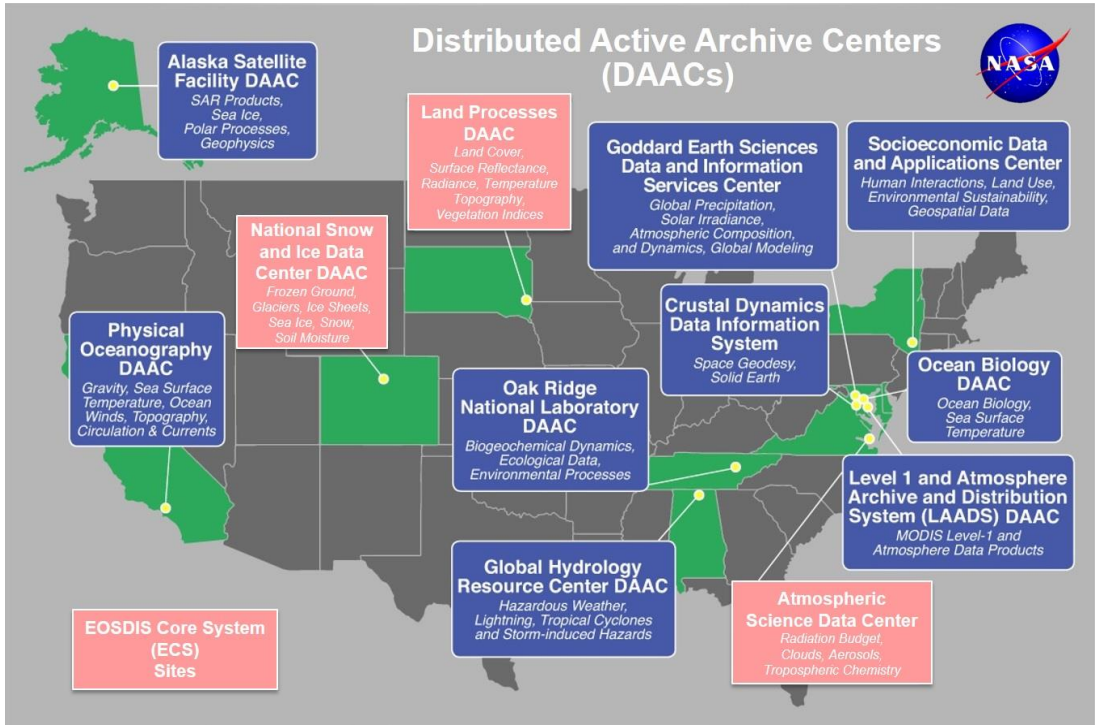
Capacity Building Program

- ARSET
- DEVELOP
- SERVIR

Earth Observation Application

- Urban Heat Islands
- Urban Tree Canopy
- Urban Flooding

EOSDIS Distributed Active Archive Centers (DAACs)



Remote Sensing and NASA's EO Fleet



Professional Development

Guest Speakers & Careers at NASA

- Dr. Kent Ross
- John Bolten
- Betzy Hernandez

Networking

- Intern to student connection
- Mentorship
- Skills and Resources

Interview and Resume Building

- Contact Info
- Education
- Experience
- Skills & Awards
- Volunteer Work
- Preparing for an Interview
- During an Interview
- Post-Interview

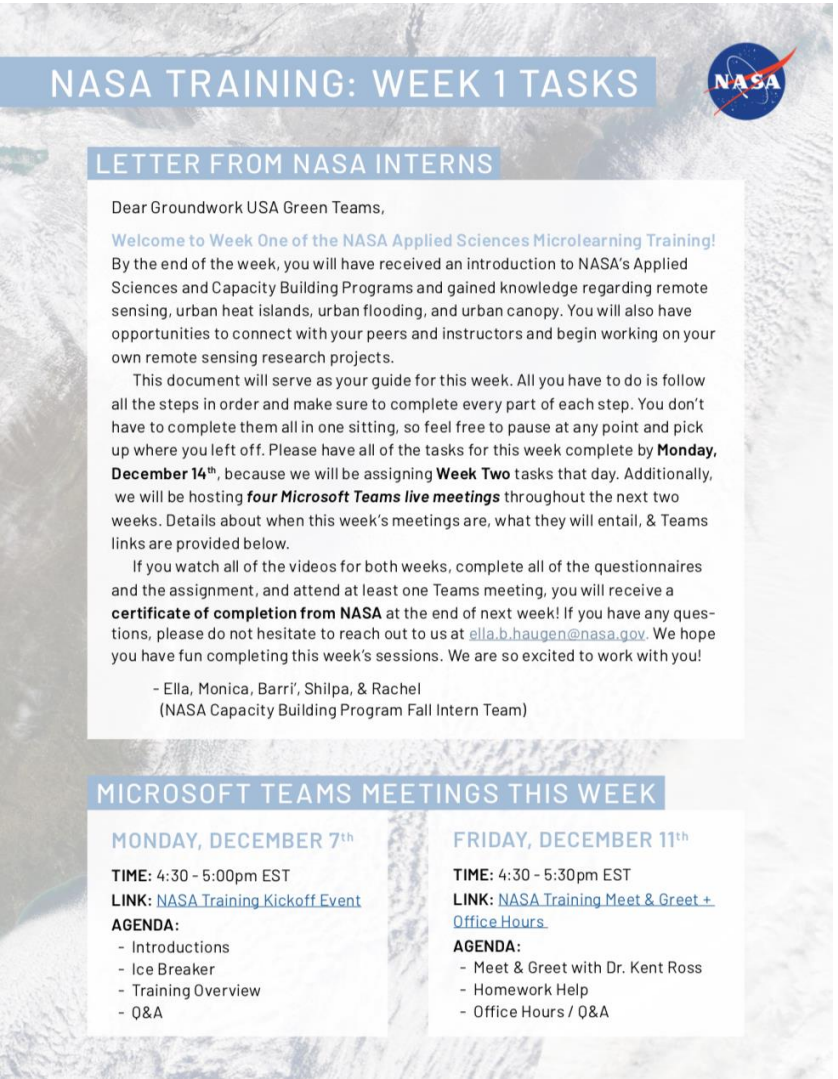
During Training: Implementation



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During Training: Implementation

Mailing List and Weekly Task List



NASA TRAINING: WEEK 1 TASKS

LETTER FROM NASA INTERNS

Dear Groundwork USA Green Teams,

Welcome to Week One of the NASA Applied Sciences Microlearning Training!
By the end of the week, you will have received an introduction to NASA's Applied Sciences and Capacity Building Programs and gained knowledge regarding remote sensing, urban heat islands, urban flooding, and urban canopy. You will also have opportunities to connect with your peers and instructors and begin working on your own remote sensing research projects.

This document will serve as your guide for this week. All you have to do is follow all the steps in order and make sure to complete every part of each step. You don't have to complete them all in one sitting, so feel free to pause at any point and pick up where you left off. Please have all of the tasks for this week complete by **Monday, December 14th**, because we will be assigning **Week Two** tasks that day. Additionally, we will be hosting ***four Microsoft Teams live meetings*** throughout the next two weeks. Details about when this week's meetings are, what they will entail, & Teams links are provided below.

If you watch all of the videos for both weeks, complete all of the questionnaires and the assignment, and attend at least one Teams meeting, you will receive a **certificate of completion from NASA** at the end of next week! If you have any questions, please do not hesitate to reach out to us at ella.b.haugen@nasa.gov. We hope you have fun completing this week's sessions. We are so excited to work with you!

- Ella, Monica, Barri', Shilpa, & Rachel
(NASA Capacity Building Program Fall Intern Team)

MICROSOFT TEAMS MEETINGS THIS WEEK

MONDAY, DECEMBER 7th

TIME: 4:30 - 5:00pm EST
LINK: NASA Training Kickoff Event
AGENDA:
- Introductions
- Ice Breaker
- Training Overview
- Q&A

FRIDAY, DECEMBER 11th

TIME: 4:30 - 5:30pm EST
LINK: NASA Training Meet & Greet + Office Hours
AGENDA:
- Meet & Greet with Dr. Kent Ross
- Homework Help
- Office Hours / Q&A



WEEK 1 TASK CHECKLIST

STEP 1

Fill out a post-it note on Jamboard.
1. **Go to link:** https://jamboard.google.com/d/
This is a great opportunity to introduce yourself to your peers and instructors! Please include: **Name, Age, Location** (Groundwork Trust), and **Tell us more about yourself!** (Fun facts, hobbies, & academic interests)

STEP 2

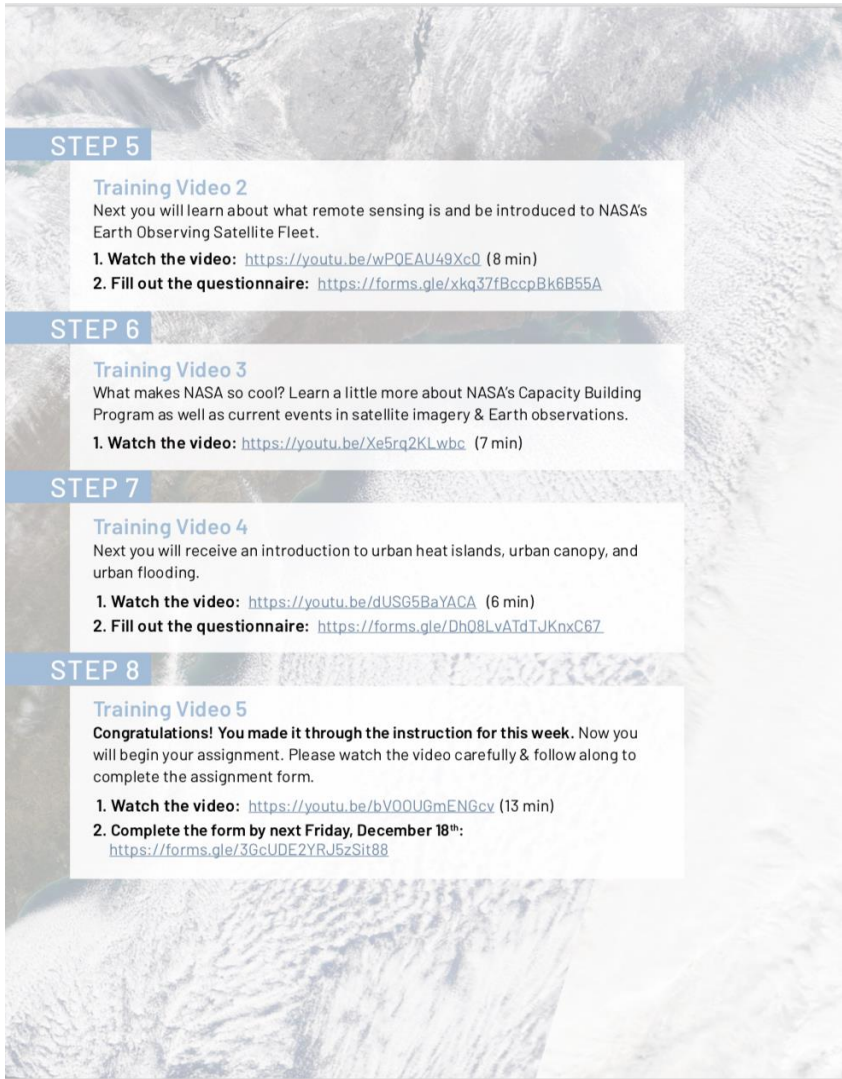
Fill out the self-assessment questionnaire.
This helps us get a better idea of who you are & your current knowledge of the training material. This is not graded, so don't be afraid to guess!
1. **Go to link:** https://forms.gle/rQo5vSAsr3c9xZMq8

STEP 3

Training Video 1
Now you will be introduced to the training, NASA's organization, Capacity Building Program, and additional resources available.
1. **Watch the video:** https://youtu.be/PhpzJ22_9x8 (16 min)
2. **Fill out the questionnaire:** https://forms.gle/S3LDrPGkCoACUhKdA

STEP 4

Guest Speaker: John Bolten
John Bolten is our first guest speaker for our training, and he is a research scientist at the NASA Goddard Space Flight Center in Greenbelt, Maryland. We hope that you will find his journey to finding a career at NASA inspiring!
1. **Watch the video:** https://youtu.be/SACFrZ20AAg (5 min)



STEP 5

Training Video 2
Next you will learn about what remote sensing is and be introduced to NASA's Earth Observing Satellite Fleet.
1. **Watch the video:** https://youtu.be/wP0EAU49Xc0 (8 min)
2. **Fill out the questionnaire:** https://forms.gle/xkq37fBccpBk6B55A

STEP 6

Training Video 3
What makes NASA so cool? Learn a little more about NASA's Capacity Building Program as well as current events in satellite imagery & Earth observations.
1. **Watch the video:** https://youtu.be/Xe5rq2KLwbc (7 min)

STEP 7

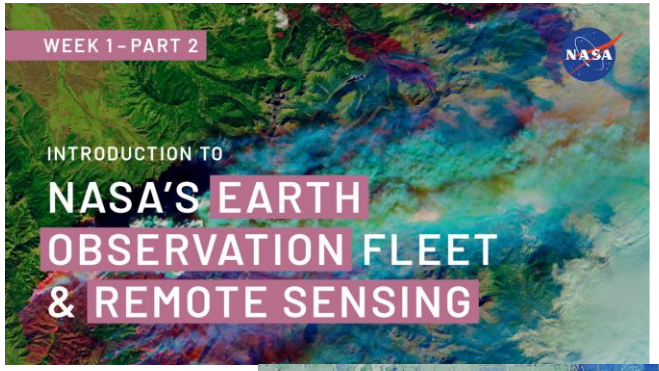
Training Video 4
Next you will receive an introduction to urban heat islands, urban canopy, and urban flooding.
1. **Watch the video:** https://youtu.be/dUSG5BaYACA (6 min)
2. **Fill out the questionnaire:** https://forms.gle/Dh08LvATdTJKnxC67

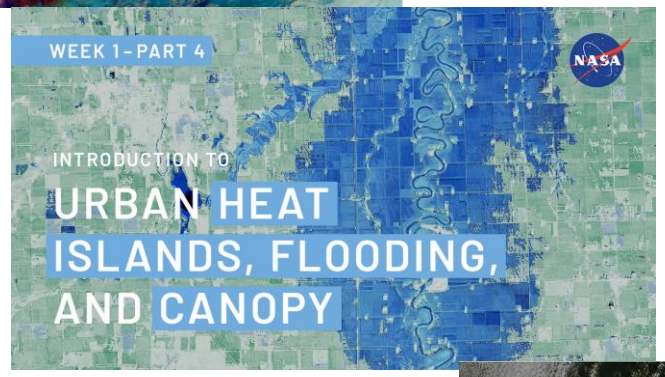
STEP 8

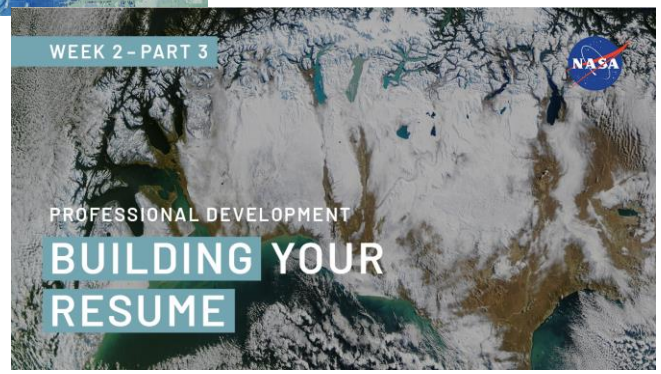
Training Video 5
Congratulations! You made it through the instruction for this week. Now you will begin your assignment. Please watch the video carefully & follow along to complete the assignment form.
1. **Watch the video:** https://youtu.be/bVOOUGmENGcv (13 min)
2. **Complete the form by next Friday, December 18th:** https://forms.gle/3GcUDE2YRJ5zSit88

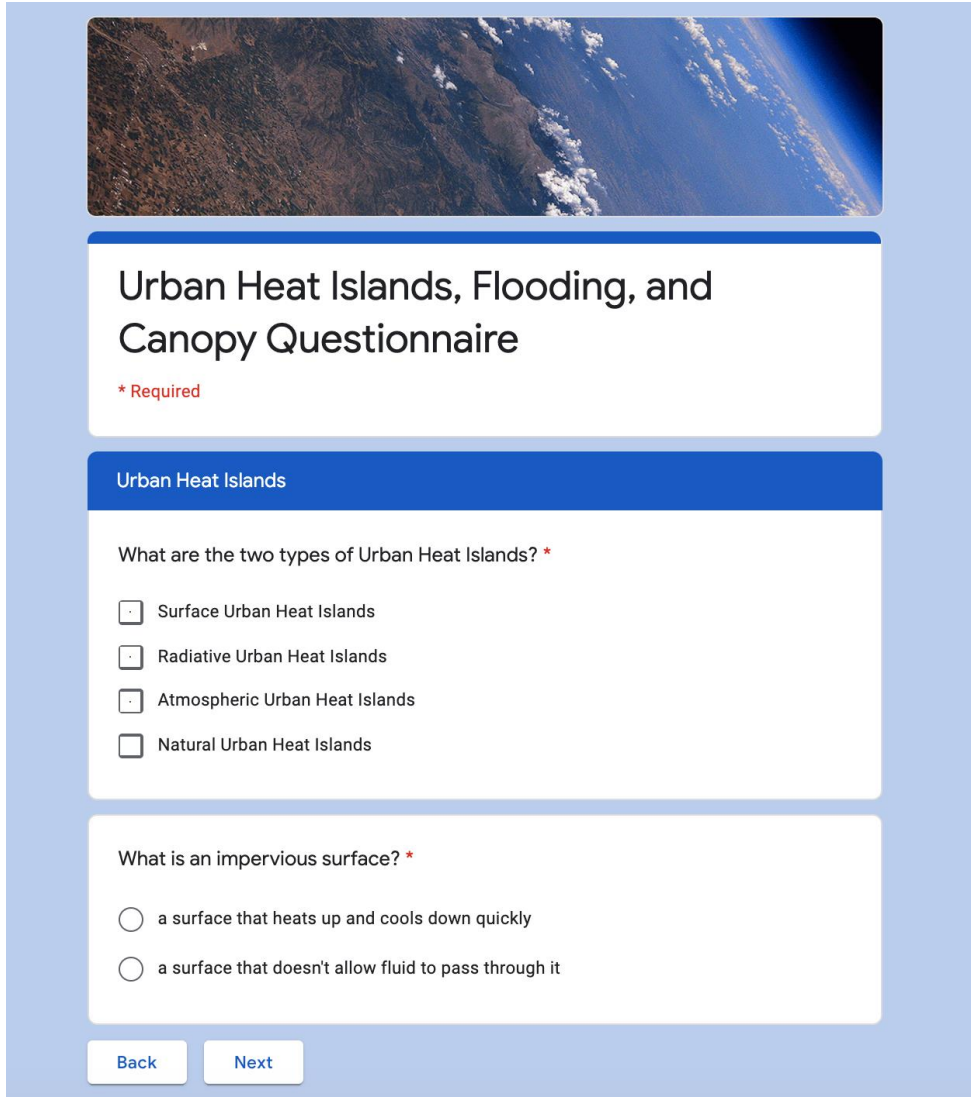
During Training: Implementation

YouTube Videos and Questionnaires





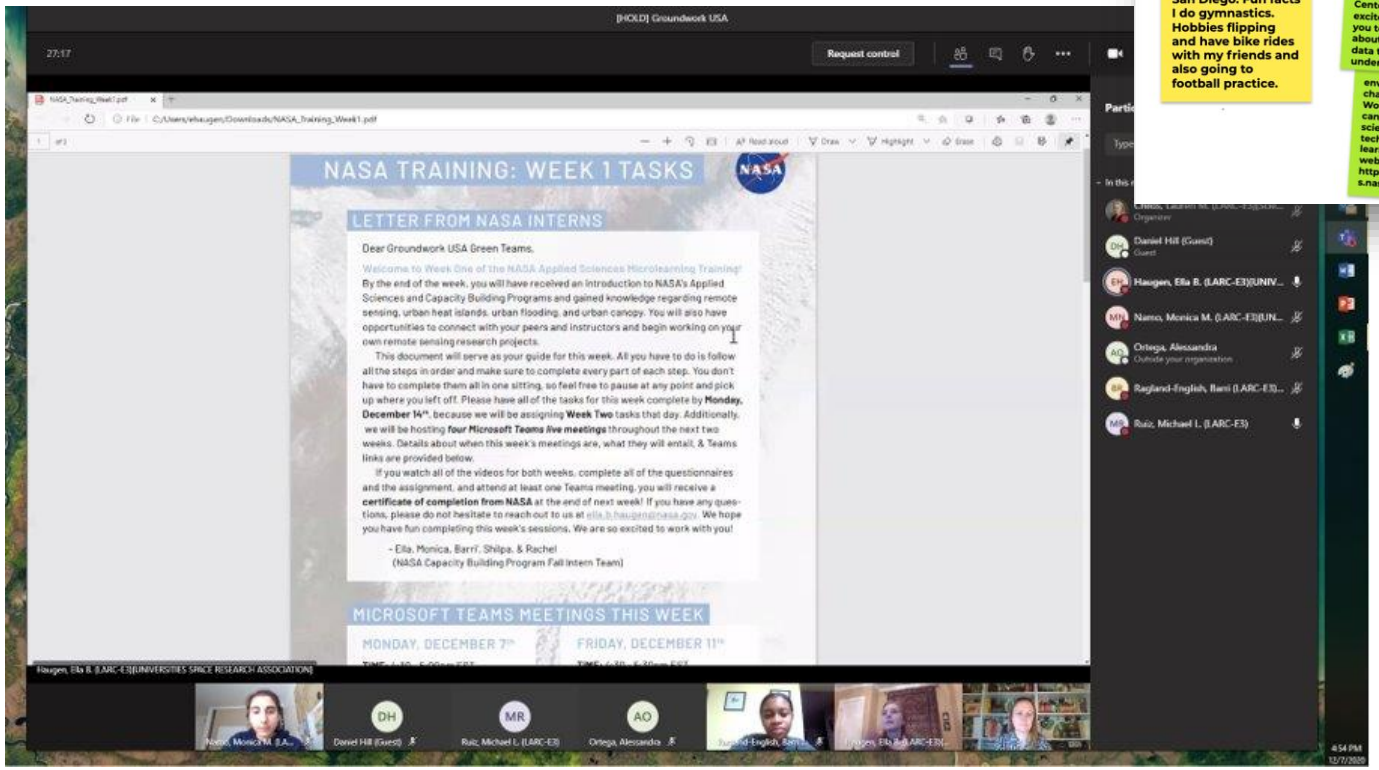




During Training: Implementation

Communication with Students

- Jamboard for introductions
- Live Microsoft Teams meetings
- Open line of communication via email





Post-Training



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White Paper

Digital Credentials: Digital Badging and Certificates

Overview:

- Researched the history and intricacies of digital badging, badges are issued by IMS Global Learning Consortium and addresses 3 different parties: the earner, the issuer, and the developer. Digital badges are an image with metadata attached as proof of the earner's achievement.
- Additionally, there are types of badges, certified products the badges can collectively be displayed on ("wallets" or "backpacks"), and platforms in which organizations can distribute and issue these badges.
- An issuer (company, organization, event) can choose to issue their badges through an already existing platform, or have developers create their own that must pass many marks before receiving the Open Badges Standard Certification.
- Certificate should be issued when a course has taken about 40 hours to complete and the user has passed an assessment. Badges are issued when a course takes 2 hours or less to complete, or if it is low-stakes or ungraded.

Findings

Issue a certificate at the very end of the training.

CBP should connect with NASA Langley's STEM Educator Professional Development Collaborative (EPDC) who already issues badges.

Post-Training

Post-training Survey

- Reflect on what was learned (were expectations and objectives met?)
- Recommendations for improvement and feedback on the training itself (content, organization, instructors, etc.)
- Self-assessment questions asked again

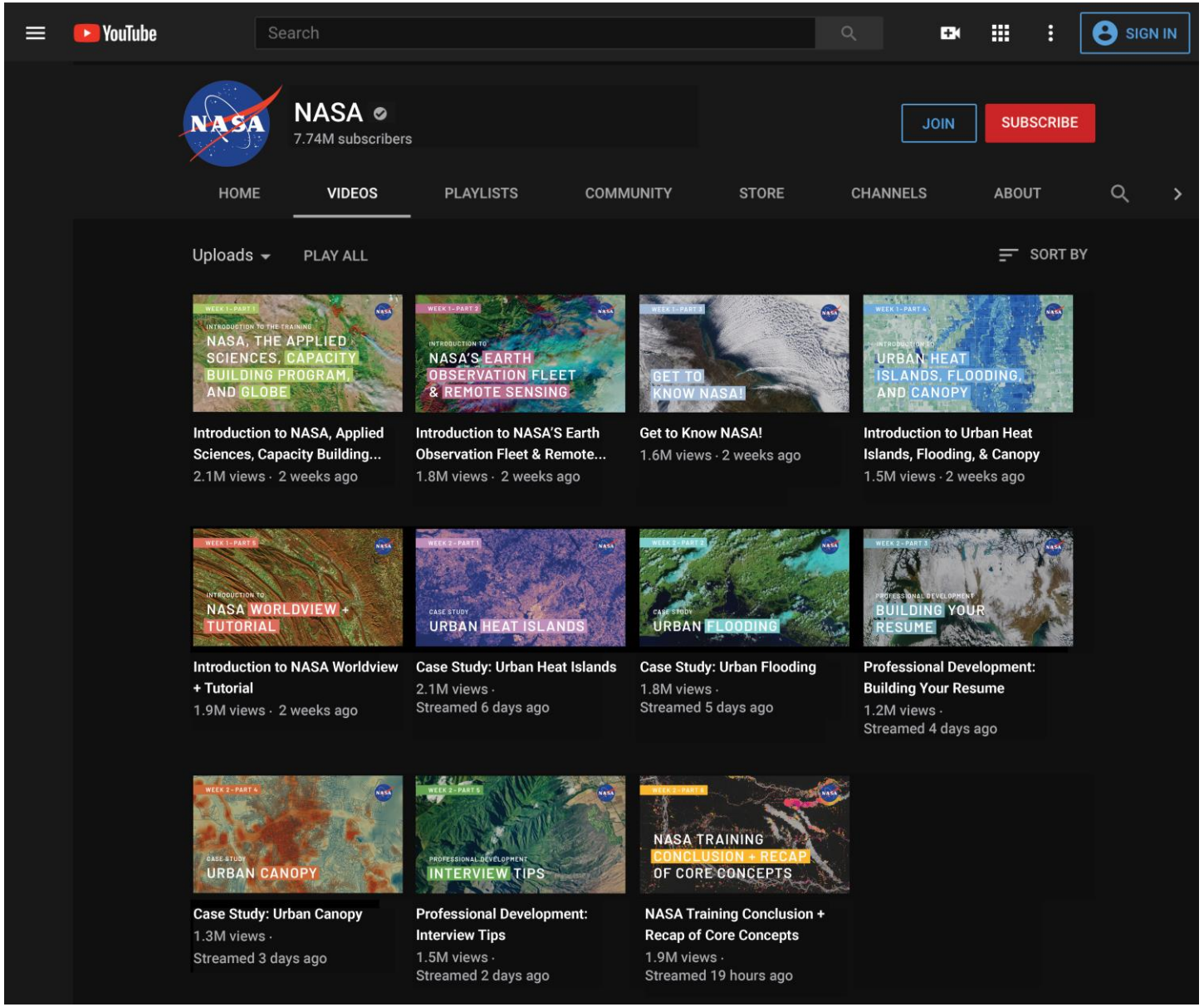
Expected Outcomes

- Reached out to youth that never would have had access to these resources/ gained this knowledge
- Introduced CBP to whole new sector (youth)
- DEI: getting more minorities aware of CBP

Post-Training

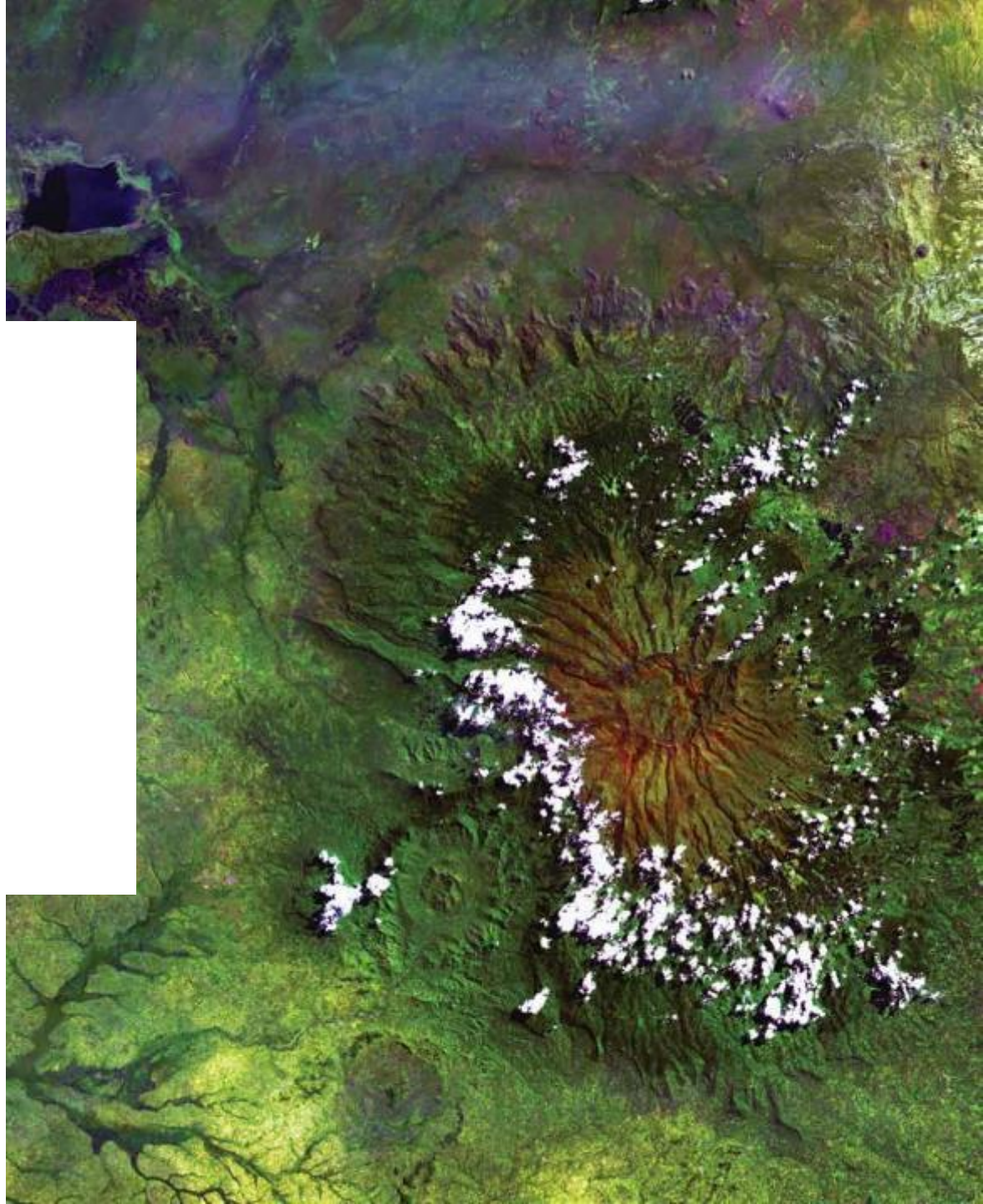
Looking Ahead: Plan for the spring

- Work with more Groundwork trusts
- Outreach to more organizations
- Create a training anyone can access on the CBP webpages – coordinate video uploads to NASA accounts like the Indigenous Peoples Pilot did with its recent training



Thank You.

https://appliedsciences.nasa.gov/what-we-do/capacity-building



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