

EarthScope Awards for Geochronology Student Research (AGeS) Program

1. Summary

Deadline: February 8, 2017

Eligibility: Students currently enrolled in a research-focused graduate degree program at an accredited college or university in the United States or its territories

Typical amount of award: ~\$8300 (maximum of \$10,000)

Estimated number of awards: 6-8 per year¹

Participating geochronology labs: Any lab in the United States or its territories can participate. For a list of participating labs [click here](#).

Funding: Grants funded this cycle must be completely expensed by January 31, 2018.

Overview: The [EarthScope AGeS program](#) is a multi-year educational initiative aimed at enhancing interdisciplinary, innovative, and high-impact science by promoting training and new interactions between students, scientists, and geochronology labs at different institutions. The program offers support of up to \$10,000 (typical awards are ~\$8,300) for graduate students to collect and interpret geochronology data that contribute to EarthScope science (http://www.earthscope.org/research/science_plan) through visits to participating geochronology labs. Awards can be used to fund analytical costs, sample preparation, travel to the host geochronology lab, lodging, and other expenses. These funds allow the students to visit the lab for a week or more, participate in the analysis and sample preparation, and learn fundamental aspects of the methods, techniques, and theory used in modern analytical facilities. Students can apply for funds to use whichever method is most appropriate for their proposed research project, including, but not limited to, U-Pb, ⁴⁰Ar/³⁹Ar, Lu-Hf, Sm-Nd, Rb-Sr, U-series, fission-track, (U-Th)/He, ¹⁴C, cosmogenic exposure, and luminescence dating.

Program goals:

- Fostering of new relationships and interdisciplinary, innovative science collaborations between researchers and labs at different institutions.
- Generation of new opportunities for students to learn fundamentals of the techniques, theory, and interpretative methods associated with data acquisition in modern analytical facilities.
- Implementation of a low-cost mechanism for students to generate key, high-quality datasets for projects and publications of mutual benefit to students, advisors, and labs, while laying the foundation for future collaborative proposals.

¹ *This initiative is supported by NSF EarthScope Grant Nos. EAR-1358514, EAR-1358514, 1358554, 1358401, 1358443, and 1101100 (EarthScope National Office) to Rebecca Flowers (CU-Boulder), Ramon Arrowsmith (ASU), James Metcalf (CU-Boulder), Tammy Rittenour (USU), and Blair Schoene (Princeton).*

- Promotion of science that provides an important contribution to EarthScope's core science goal to investigate the geologic history of the North American continent.

2. Participating Labs

2.1. General information

Any lab in the United States or its territories can become a participating lab at any point in the program by providing a brief (1-2 page) written summary that describes how a student will use the facility and the research and learning experiences a student should expect when visiting (see section 2.3). The lab name, contact information, and lab plan will be posted on the Participating lab database page to help students connect with potential host facilities (http://www.earthscope.org/research/geochronology/participating_labs).

Interested students will initiate contact with a participating lab to discuss a potential project, including timelines and why this particular technique will help address the fundamental questions in their research proposal. If the lab director feels that this is a mutually beneficial opportunity, the lab will help the student refine and clarify their proposed research and provide a support letter for this specific project.

Labs are under no obligation to collaborate on a project if approached by a student. If the lab director decides that the project is not a good fit, then the lab is encouraged to suggest alternate labs that may be more interested in or more appropriate for the project. Different labs that use the same dating tool commonly specialize in specific techniques and problems, so certain projects may be better suited for some labs than others.

2.2. Limits on proposals and awards per lab

Participating labs will receive no more than 2 awards in a given year. If desired, labs can support up to 3 proposals in a given application cycle. If a lab receives more than 3 proposals requests from students, then the lab is encouraged to direct the student to another lab.

2.3. Lab educational plan

Although individual plans and experiences can vary significantly, labs should try to provide a realistic overview of the sort of research and learning experiences a student should expect when visiting the lab. The program is not meant to fund contract work. The brief written summary that describes how a student will use the facility must include the following information:

1. Provide a brief overview of the laboratory facilities available for student use.
2. Give a realistic time frame for a student visit that includes training, sample preparation, and facility usage. If a technique requires special steps that take significant amounts of time (e.g., sample irradiation), the lab outline must discuss plans to address this given the limited timeframe of a student visit.

3. Provide a complete list of costs and expenses for lab use that a student would be expected to budget when writing their grant proposal, such as equipment, training, sample processing, and sample analysis. We expect individual student grants to average ~\$8,500, and be no more than \$10,000. These costs include travel support for the student. The laboratory-related expenses will be paid directly by invoice to Professor Ramon Arrowsmith, School of Earth and Space Exploration, Arizona State University
4. Describe what a student needs to accomplish prior to visiting and what materials should be brought for the visit. In particular, address what type of samples a student should have when they arrive, and whether or not they need to do any sample processing, data preparation, or additional training before working in the lab.
5. List which laboratory staff will be in charge of training and overseeing the student while they are working in the lab.
6. Discuss the processes required for data reduction and interpretation, and how laboratory staff will help advise these steps.
7. Estimate the average waiting time for lab use. Can a lab typically fit a visitor in quickly, or should a student schedule time 6 months or more in advance?
8. List the name(s) and email address(es) of lab personnel who should be contacted by students interested in initiating a new collaboration.

Please visit the [Lab Submission](#) page to submit your lab.

2.4. Assessment

To better assess the program activity and outcomes, we are carrying out several surveys that are required of all funded students and labs, as well as potentially of applicants that were not funded. Responses to these assessments are essential for evaluating the overall effectiveness of the program. The results are being used to improve the program and will be a factor in NSF's decision whether to continue supporting it in the future.

3. Guidelines for Student Applicants

3.1. General information

Students must be currently enrolled in a research-focused graduate degree program at an accredited college or university in the United States or its territories to submit an EarthScope Geochronology Grant Proposal. Students may submit one proposal per funding cycle.

Students wishing to apply for funds are responsible for initiating contact with a potential host lab to propose a project and discuss potential timelines. If the lab director feels that this is a mutually beneficial opportunity, the lab will help the student refine and clarify their proposed research and provide a support letter for this specific project. Note that labs are under no obligation to collaborate on a project if approached by a student.

A list of labs that have expressed interest in this program can be viewed on [Participating Lab](#) page. Any lab in the United States or its territories can become a participating lab at any time. If a lab you are interested in working with is not yet a participating lab, please encourage the lab to join the program.

Because one of the goals of this program is to foster new research collaborations, students may not request funds to work in labs they are already associated with, including labs managed or directed by their project supervisor(s). Students may request funds to work in labs at their home institution, provided that they can demonstrate that the collaboration is new (see section 3.2).

Please note that labs can support up to 3 proposals in a given application cycle and that participating labs will receive no more than 2 awards in a given year. Students are encouraged to discuss an individual lab's overall AGeS commitments.

3.2. Proposal preparation

Proposals must include the following, use the following format, and fit within the stated character limits (character limits exclude spaces). Incomplete proposals will not be considered.

Project Description

- *Project title*
- *Project supervisor at home institution*
- *EarthScope geochronology lab and lab contact*
- *Statement of the question or hypothesis that this project will address (up to 1200 characters)*
- *Importance of the proposed study (up to 2500 characters):*
- *Relevance to EarthScope geochronology science goals (up to 1000 characters):*
Specifically address how the project supports the overall goals of EarthScope (see the [EarthScope Science Plan](#)). Projects are not required to focus on North American geology, but must demonstrate relevance to EarthScope goals (see section 4.2 for project review criteria).
- *Proposed work (up to 2500 characters):*
Explain what geochronologic data you propose to collect and how it will address the question or test the hypothesis defined for this proposal.
- *Potential for fostering new research collaborations and experiences (up to 500 characters):*
Describe the extent to which this project will represent a new collaboration with a

geochronology lab and how it will provide a new research and learning experience that you otherwise would be unlikely to obtain during your degree.

- *Brief timeline* (up to 200 characters)
- *List any other funds currently available to you that could support your proposed project.*
- Proposals may include one additional page of references and one additional page of figures and captions of easily legible size.

Additional required documents

- Detailed budget and budget justification:
Budgets may include funds for travel to and from the participating Earthscope Geochronology lab where you propose to work, food and lodging while visiting the lab, analytical and training fees, equipment or consumables required for analysis, and sample preparation fees (including mineral separation accomplished at another facility if necessary). Requested budgets may not exceed \$10,000 per proposal. Lab fee payment and travel reimbursement will be coordinated by Arizona State University. Lab fees will be paid directly to the to the laboratory.
- A letter of support for your project provided by the Earthscope Geochronology lab(s) where you propose to do your work.
- Lab plan provided by the EarthScope Geochronology lab(s). The plans for all participating labs can be found [here](#).
- Letter of support from your project supervisor at your home institution.

To see a list of the 2016 recipients please click here.

3.3. Assessment

To better assess the program activity and outcomes, we are carrying out several surveys that are required of all funded students and labs, as well as potentially of applicants that were not funded. Responses to these assessments are essential for evaluating the overall effectiveness of the program. The results are being used to improve the program and will be a factor in NSF's decision whether to continue supporting it in the future.

4. EarthScope AGeS Grant Proposal Review Process and Criteria

4.1. Review process

The proposals will be reviewed by an external panel of 4-6 geoscientists with a broad range of backgrounds familiar with the application of geochronologic techniques and/or have experience with

EarthScope-related science. Nominations for the review panel will be sought from colleagues in the community. The review process will not be influenced by the geochronologist PIs on this project or other personnel who run facilities participating as EarthScope labs in the program. The panel members will not directly advise any of the student applicants to minimize conflict of interest.

The review panel will meet virtually, shortly after the submission deadline. First, each proposal will be reviewed by at least two panel members, with each panelist scoring the proposal based on the weighted merit system described below. Panelists will be asked to use the full point scale in ranking proposals. Second, following this initial proposal ranking, the panel will evaluate the diversity of techniques, labs, and types of science in the top suite of proposals to ensure that there is breadth in the funded proposal pool. The review panel will then make the final list of awardees and their support levels.

4.2. Review criteria

Proposals will be evaluated based on their significance, relevance to EarthScope science goals, overall intellectual merit, likelihood of success, promotion of new analytical skill acquisition by the student, and potential for fostering new research collaborations. Reviewers will use a point system that weights the relative importance of each category, and allows for direct comparison of multiple proposals. The panel may decide to partially fund proposals. All proposals must satisfactorily address all of the following requirements and must include all of the requested application materials to be considered for funding.

1. Overall significance, intellectual merit, and likelihood of success: 50 points

General quality of the proposed research, including its scope, relevance, and importance, and general likelihood that the research will be able to answer the central question or hypothesis of the proposal and produce useful results. Considerations can include the choice of technique, sampling strategy, and whether the proposed methods are well-established or experimental. Reviewers will also address the clarity of the proposal's central question or hypothesis.

2. Relevance to Earthscope Goals: 20 points

Contributions of the central question or hypothesis and the proposed research to the science targets of EarthScope as defined in the [EarthScope Science Plan](#). Projects do not necessarily have to focus on North American geology, however the proposal must demonstrate the relevance to EarthScope goals.

3. Potential for fostering new research collaborations and acquisition of new analytical skills by the student: 15 points

The degree to which this research will create new partnerships and opportunities including collaborations between different institutions and/or research groups. The extent to which this research provides a new and otherwise unavailable opportunity for the student to obtain experience with and training in analytical work and geochronology.

4. **Realistic and efficient research plan and reasonable budget: 15 points**

Assessment of the proposed timeline and budget, specifically considering the time required for sample acquisition and preparation, training, analysis, and interpretation. This criterion relies partially on good coordination between the proponent and the hosting facility, evaluated based on the student proposal, the clarity of the lab plan, and the support letters. Budgetary considerations can include the availability of other sources of funding.

5. FAQ

- You state that the project must contribute to EarthScope's core science goals, does that mean that I can't apply to work on projects outside of North America?

No. The relevance of your project to EarthScope's core science goals is one of a number of criteria that your proposal will be graded on. Projects that do not connect directly to understanding the evolution of the North America continent will not score well on that particular criteria, but if the proposal is outstanding in all other respects it could still score well enough overall to be funded. Be sure to look at the EarthScope Science Plan (<http://www.earthscope.org/information/publications/science-plan/>). You will see that there is a very broad remit for EarthScope Science Targets.

- Do I have to be a graduate student in the United States to apply for a grant?

Yes. Students must be currently enrolled in a research-focused graduate degree program at an accredited college or university in the United States or its territories to submit an EarthScope Geochronology Grant Proposal. Students may submit one proposal per funding cycle.

- Are these awards only for graduate students, or can undergraduate students also apply?

These awards are restricted to graduate students enrolled in research-focused graduate degree programs at accredited colleges or universities in the United States or its territories. We hope that this program can serve as a template and be expanded to include a larger pool of applicants in the future, including undergraduates, however at this time only graduate students are eligible to apply.

- What if a lab I want to work with isn't listed as a participating lab?

You can contact them about becoming a participating lab. Any lab in the United States or its territories can become a participating lab at any point in the program by providing a brief (1-2 page) written summary that describes how a student will use the facility.

- Awards are for up to \$10,000, but the average award will be ~\$8,300. Will the reviewers give partial awards, or cut proposed budgets?

Part of the evaluation process examines whether or not the proposed budget is reasonable and efficient. Applications that request too much, or too little, money will score poorly in this category. The review committee does reserve the right to award partial grants.

- Can I request funds to work in a lab at my institution?

Yes, as long as the project represents a new collaboration. This criterion is worth 15 points (out of 100 possible), so applications that do not demonstrate new collaborations will not score as highly as those that do.

- How will the funds be distributed?

Fund distribution will be coordinated by Professor Arrowsmith's project (former EarthScope National Office at ASU) via invoice. Costs for geochronology analyses, sample preparation, and other analysis-related activities will be invoiced directly to Professor Ramón Arrowsmith, School of Earth and Space Exploration, Arizona State University. Travel will be reimbursed directly to the participant. Stipends, if budgeted, will be paid directly to the recipient.

- How do I become a participating lab?

Any lab in the United States or its territories can become a participating lab at any point in the program by providing a brief (1-2 page) written summary that describes how a student will use the facility. For more information, and links on where to submit your lab plan, [click here](#).

- If I become a participating lab, am I required to work with any student that contacts me?

No. If the lab director feels that the proposed research is a mutually beneficial opportunity, then the lab will provide a support letter and help the student refine and clarify the proposal. If the lab director decides that the project is not a good fit, then the lab is encouraged to suggest alternative labs that may be more interested in the project. Different labs that apply the same dating tool commonly specialize in specific techniques and problems, so certain projects may be better suited for some labs than others.

- What exactly constitutes a “research and learning” experience for the student?

This can vary from lab to lab and technique to technique. Each lab is free to customize their lab plan, provided that they have a goal of providing a hands-on learning and educational experience for the student. Simply put, the students should be involved with as many analytical

steps as reasonable, and the labs should expect to help the students refine their proposals, and interpret their data. This is not meant to fund contract work. Part of the decision process for the awards will be an assessment of the quality of the research and learning experience.