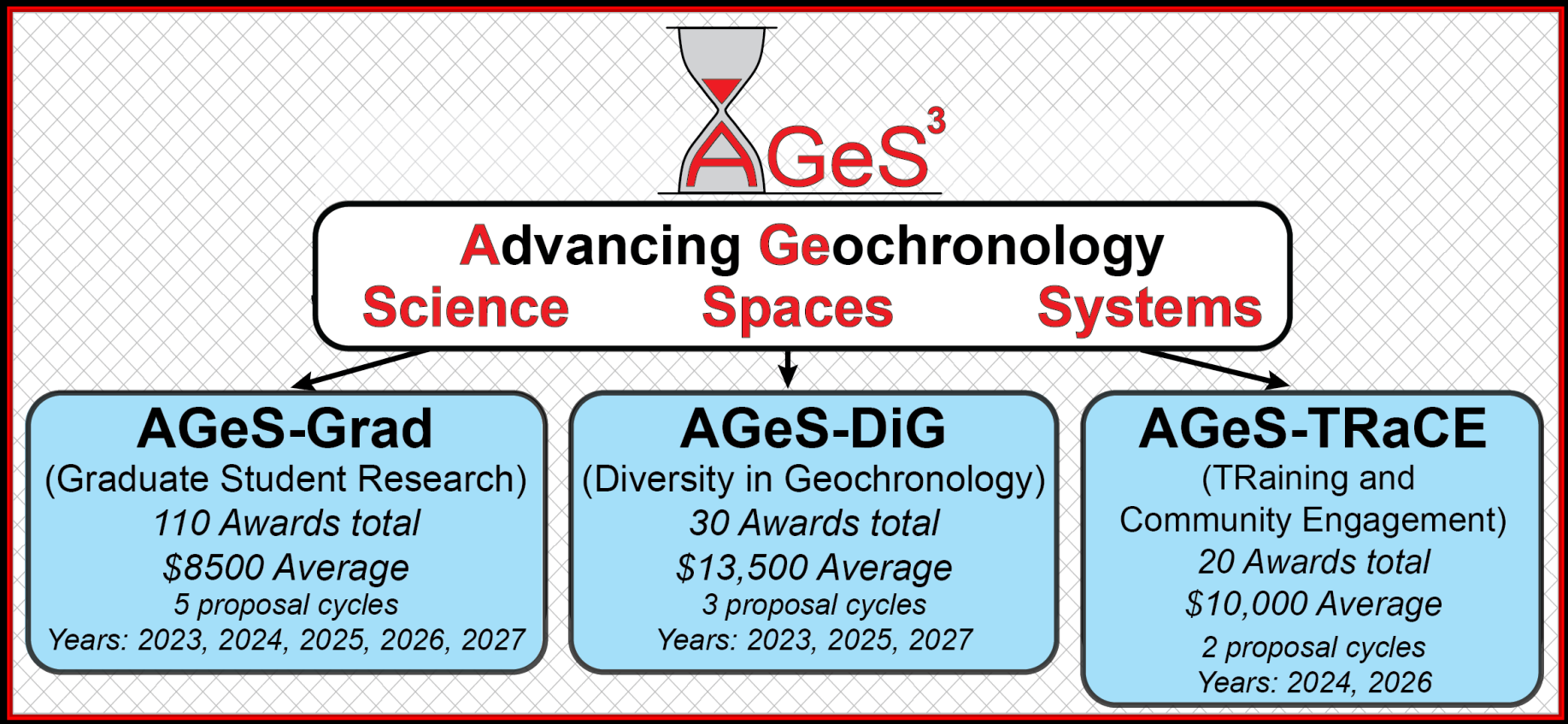
AGeS^3: Micro-funding an inclusive community grassroots effort to better understand the Earth system

Becky Flowers (CU Boulder), Ramon Arrowsmith (ASU)

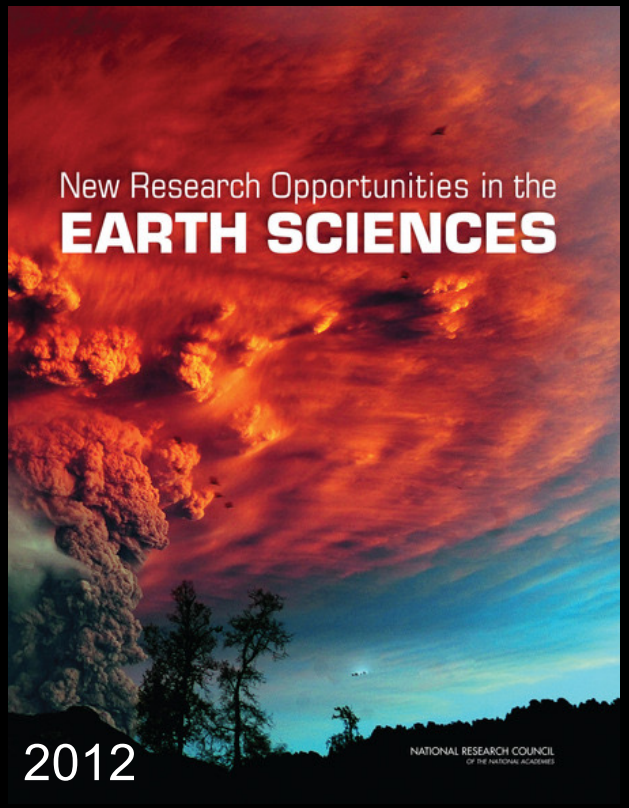
www.agesgeochronology.org



Supported by NSF FRES awards EAR-2218547, -2218544, -2218504

National Academy reports repeatedly identify geochronology as key to addressing major unresolved questions in Earth science

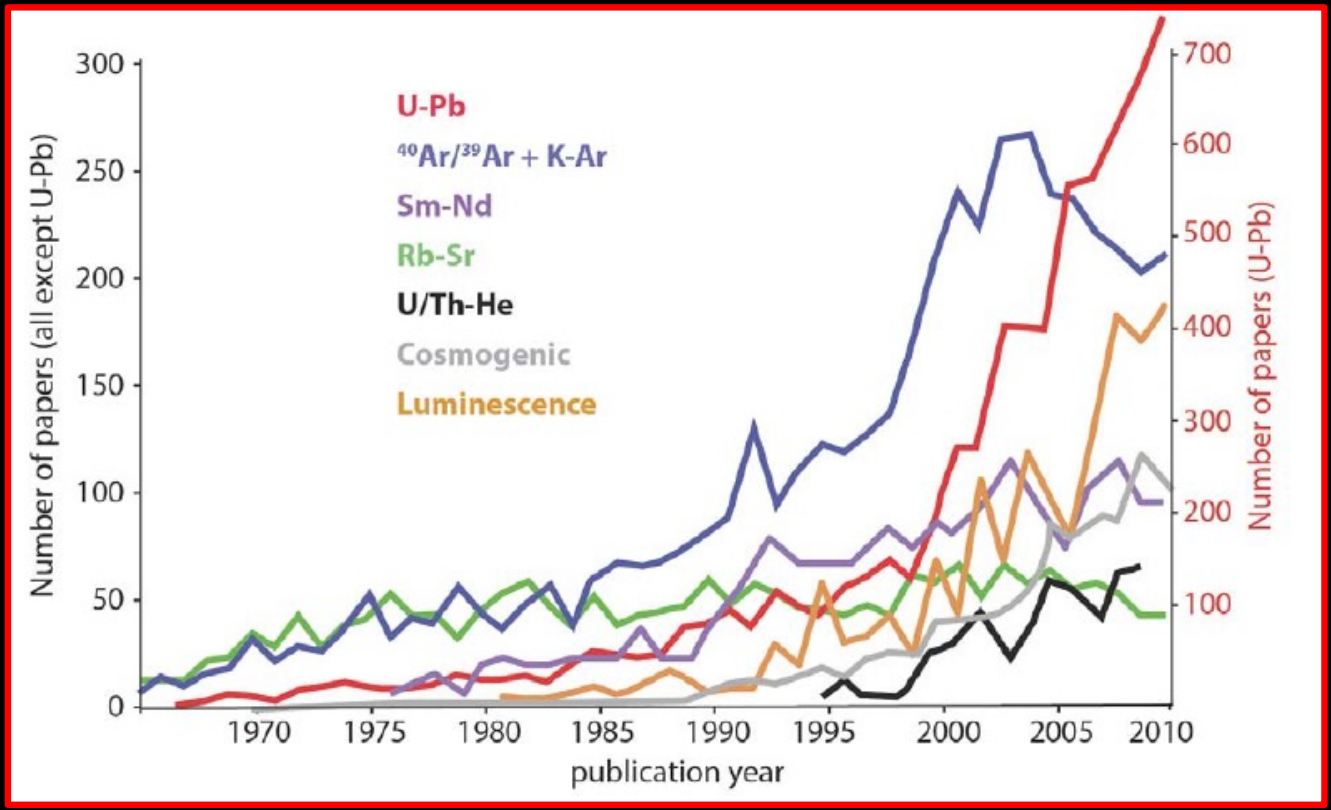
- Climate change
  - Tempo of biologic and landscape change
    - Earthquake cyclicity
      - 4D Earth evolution

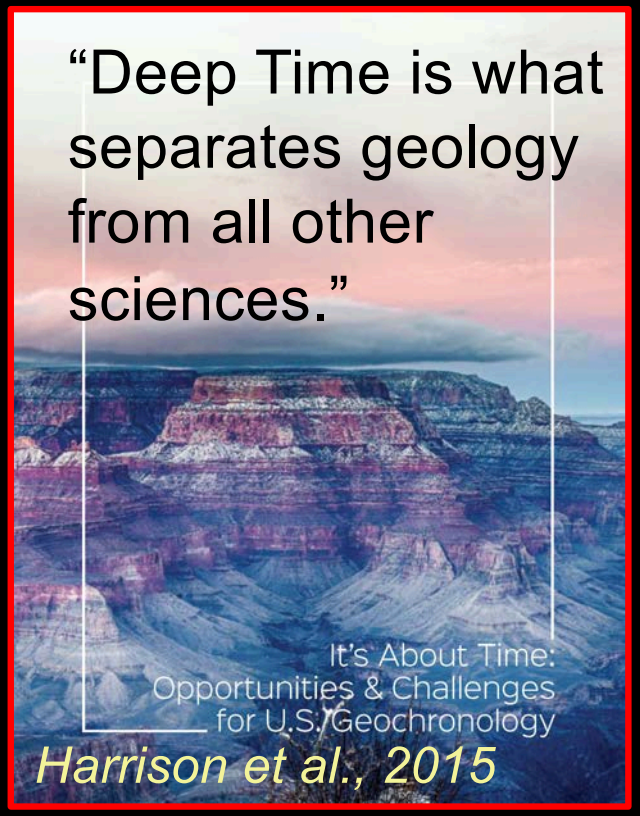


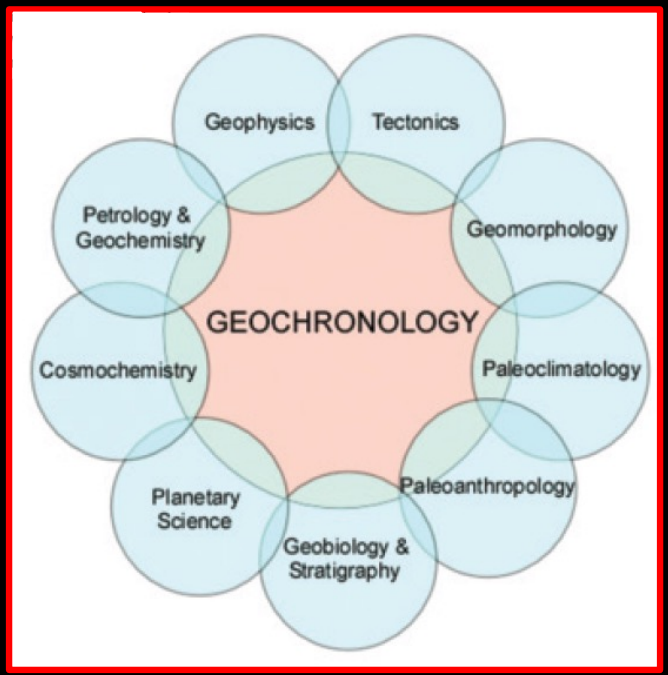
"The best science outcomes occur when strong intellectual engagement exists between the investigators who make the measurements and those who use them…A simple analysis-for-hire scheme is unlikely to yield results of consistent high quality."

NSF report on: "Opportunities and Challenges for U.S. Geochronology"

"While there has never been a time when users have had greater access to geochronologic data, they remain, by and large, **dissatisfied with the available style/quantity/cost/efficiency.**"

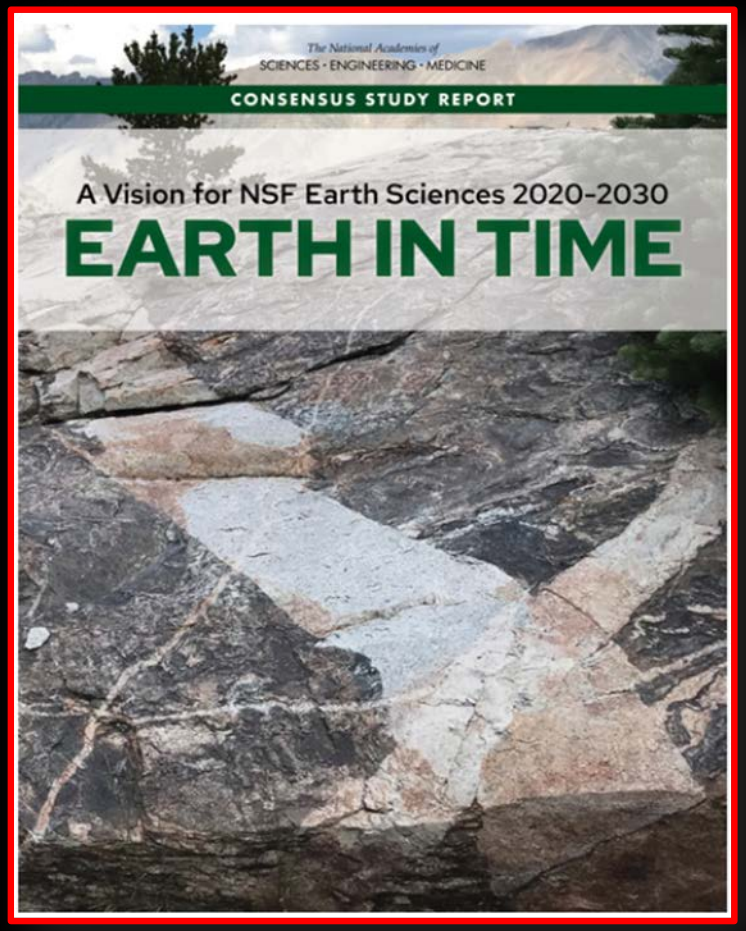


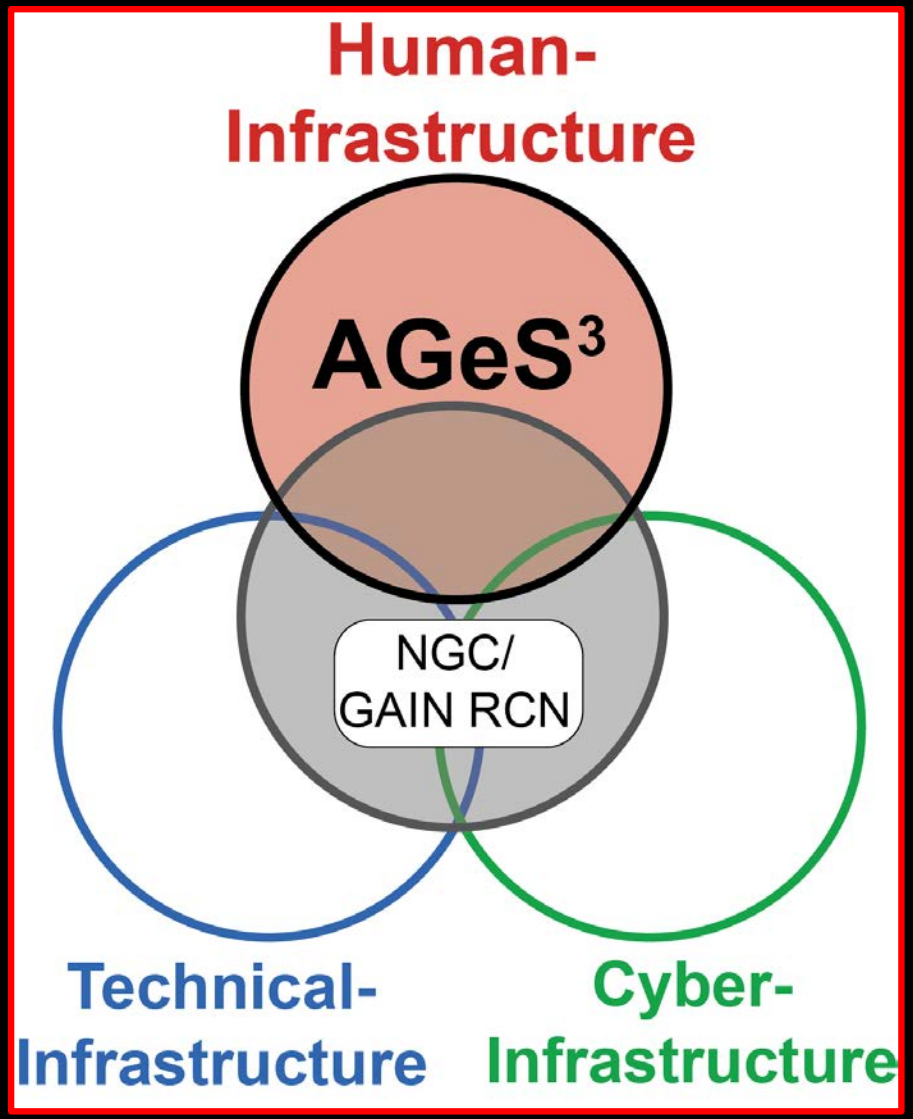


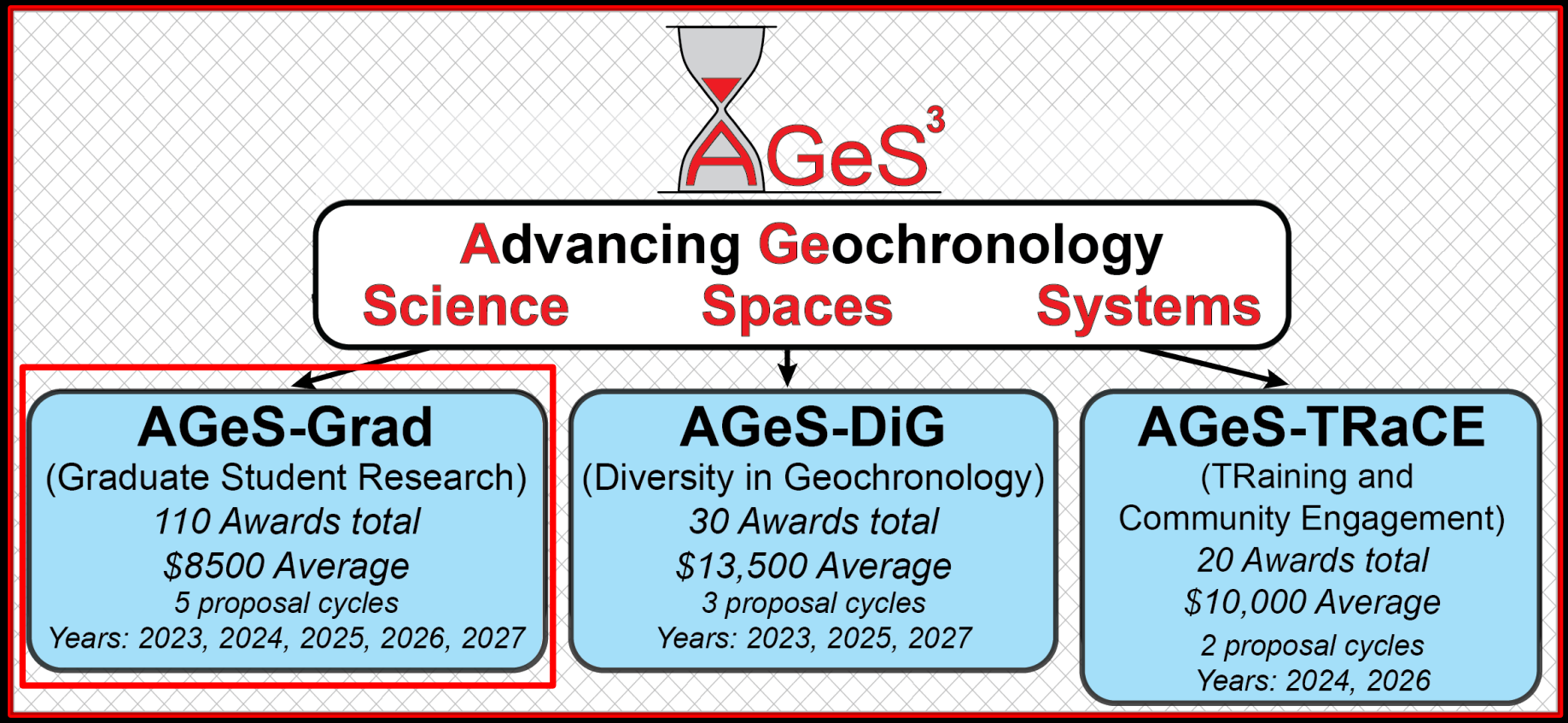


Vision for Earth Sciences 2020-2030: Earth in Time Report

Recommends that NSF's Division of Earth sciences "should fund a **National Consortium for Geochronology**."







- Increase access to geochronology data and expertise
- Support and grow the geochronology community
- Promote inclusive and collaborative science

- ~160 micro-awards of $8-15k each through trio of programs
- Engage hundreds in collaborative science, training, review, and governance activities

www.agesgeochronology.org

AGeS-Grad

(Graduate Student Research)

110 Awards total

$8500 Average

5 proposal cycles

Years: 2023, 2024, 2025, 2026, 2027

Mature Program

- Continues successful AGeS1 and AGeS2 program
- Support high-impact collaborative science projects between graduate students, labs, and home institution mentors.
- Grad students can apply for up to $10k to visit a lab, acquire data, be mentored by geochronologists on a project of joint interest

Who can apply?

- Graduate students in the U.S. or its territories

Next deadline: Feb 1, 2023

www.agesgeochronology.org

AGeS-Grad

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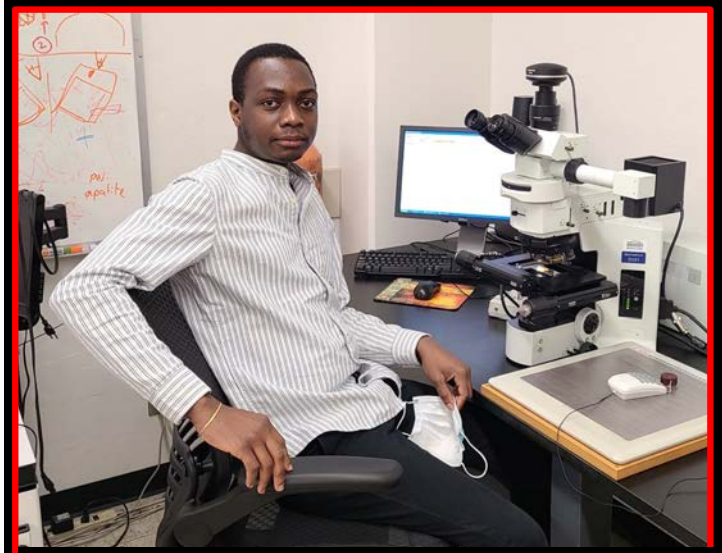
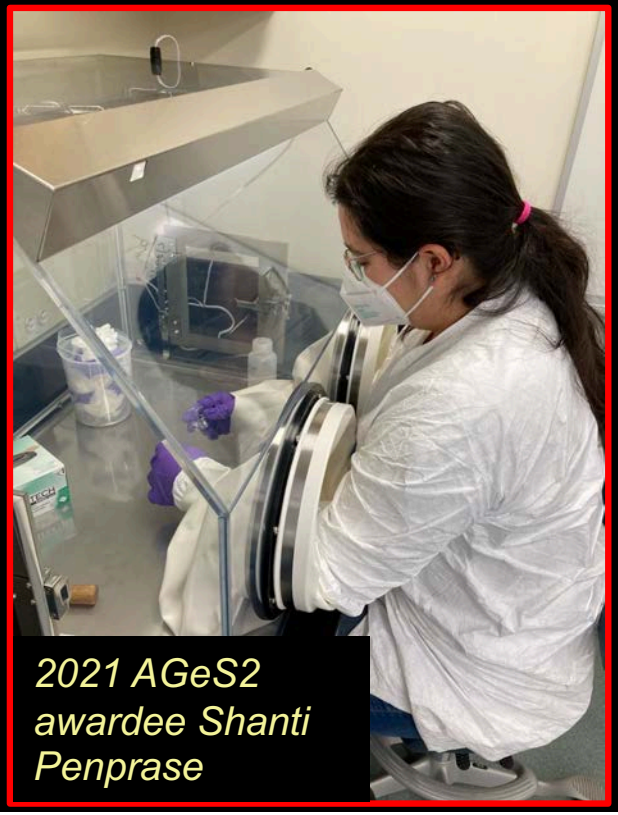
2016 AGeS1 awardee Jay Chapman



2020 AGeS2 awardee Oyewande Ojo



2021 AGeS2 awardee Shanti Penprase

2019 AGeS2 awardee Ellen Lamont

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AGeS-Grad

Some AGeS1&2 Numbers

- 77 awards
- $8,250 avg. award amount
- 311 submitted proposals
- 6 proposal cycles
- >85 abstracts
- >30 published manuscripts

"Understanding earthquake-cycle contributions to uplift and incision of the southern Olympic Mountains, WA" Jaime Delano (WWU), OSL at USU

"Assessing the contribution of Jurassic crustal thickening to growth of the Cretaceous Nevadaplano" Drew Levy (UNR), $^{40}Ar/^{39}Ar$ at NMT

"Rate of accommodation space filling following the 1700 earthquake in an Oregon estuary" Erin Peck (Oregon State), cosmogenics at LLNL

AGeS-Grad: Publication examples

Reading a 400,000-year record of earthquake frequency for an intraplate fault

Randolph T. Williams[a,1], Laurel B. Goodwin[a], Warren D. Sharp[b], and Peter S. Mozley[c]

PNAS (2017) – Randy Williams (UWisc), U-series at BGC

Influence of the megathrust earthquake cycle on upper-plate deformation in the Cascadia forearc of Washington State, USA

Jaime E. Delano[1*], Colin B. Amos[1], John P. Loveless[2], Tammy M. Rittenour[3], Brian L. Sherrod[4], and Emerson M. Lynch[2]

Geology (2017) – Jaime Delano (Western Wash), OSL at USU

Subduction initiation and early evolution of the Easton metamorphic suite, northwest Cascades, Washington

Jeremy L. Cordova[1], Sean R. Mulcahy[1], Elizabeth R. Schermer[1], and Laura E. Webb[2]

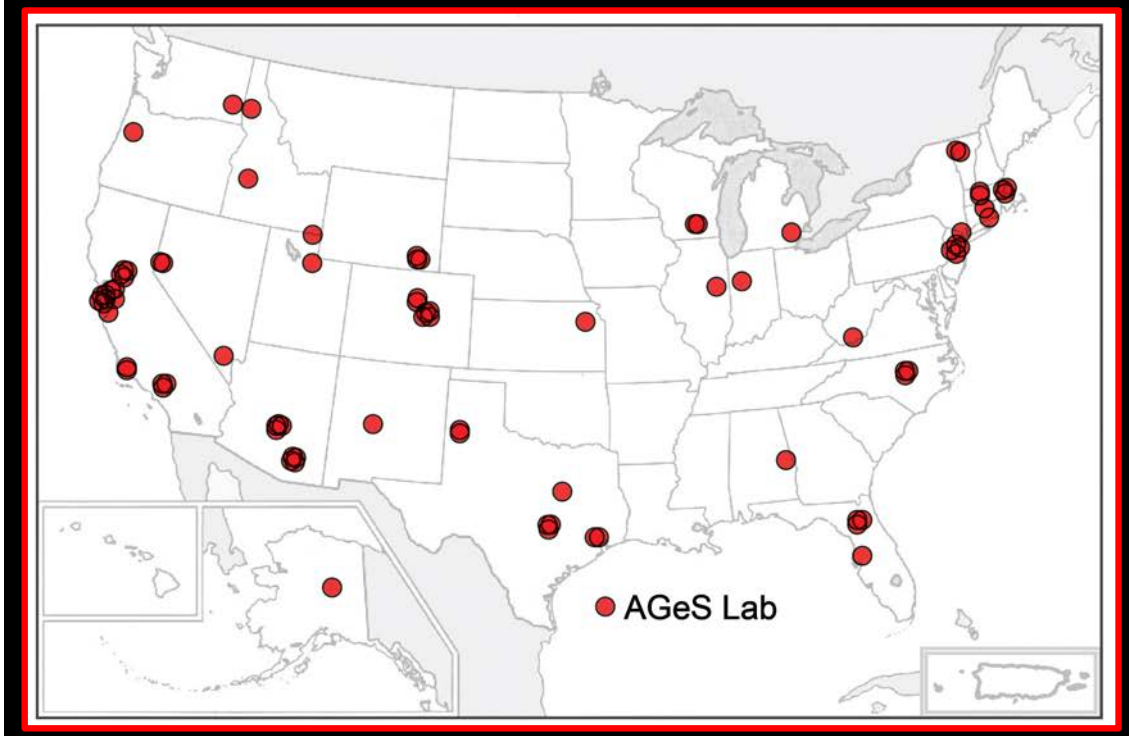
Lithosphere (2018) – Jeremy Cordova (WWU), $^{40}Ar/^{39}Ar$ at Univ Vermont

Volumetric extrusive rates of silicic supereruptions from the Afro-Arabian large igneous province

Jennifer E. Thines[1✉], Ingrid A. Ukstins[2], Corey Wall[3] & Mark Schmitz[3]

Nature Communications (2021) – Jennifer Thines (U Iowa), U-Pb at Boise State

AGeS Labs, 2022
>100 geochronologists, 64 labs



Clean lab at MIT U-Th facility

(U-Th)/He lab at CU-Boulder

Noble gas lab at NM Tech/ NM Bureau of Mines

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AGeS Labs, 2022
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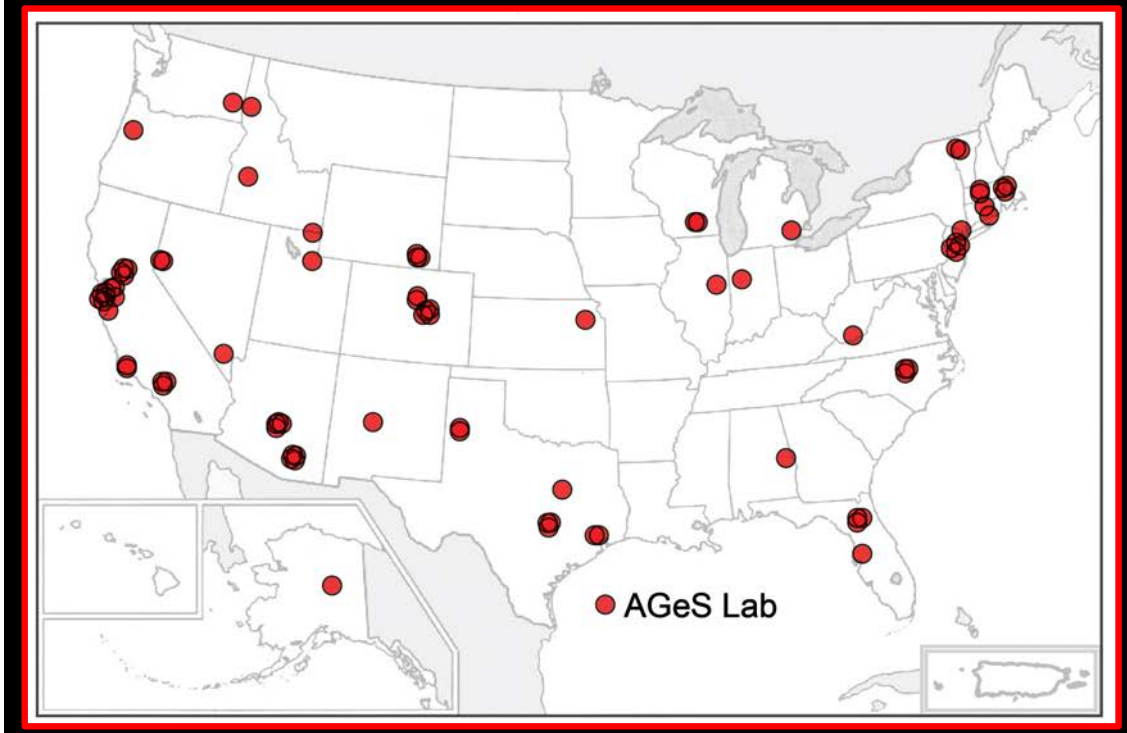
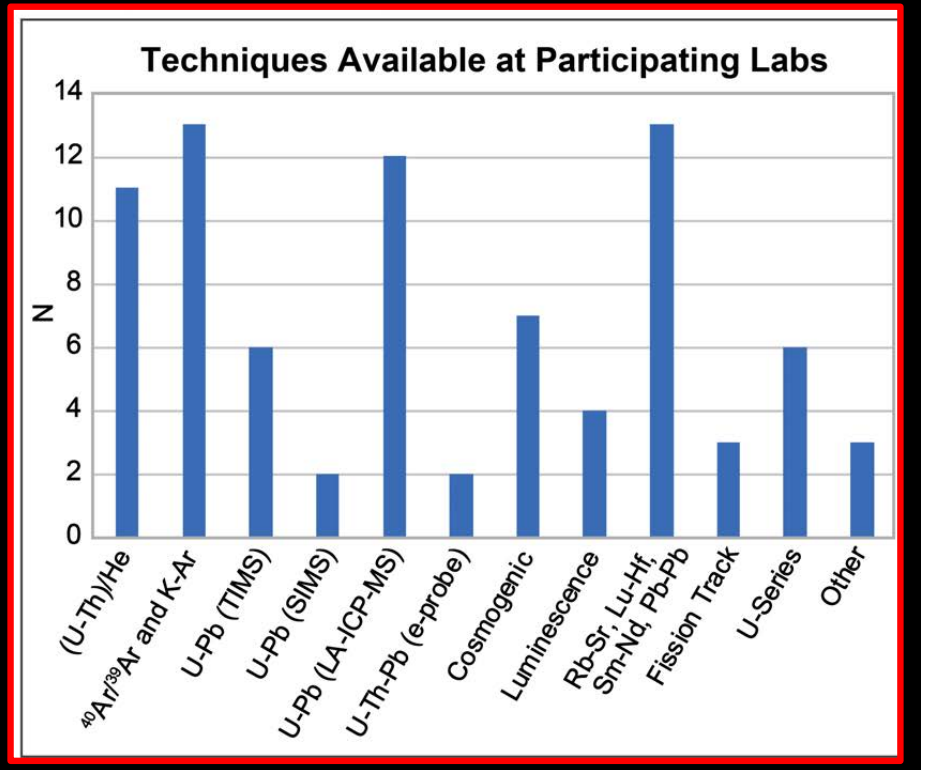




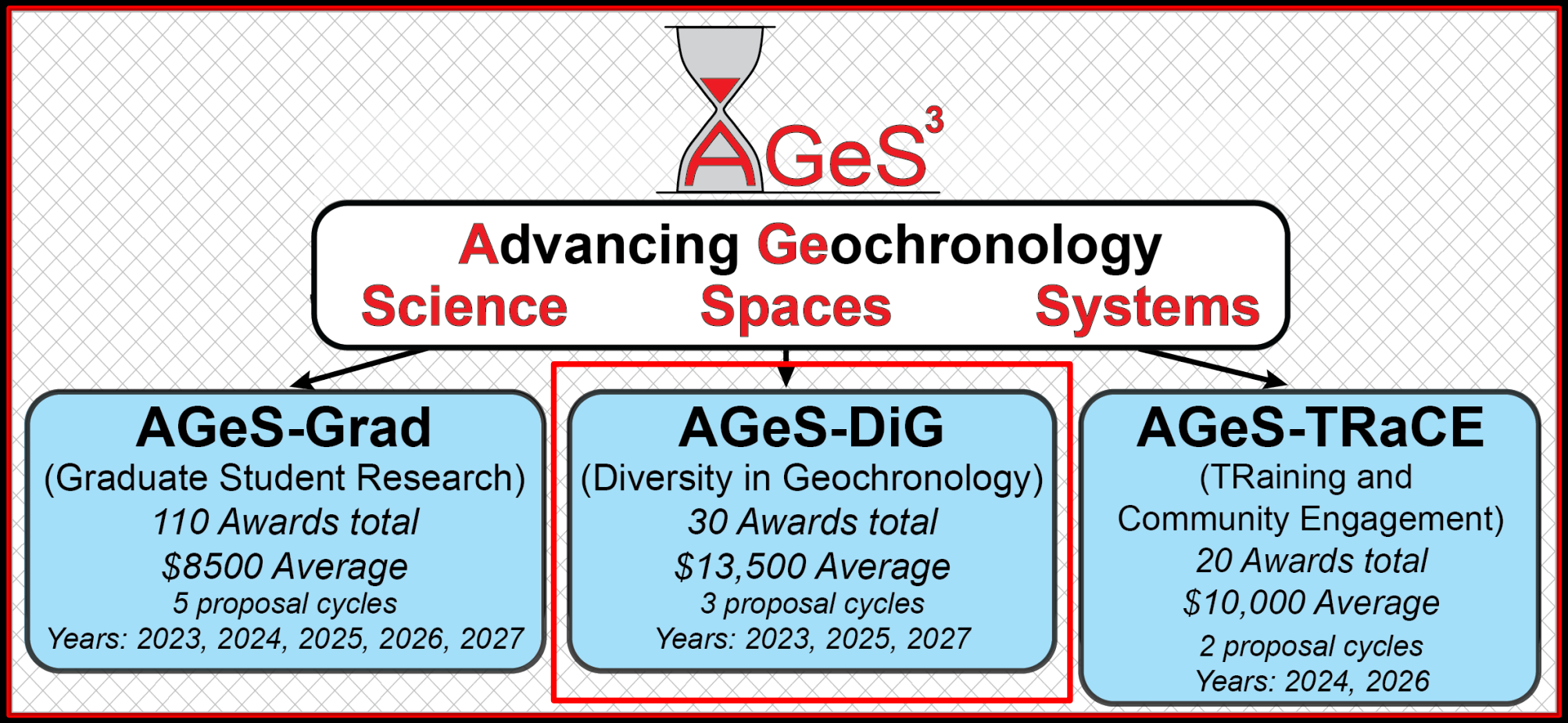
Who can join?

Any lab in the U.S. or its territories can become an AGeS lab at any time by submitting a lab profile to AGeS.
contact@agesgeochronology.org

Lab profiles

Contain information about instrumentation, training, sample prep, analysis, analytical rates, and contact personnel

www.agesgeochronology.org



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AGeS-DiG

(Diversity in Geochronology)

30 Awards total

$13,500 Average

3 proposal cycles

Years: 2023, 2025, 2027

A Prototype Program

- Support pilot initiatives to increase access to geochronology for those underrepresented in the earth sciences.

- Priority given to projects that:
  - emphasize authentic research experiences
  - mentor multiple students
  - foster a cohort experience

Who can apply?

- Scientists in the U.S. or its territories at the senior scientist, postdoc, and graduate levels

Next deadline: Sept 15, 2023

www.agesgeochronology.org

AGeS-DiG

(Diversity in Geochronology)

30 Awards total

$13,500 Average

3 proposal cycles

Years: 2023, 2025, 2027

Some AGeS2 DiG Numbers

- 1 proposal cycle (in 2022)
- 16 submitted proposals
- 6 awards
- $14,350 avg. award amount

www.agesgeochronology.org

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Awardee	Project Title
Christopher Bailey (W&M)	Cracking open Rodinia -- engaging under-represented students in U-Pb geochronology to better understand Iapetus rifting in the central Appalachians
Jaclyn Baughman (Humboldt State)	An undergraduate cohort thermochronology research and mentorship experience documenting Northern California's response to Eocene Siletzia accretion
Isabella Bennett (UVM)	Authentic Undergraduate Geochronology Research (AUGR)
Kevin Konrad (UNLV)	Three-phases of $^{40}Ar/^{39}Ar$ geochronology research into ancient marine volcanos
Lyman Persico (Whitman)	A project focused on landscape evolution and climate change to introduce research to first-year students from underrepresented backgrounds
Darryl Reano (ASU)	GeoConnections 2 (GC2)

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www.agesgeochronology.org

2022 AGeS-DiG Project Example

Visiting AMS in Purdue PRIME lab

Conditioning columns

AUGR program
Awardee Bella Bennett (UVM)

Preparing aliquots

Working in UVM cosmogenic lab

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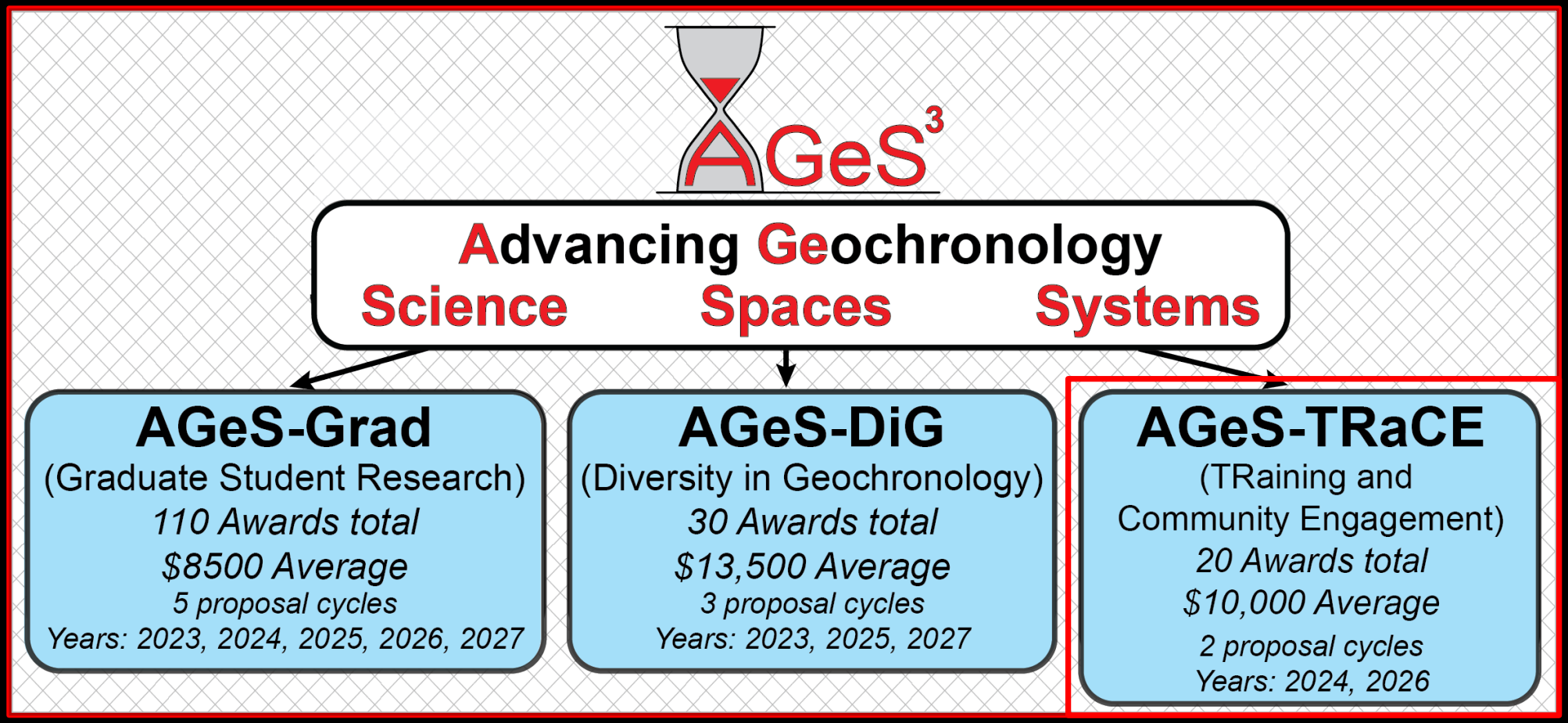

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AGeS-TRaCE

(TRaining and Community Engagement)

20 Awards total

$10,000 Average

2 proposal cycles

Years: 2024, 2026

A New Program

- Support community-led efforts to address other self-identified needs in geochronology
- Capture, formalize, and disseminate not yet standardized and not widely available geochronology knowledge
- Opportunities for collaborative discussion on key topics

Possible projects

- Accessible webinars, tutorials, and workshops on best practices, lab procedures, instrument design, statistics and uncertainties, or data interpretation
- Focused meetings to discuss interlab calibration, spikes, data management systems, modeling tool development or other capabilities needed for the future.
- Organic and open-minded to supporting different types of needs identified and addressed by proposal advocates.

Who can apply?

- Scientists anywhere in the U.S. at the senior scientist and postdoc levels

First deadline:

Sept 15, 2024

www.agesgeochronology.org

Project Team

Becky Flowers (CU), Lead-PI, co-director

Ramon Arrowsmith (ASU), co-PI, co-director

THE GEOLOGICAL SOCIETY OF AMERICA®

GSA, co-PI, submission and review portal logistics

Leilani Arthurs (CU), co-PI, advice on evaluation

Amy Myrbo (Amiable Consulting) Project evaluator

Jacky Baughman (Humboldt State), Cohort lead

Governance and Coordination

Steering committee (rotating):

- Shape and refine AGeS.
- Facilitate communication with the groups they represent
- Enable effective coordination with other geochronology leadership groups

Review committees (rotating):

- Evaluate, rank, and provide feedback on every submitted proposal
- Shape requested content of proposals, the review criteria, and the rubrics
- Act in an advisory role

Charter document

- Formalize the charge, responsibilities, and structure of both committees

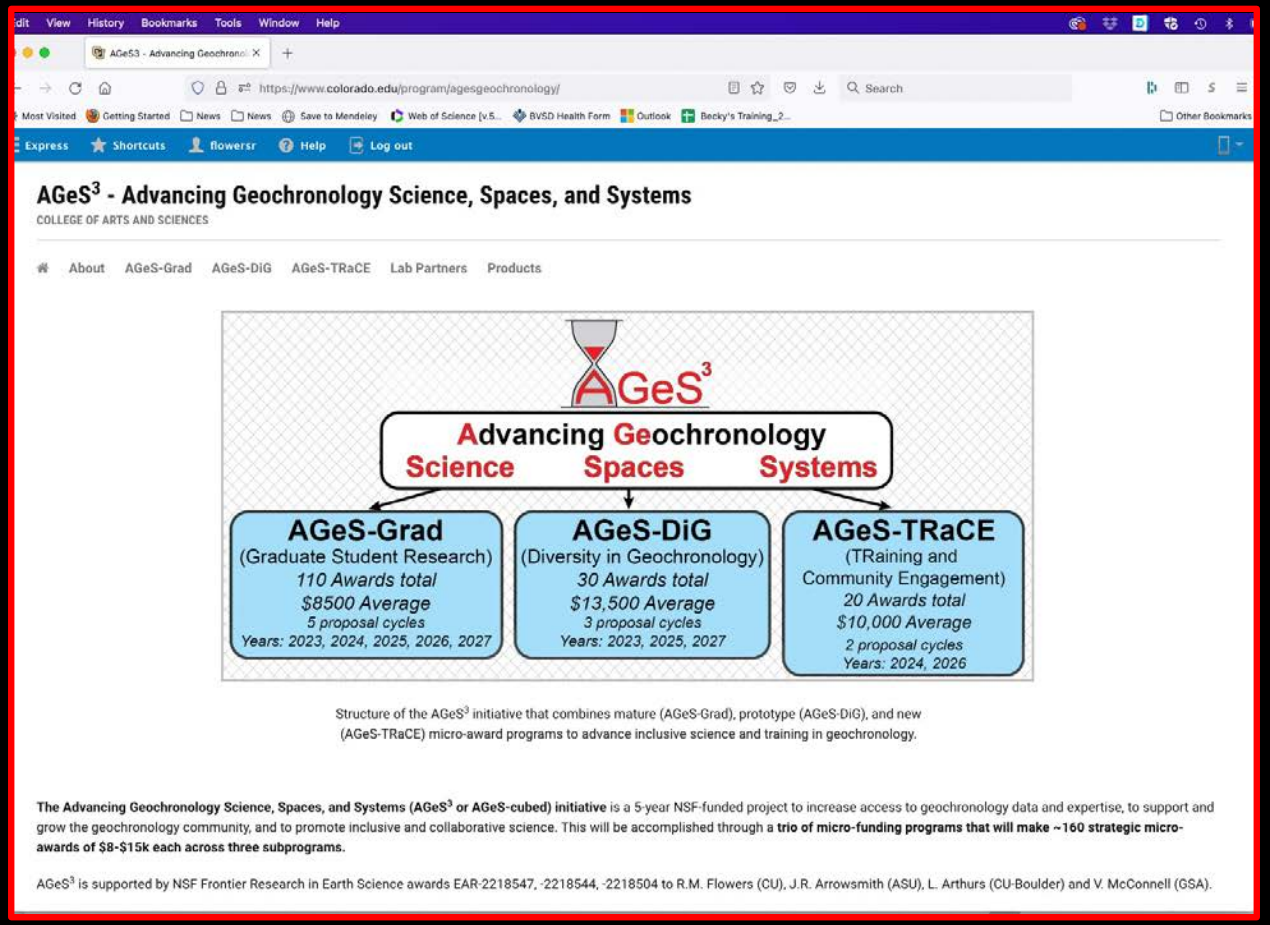
Review process

- Review criteria and evaluation rubrics made available before each proposal deadline at www.agesgeochonology.org
- Criteria and rubrics tuned annually based on feedback and program evaluation.
- Process: COIs identified. Initial discussion. At least 2 members of the review committee scores each proposal with rubric to obtain ranked list. Discussion. Second stage of more intense review. Final discussion.
- Unanimous support of final rankings awards sought.
- Review context statement made available on website after each review cycle.

Website

www.agesgeochronology.org

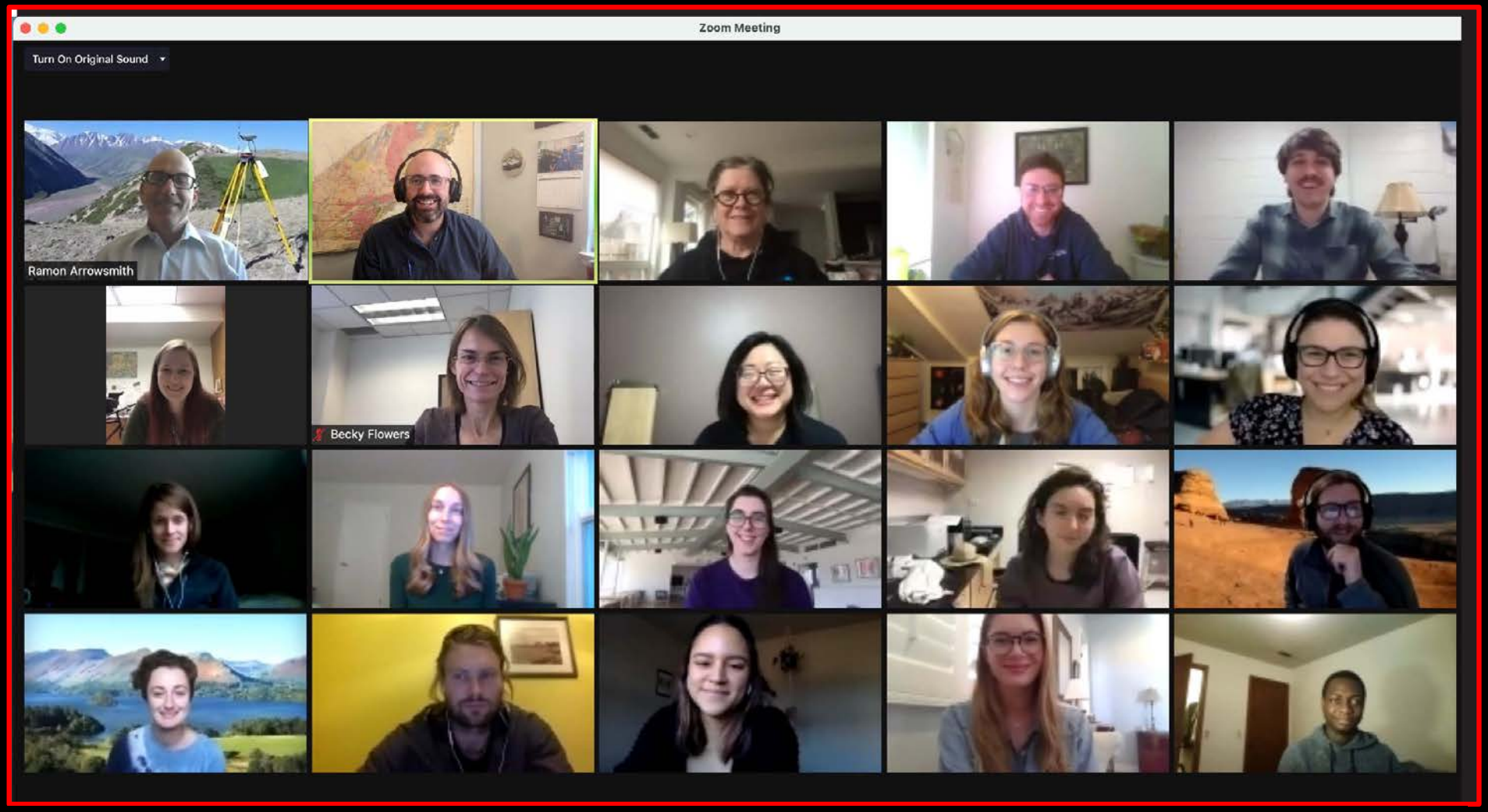
- Main website hosted at CU-Boulder.
- Program information. Other resources.
- Project summaries at end of all funded projects, any tangible products from awards (e.g., tutorials), list of publications and abstracts.



GSA hosts and manages logistics of the proposal submission portal and the online review process

AGeS-Grad Cohort Building

- Virtual meetings, slack communication
- Assessment, products, final project summaries



Zoom call in February 2021 with the 2020 AGeS2-Grad awardee cohort

Annual AGeS^3 meetings

- Annual AGeS^3 meetings that are entirely open, virtual, advertised widely.
- Communicate AGeS project outcomes
- Enable broader discussion and community feedback on AGeS
- Accessible and cost-effective.

Program Evaluation

- How well is AGeS achieving its goals?
- Demographic information
- Surveys of AGeS project participants
- Invited to provide additional comments in focus groups or interviews

Leilani Arthurs (CU), co-PI, advice on evaluation

Amy Myrbo (Amiable Consulting) Project evaluator

Thanks to:

AGeS review panels: *For their substantial time and energy invested in the proposal evaluation process*

AGeS1 & AGeS2 team

- *Executive Committee: Tammy Rittenour (USU), Blair Schoene (Princeton), Kathy Surpless (Trinity)*
- *Cohort Lead: Jim Metcalf (CU)*
- *Program Evaluator:* Susan Eriksson
- *Website logistical support: Vicki McConnell and Matt Dawson (GSA)*

NSF support:

- **AGeS^3:** *NSF FRES EAR-2218547, -2218544, -2218504*
- **AGeS2:** *NSF EAR-1759200, -1759353, -1759201*
- **AGeS1:** *NSF EarthScope EAR-1358514, -1358554, -1358401, -1358443*