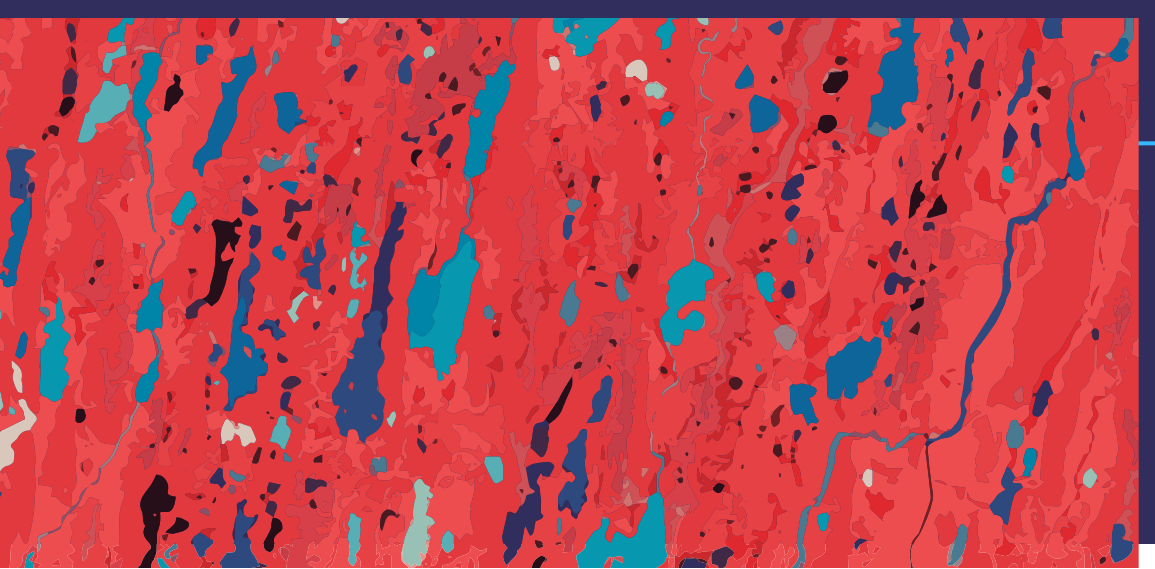


UNITED STATES EARTH SCIENCE ORGANIZATION, INC.



Annual Report



2022

A Letter from the Chair

In the wake of the recent World Cup in Qatar, I was fascinated to learn that since 2002, France has produced more players for World Cup rosters than any other country. Further research revealed that the knack for producing world class football talent was not coincidence, but the result of a carefully planned, intensive youth training program called Clairefontaine. Recruiting as early as age 12, the French talent pipeline is credited with systematically producing household names like Kylian Mbappé.

USES0's goals are not unlike those of Clairefontaine. If successful, programs like USESO will systematically produce the talent necessary to position the United States as a leader in climate innovation and energy independence. Developing this talent is critical. The Russian invasion of Ukraine has had an unprecedented impact on global energy prices. China produces over 90% of the rare earth minerals essential for renewable energy production. Our mission is deeply intertwined with not only the ecological health of our planet, but also our financial markets and national security.

Clairefontaine is singularly focused on training young players with the highest potential to grow into someone great. To do so, it recruits as widely as possible from the affluent areas of Paris as well as its relatively impoverished outer banlieue regions. In 2022, over half of USESO's applicants attended schools in just 12 zip codes. Achieving our mission is contingent on finding the highest potential students in the country—potential that can be found everywhere. In 2023 and beyond, USESO is committed to measurably increasing participation from beyond a handful of school districts.

USES0's audacity to dream big is rooted in a simple concept. We view every student as an investment opportunity, where familiar forces of growth rate and compound interest readily apply. In the long run, we believe that students who prioritize continuous growth and are driven by enduring motives will consistently outperform others, regardless of the starting line. Finally, high school is a particularly intense period of formative experiences where just one great lecture or teacher can lead to divergent career trajectories. By “investing early,” our impact compounds exponentially.

Our sights are set high. Whether you are a prospective student, volunteer, or donor, I hope you will join us on this journey.

With sincere gratitude,
Benjamin Choi, Board Chair

A Letter from the Executive Director

Greetings from frosty Tulsa! What an interesting time to be an Earth science enthusiast—recently there have been incredible challenges like once-in-a-hundred-year snow storms and erupting Hawaiian volcanoes. There have also been amazing new revelations like the images from the Webb Space Telescope. As I reflect on the last four years that I have been with USESO, I'm humbled by how far we have come and excited for new opportunities ahead.

This year brought many changes to our organization. We saw the retirement of the beloved Tom and Beth Tailer, who helped lay the foundation for USESO and led its predecessor organization, IESO Team USA, since 2007. The Tailers now partition their time between caring for their sheep in Vermont spending time at a winter home in Mexico. We are so grateful to Tom for continuing to provide his wisdom and advice when called upon!

This year also marked the beginning of a new chapter for USESO. We officially incorporated as a nonprofit in the state of Oklahoma where I live, and I became the nonprofit's inaugural Executive Director. We are currently in the final stages of filing for federal tax exemption and expect to formally begin our fundraising efforts in 2023. The first item on our fundraising agenda is making USESO's programs free for all students.

We also established an official Board of Directors to guide USESO towards its mission. Initially serving on the board are two familiar faces: Chelsea Brunner-Bourne and Benjamin Choi, USESO '17. We also welcomed two new members to our board of directors—Aisha Owusu, Assistant Dean of Student Services for the College of Atmospheric and Geographic Sciences at the University of Oklahoma, and Ida Hempel, USESO '07 alumna and Vice President at Galvanize, a climate-focused global investment firm. Welcome!

I've spent the last month assembling USESO's new teaching mineral collection. It's taken some time (and help from Scott Maurer, USESO '18) but the collection is starting to materialize. I'm also starting to think about field trip locations for camp. Please reach out if you have any recommendations or would like to get involved!

Thank you so much for your support and interest in USESO. Please reach out if you have any questions or comments, and I hope the new year is prosperous for all.

With warmth and gratitude,
Chelsea Brunner-Bourne, Executive Director

USES0

Realizing the planet we deserve.



Our Mission

The United States Earth Science Organization (USES0) incentivizes and prepares ambitious, purpose-driven students to work on era-defining challenges that intersect Earth, technology, and society.

Our program identifies and serves students who exhibit potential for becoming formidable leaders through deep understanding of a specific domain and independence of thought.

We provide students with opportunities for collaboration, creativity, and individual agency through competition, outdoor field studies, and discussions led by industry experts and faculty.

By investing in these students early in their journey, our impact compounds exponentially over time towards assembling a truly influential generation of leaders capable of making high-leverage decisions in the planet's best interest.

Our Work

USES0 currently operates two programs.

Program #1: Training Camp Program

The first is the USESO Training Camp, a week-long program for U.S. high school students that occurs annually in late June. Historically, this program has taken place in person, but it was operated online in 2020, 2021, and 2022. It will once again take place in person in 2023 and beyond.

This program is the only path through which students are selected to represent the United States at the International Earth Science Olympiad (IESO).

Students selected to participate in this program take part in:

- Theoretical and practical exams assessing knowledge of the Earth and environmental sciences
- Team research projects that involve data collection, analysis, and presentation of research results
- Discussions with distinguished faculty and industry experts doing work relevant to the Earth and environmental sciences

After Training Camp, we choose the 8 students selected for the U.S. Team at the IESO.

Program #2: LEES Program

The second program is the Leadership in Earth and Environmental Science (LEES) Program. Piloted for the first time in 2022, the LEES program is the policy and equity focused analog to the science-focused Training Camp program. Instead of academic exams, selection for the LEES program is based on essays that assess the unique perspective, circumstances, and specific areas of interest that each applicant can bring to the program.

All students are welcome to apply. While anyone may be accepted, we particularly encourage students from backgrounds that may be underrepresented in the Earth and environmental sciences to apply.

As previously mentioned, participation in the LEES Program is not dependent on exam scores. Rather, students submit several essays for admission. We look for students who

- Show commitment to being leaders and engaged members of their community
- Exhibit critical thinking when shaping their goals and motivations in the Earth and environmental sciences
- Are eager to learn and challenge themselves both academically and for personal growth

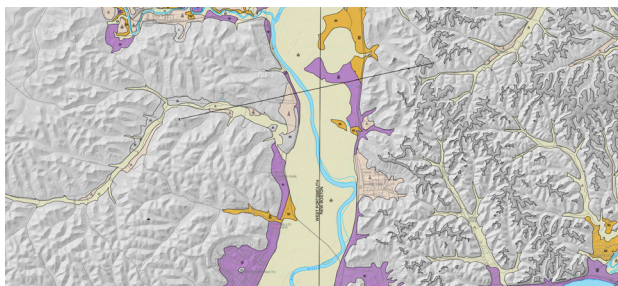


2022 Year-in-Review

National Open Exam

Each year, the USESO hosts the National Open Exam for high school students to compete for one of approximately 40 spots in our Training Camp. These exams, spanning topics ranging from metamorphic minerals to massive eddy currents in the Pacific Ocean, are challenging even for the best and brightest students in the nation. An example question from this year's exam is included below.

Based on the geologic map shown, if large-scale glaciation occurred, which of the following would most likely happen?



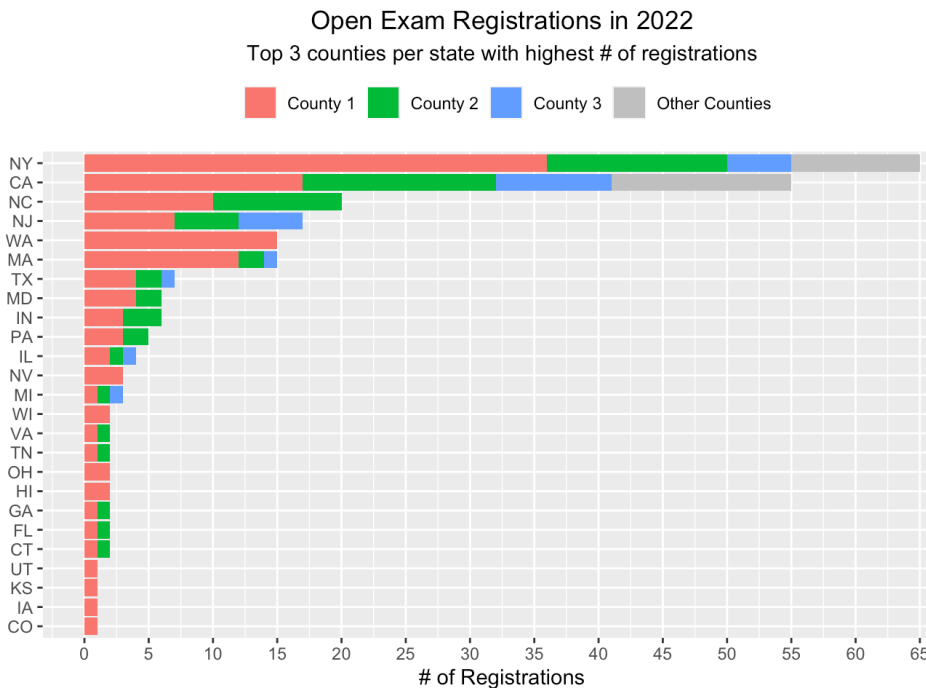
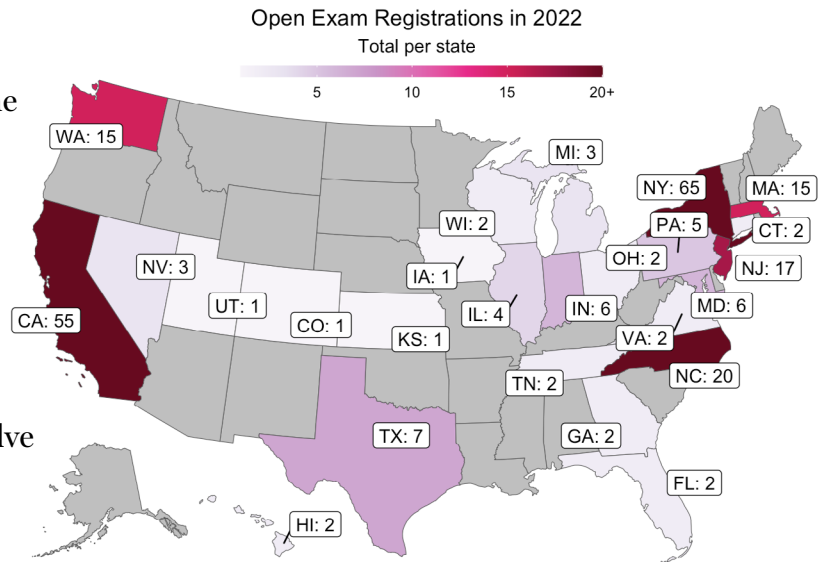
- A. Increased deposition, hydrological cycle would slow down due to more water being in glaciers.
- B. Nickpoint created, forming a waterfall due to a layer of hard, durable rock.
- C. Lakes form and the river would have more meanders in order to adjust to the change in base level.
- D. River starts downcutting, which could lead to the meanders becoming incised.

Stats & Plots

This year the open exam was administered online in early April to roughly 200 students from 25 states. The plots below offer a snapshot of the current geographic distribution of students who registered for our program.

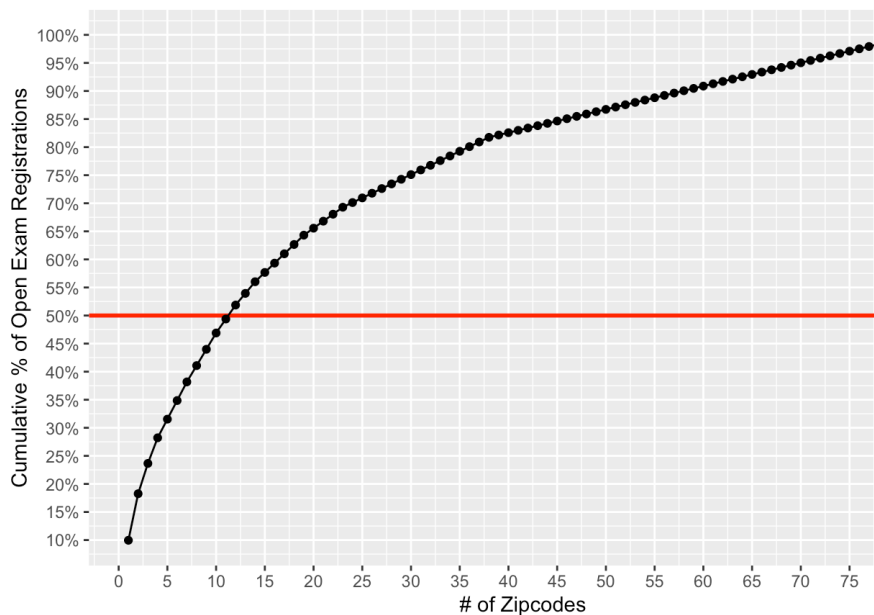
Some high-level takeaways:

- Over $\frac{1}{2}$ of all registered students came from two states: California and New York
- An overwhelming majority of students came from one of three counties within their state
- Over $\frac{1}{2}$ of all registered students attend high school in just one of twelve zip codes (for comparison, the 4000 most populous zip codes harbor roughly 50% of the US population).



A core tenet of our mission is identifying and “assembling a truly influential generation of leaders capable of making high-leverage decisions in the planet’s best interest.” We believe that everyone should have a seat at the table, regardless of the zip code they happen to live in. A key priority going forward will be to identify fair, even-handed outreach and selection processes to give everyone

Cumulative % of 2022 Open Exam Registrants vs. # of Zipcodes
Over 50% of registrants come from schools in just 12 zipcodes

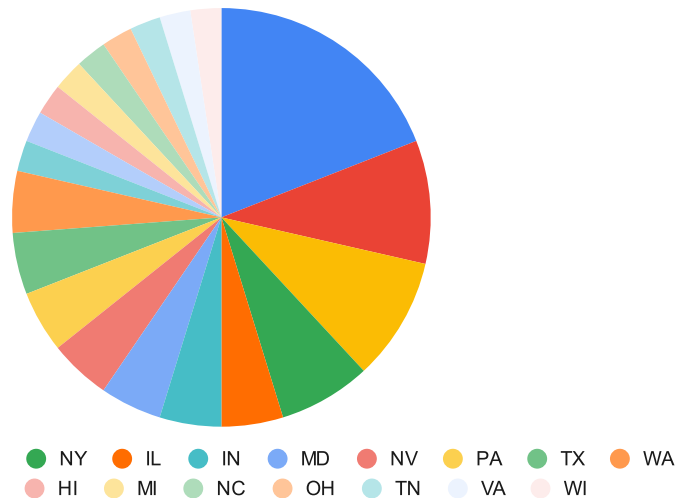


an equal opportunity to participate in our programs. In other words, we are interested in our students' slope, not intercept.

This year the open exam was administered online in early April to roughly 200 students from 25 states. The plots below offer a snapshot of the current geographic distribution of students who registered for our program.

Training Camp

Due to COVID-19 uncertainty, Training Camp took place online in 2022. This year we had **42 students** from **20 states**: 8 freshmen, 15 sophomores, 17 juniors, and 2 seniors. There were 8 female students, 32 male students, and 2 students who preferred not to disclose.



During camp we had six invited guest speakers from the USA and one invited guest speaker from Japan. A handful of topics available to students this year:

- Physics of the 2022 Tonga eruption
- Ocean thermal energy conversion (OTEC)
- Interdecadal Arctic sea ice research
- Machine learning in geophysics.

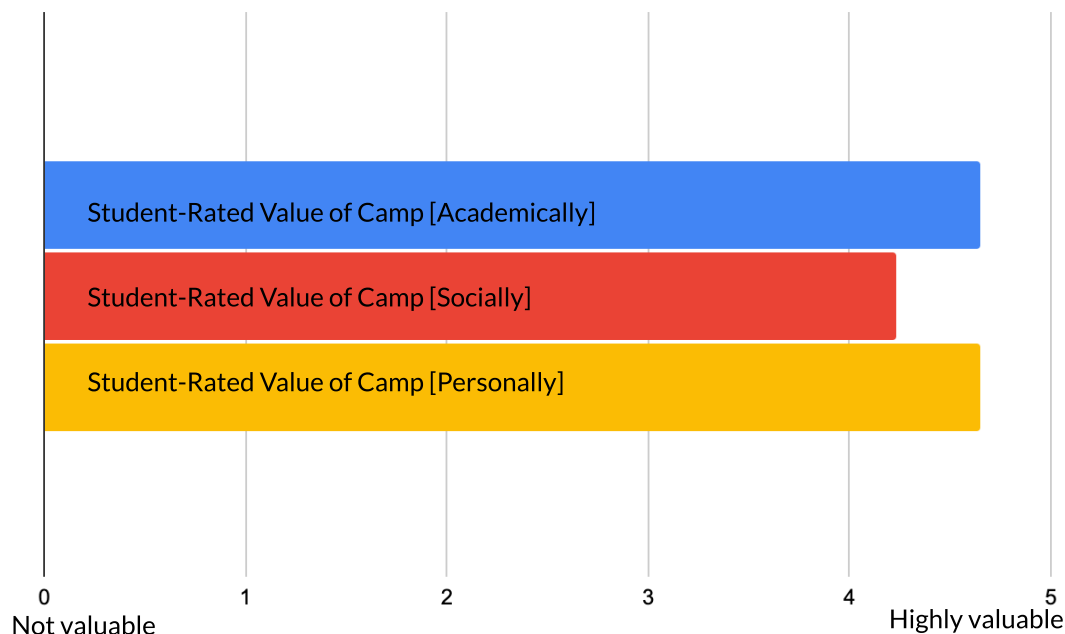
A full list of this year's topics is available [here](#).

Feedback

Student surveys after camp reflected a generally positive experience across the board. While forging relationships in online spaces can be difficult, our students enjoyed getting to know one another via unofficial channels like a student Discord server.

In particular, many students reflected on the heartening experience of being received into a community of like-minded peers who had similar interests in the geosciences. They mentioned the array of talks as being very fascinating, and they especially enjoyed hearing about the exploits of Dr. Walter Mooney, a career field geologist with the USGS.

Surveys indicated that campers thought that the breaks between lectures were too short, and that there was not enough time allotted for ESP preparation. In the future we will design the schedule with greater intention to avoid these awkward short periods of downtime in favor of longer, aggregated periods of rest. It is also possible that moving to an in-person format will help to avoid the burnout associated with large amounts of screentime.



International Earth Science Olympiad

8 students from the Training Camp program were selected to represent the United States at the International Earth Science Olympiad (IESO). The IESO is a competition that encourages international cooperation between students of different nationalities. The IESO was held online this year and hosted by university members in Italy.

This year's event was record-breaking with participation from 42 different countries worldwide. The United States team (below) performed exceedingly well, taking home 4 gold medals in the Data Mining Test and 8 gold medals for Earth Systems Presentations.



Wonjae Suh
River Hill High School
MD



Wendy Cao
University High School
CA



Alex Franks
North Hollywood High School
CA



Aashray Chegu Vijay
Tesla STEM High School
WA



David Zhou
Lexington High School
MA



Yufei Chen
University High School
CA



Saranya Anantapantula
Spring-Ford Area High School
PA



Leo Li
West Windsor-Plainsboro
High School South
NJ

2022 U.S. Earth Science Team

LEES Program

This year's LEES program was a pilot run, and was motivated by a dual purpose to offer a more accessible avenue to participation in our programs and to fulfill the idea that climate change requires a multi-pronged effort that includes not just scientists and engineers, but also policymakers, activists, and design/storytelling.

During camp we had six invited guest speakers from the USA and one invited guest speaker from Japan.

A handful of topics available to students this year:

- An overview of the IPCC
- The intersection of environmental law and ESG standards
- Indoor air quality in public housing
- The Superfund Research Program

A full list of this year's topics is available [here](#).

This year's initial cohort was kept small at roughly 15 students from 7 states composed of one 8th grader, one freshman, five sophomores, three juniors, and five seniors. Students tackled a wide variety of topics important to understanding the broader landscape of environmental policy and equity with seminars, activities, and case studies giving students an opportunity to dive deep.

By virtue of being a pilot run, this year's program generated many important learnings. In particular, foundational aspects of our program such as outreach strategies and selection processes will need to be further fine tuned as this program finds its footing in order to cultivate a vibrant, diverse cohort of students who can make the most of what this program has to offer. In addition, in future iterations, we will identify and hire passionate individuals at the intersection of education and "the environmental humanities" to take a leadership role in the development and refinement of this program's curriculum and operations.

Student Spotlights

LEES Program - Abigail Andal



Question: How did you hear about USESO?

Answer: I had been recovering from surgery and was scrolling on the [International Science and Engineering Fair] ISEF messaging server then found USESO LEES. I was especially excited for the program because it sounded like a really amazing opportunity I could participate in even when I couldn't really walk.

Question: How did the LEES Program affect you?

Answer: The LEES program was incredibly interesting and introduced environmental activism to me. It prompted me to start a research club at my own school and address environmental/social issues similarly.

Question: What was the most memorable part of being in the LEES Program?

Answer: The most memorable part was the social hour when I got to connect with everyone during the drawing game. I didn't expect to be able to connect with everyone casually, even counselors.

Training Camp - Ryan Eto

Question: How did you hear about USESO?

Answer: I heard about USESO through one of my science bowl teammates who was extremely good at Science Bowl... He introduced me to and encouraged me to sign up for the open test, as well as giving me a bunch of materials I could use to prepare for it.



Question: How did participating in USESO's Training Camp affect you?

Answer: I feel like it opened my eyes to the larger community of people that are interested in the same things that I am. Especially with science interest and earth science interest specifically being a bit rare, camp was able to completely change the idea in my head that there weren't many other people who were interested in what I was and show me that there were actually many!

Question: What was the most memorable part of being in Training Camp?



Answer: My most memorable moment was during the first day and the first break of camp when ... we were introducing ourselves, playing some games, and just starting to break the ice. I ended up spontaneously playing an odd variant of Science Bowl with other campers and counselors where you ...have to simultaneously be doing physical exercises at the same time.

Question: What are you up to these days?

Answer: These days I'm back in school doing all of the regular school things, I'm running on my school's cross country team which is shooting for a state championship in the coming weeks, and both my Science Olympiad and Science Bowl programs have started back up... Something new that I've been trying to do this year is to sign up to write some tests for Science Olympiad tournaments...

Volunteer spotlight - Chloe Cheng



How have you been involved as a volunteer with USESO?

Helping this program run and grow was a clear decision. After participating in USESO as a student in 2019, earth science was no longer just an interesting field but one that felt right personally. Each year since then I've had the opportunities to get involved in many capacities, including revamping our exam rigor and style, designing our current website and logo, and guiding students as a counselor.

What drives you to volunteer with USESO?

I have thrived working with a team that wholeheartedly shares a mission: building avenues for students to pursue earth science. The people of USESO make up a tight-knit community of extraordinarily ambitious and accomplished individuals. Whether it concerns exam writing or the

organization's societal responsibility, my experiences throughout have been marked by collaboration and open discussion. It's truly our dedicated directors and my dear colleagues that make me optimistic that we are progressing towards that common vision.

How has volunteering with USESO helped you in your personal and professional life?

Once on a plane, a retiree told me how the good work is work that prompts otherwise inaccessible drive. Through USESO, I've learned what good work means to me in a way that can inform what I'll do daily, both personal and professional.

What advice would you give to someone who wants to volunteer with USESO?

If you're considering volunteering, I would recommend talking to one of our volunteers to get a sense of where our most pressing needs are, or suggest something you could help improve. Your insights are invaluable!



2023 and Beyond

Operational Objectives

Objective: Return to an in-person program for Training Camp.

Details: Training Camp will be held in person in Tulsa, Oklahoma from June 24 to July 1, 2023—our first in-person camp experience since 2019, and the first time this program will take place in Oklahoma. The residential program will take place at the University of Tulsa and will offer a rich variety of field studies and experiences around the state.

Objective: Prepare students for the IESO.

Details: The International Geoscience Education Organisation (IGEO) has announced that the 2023 IESO will once again be online and hosted by IGEO instead of a single country. The events will include a National Team Field Investigation, Earth System Project, Data Mining Test, IESO Pledge and Art in Earth Sciences.

Objective: Continue to develop humanities-focused analog to Training Camp.

Details: The LEES program will once again take place virtually from July 15 to July 22, 2023 but it's possible that this program will shift to an in-person format in later years. We will also be actively looking to hire for an executive leadership role at LEES—referrals welcome.

Growth Objectives

Objective: Prioritize measurement to measure results.

Details: Assign numbers we can actually measure to specific clauses in our mission statement to show that we actually do what we say we'll do. This includes metrics related to who is participating in our programs, the immediate before-after impact of our programs, and the long-term impact of our programs.

Objective: Enable top-down accessibility.

Details: Eliminate all tuition and fees. We have submitted our 501(c)(3) application to enable financing through grants and funds instead of operating as a for-profit. The program will continue to operate on a tuition-basis until we can secure external funds.

Objective: Enable bottom-up accessibility.

Details: Offer free, scalable resources available to everyone (e.g., increase availability of curated study resources, AI-driven grading services for automating feedback). In general, work towards a technology-driven education center focused on cultivating top of funnel towards creating a climate-forward, energy-independent workforce and society.

Work with us!

USESO is sustained year to year by a group of incredible volunteers. Usually these volunteers are alumni from our programs, but we can accommodate volunteers from the general public as well. Typical volunteer positions include being a counselor at one of our camps, helping with exams, and researching and giving a presentation. As we take on more ambitious projects, there will be plenty of opportunities for ownership of specific initiatives as well (if you have a specific idea in mind, please reach out).

Alumni of any of our programs should apply for in-person and virtual volunteer opportunities via [this link](#). Please note that while we try to accommodate everyone's first choice and desired role, there is currently a surplus of interested alumni requesting to be in-person counselors for 2023 due to the 2020 and 2021 IESO disruptions in the pandemic.

General public should either email info@useso.org or use [this link](#).



Board of Directors

Benjamin Choi*

776 Foundation

Ida Hempel*

Galvanize

Aisha Owusu

University of Oklahoma

Executive Director

Chelsea Brunner-Bourne

*USES0 Alumnus

*Report Design: Chloe Cheng**

*Back cover illustration: Wendy Cao**

Cover image and design motifs adapted from NASA Earth Observatory image by Robert Simmon of the Kitikmeot region of Nunavut Territory, Canada. Access [here](#).

Appendix. US Earth Science Organization, Inc. Financial Statement

PUBLIC SUPPORT & REVENUE	2022 (online)	2023 (in person)	2024 (in person)
Program Revenue (camp tuition, open exam)	\$30,065.00	\$103,000.00	\$54,000.00
Foundation Contributions	\$0.00	\$0.00	\$25,000.00
Donations	\$0.00	\$0.00	\$25,000.00
Total Public Support and Revenue	\$30,065.00	\$103,000.00	\$104,000.00

PROGRAM EXPENSES	2022 (online)	2023 (in person)	2024 (in person)
Payroll (counselors, staff)	\$5,100.00	\$4,500.00	\$4,500.00
Employee Benefits (Travel allowance)	\$0.00	\$3,000.00	\$3,000.00
Supplies & Materials	\$6,820.00	\$10,000.00	\$10,000.00
Professional Speaking Honoraria	\$415.00	\$500.00	\$500.00
Housing	\$0.00	\$8,201.26	\$8,201.26
Dining	\$0.00	\$12,328.94	\$12,328.94
Information Technology (Paypal fees, etc.)	\$1,502.39	\$2,000.00	\$2,000.00
Shipping & Postage (NTFI, etc.)	\$1,336.28	\$2,000.00	\$2,000.00
Travel & Transportation (counselors)	\$0.00	\$3,000.00	\$3,000.00
Travel & Transportation (field trips, airport)	\$0.00	\$5,000.00	\$5,000.00
Insurance	\$0.00	\$5,000.00	\$5,000.00
T-Shirts	\$2,107.38	\$2,000.00	\$2,000.00
Meals & Entertainment	\$0.00	\$0.00	\$0.00
Advertising	\$150.00	\$300.00	\$300.00
International Olympiad (online)	\$1,030.00	\$1,030.00	\$1,030.00
Total Program Expenses	\$18,461.05	\$57,830.20	\$57,830.20

MANAGEMENT & GENERAL SERVICES	2022 (online)	2023 (in person)	2024 (in person)
Payroll & Payroll Taxes	\$10,000.00	\$25,000.00	\$25,000.00
Employee Benefits	\$0.00	\$0.00	\$0.00
Occupancy	\$0.00	\$0.00	\$0.00
Storage space	\$0.00	\$750.00	\$750.00
Information Technology	\$795.99	\$1,500.00	\$1,500.00
Payroll Fees	\$0.00	\$0.00	\$0.00
Office Expenses	\$807.31	\$1,000.00	\$1,000.00
Marketing & Printing	\$0.00	\$500.00	\$500.00
Insurance	\$0.00	\$0.00	\$0.00
Scouting field trips (mileage, etc.)	\$0.00	\$300.00	\$300.00
Meals & Entertainment	\$0.00	\$0.00	\$0.00
Travel	\$0.00	\$0.00	\$0.00
Total Management and General Services	\$11,603.30	\$29,050.00	\$29,050.00

Total Expenses	\$30,064.35	\$86,880.20	\$86,880.20
Net Assets, Beginning of Year	\$0.00	\$0.00	\$16,119.80
Net Assets, End of Year	\$0.65	\$16,119.80	\$33,239.60



Artwork for IESO 2022 from USA team member Wendy Cao (with permission).
This piece was given a staff honorable mention award by the Italian hosts.

Wendy Cao