

RESESS Annual Report 2012

Activities and Findings

Research and Education Activities

RESESS, Research Experiences in the Solid Earth Sciences for Students, is a summer internship program designed to increase the number of individuals from underrepresented populations in geosciences who will enter graduate school and complete Masters degree or higher in the Earth sciences, with support from the National Science Foundation under Award No. 0917474 GEO-OEDG. RESESS accomplishes this through three project goals:

Goal 1. Increase the impact of the RESESS program with the purpose of increasing the number of undergraduate students in geosciences who will enter graduate school and complete a masters degree or higher.

Goal 2. Build a *RESESS Sustainability Framework*.

Goal 3. Provide opportunities for research interns to engage with communities about science issues, and thereby increase the perceived relevance of the geosciences among broad and diverse segments of the population.

The RESESS internship provides a financially viable opportunity for students who otherwise might not be able to participate. Interns are provided with travel support, lodging, and full-time pay for an eleven-week internship, most typically based in Boulder, Colorado.



A relatively unique aspect of RESESS compared to most REU programs is that we look for projects that match the students' interests, whereas many REUs have one project for the whole group, or find willing mentors first. We attempt to find a mentor in the Boulder area who specializes in the subdiscipline that is of greatest interest to the intern, and a scientist who is interested in mentoring a student. We work with the mentors on defining the scope, purpose and methodology of the project with the intent of providing the intern with a well-defined research problem that can be tackled in a short internship. For example, intern Kayla Christian from University of Illinois, Chicago, expressed a strong interest in exploring aqueous geochemistry,

and we were able to match her with a leading research group at the USGS headed by Dr. Kirk Nordstrum.

In addition to having an opportunity to do authentic research, interns received training in critical thinking, reading and analyzing journal articles, writing a research abstract and research article, preparing a scientific poster, and giving a talk. We also provide technical training on tools that are available at UNAVCO such as the TLS instrument (Terrestrial Laser Scanner), training in statistics, and geology field trips.



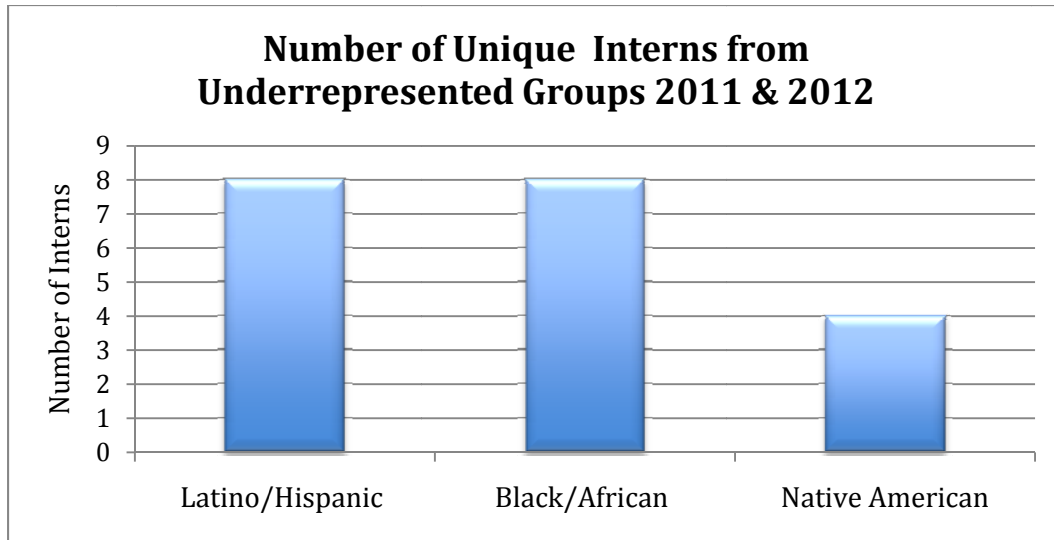
This year, interns are coaching each other on GRE preparation in formal sessions, and interns will participate in a graduate school application and career choice workshop at the University of Colorado designed for them. In addition, interns will have the opportunity to participate in an outreach program with a local organization serving the Latino community, CLACE, by working with elementary-aged children in an existing STEM program.

The interns develop a strong sense of group with their cohort, first during the Leadership Training week, and later while working together on assignments, field trips, and group social events such as RESESS potluck dinners. Returning interns and alumni keep close contact with each other throughout the year via Facebook, conferences, and visiting each other. The degree of tight support that they provide each other is an important outcome of this program.

Recruiting Process and Application Numbers

In the winter of 2012, we continued the recruiting approach of 2011 and posted ads on websites of scientific organizations (GSA, AGU, etc.), scientific organizations serving minority students (SACNAS, NABGG, IBP, etc.), student organizations (AAPG, American Institute of Physics, etc.), and other sites (e.g. GeoCorps America).

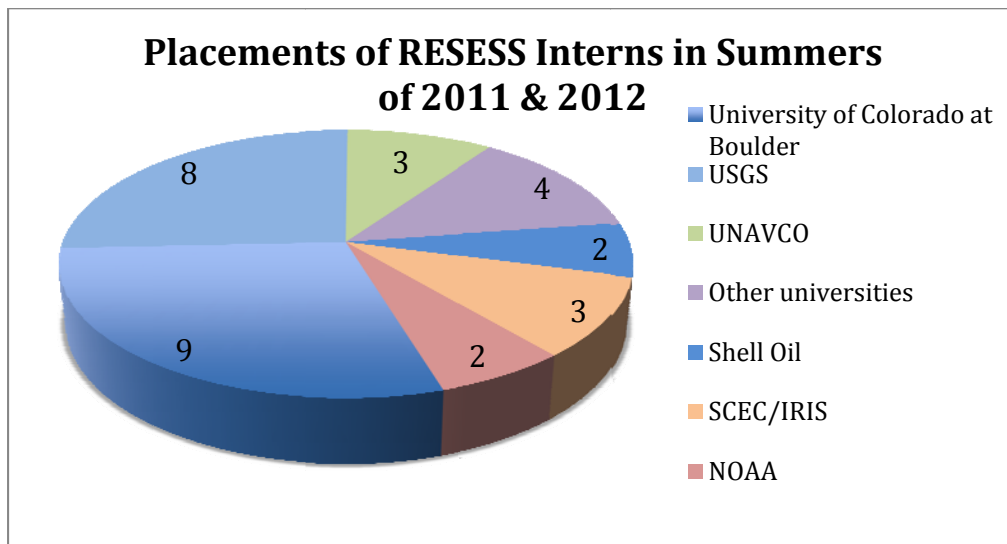
This year, an email containing a recruiting message about RESESS and SCEC's (Southern California Earthquake Center) internships was sent to 6,493 tenured and tenure-track faculty members in geoscience departments of universities around the country via the American Geoscience Institute. Within the week following this mailing, RESESS received one hundred new applications. While many of these were from students who were not from underrepresented populations, many were from minority students or students who have demonstrated support of underserved communities.



In total, we received 165 applications to RESESS in 2012. Of these, 130 applications were complete; commonly the letters of recommendation were the missing items. Of the 130 completed applications, 80 were submitted by female applicants and 50 were submitted by male applicants. Approximately 55 applications were submitted by underrepresented minorities or disabled students. We encouraged sharing of applications between REUs through the GEO-REU listserv, and shared some applications with other programs. At least four REUs participated in application sharing.

Cohorts of 2011 and 2012

The twenty unique interns in 2011 and 2012 represented 15 different educational institutions from across the United States. In selecting applicants for the program, the panel endeavored to maximize institutional diversity so as to provide students from different colleges an experience and a chance to spread the word with other future RESESS applicants. We matched interns with science mentors in their field of interest; the following chart shows the organizations where the interns performed their summer research:



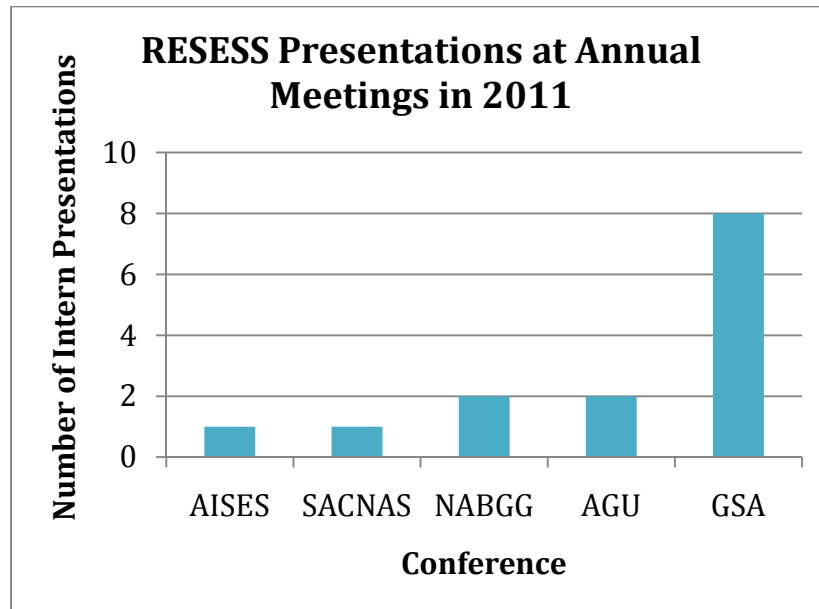
In 2011, one student working at the USGS (Lakewood,CO) collaborated with the Denver Museum of Nature and Science on the “Snowmastadon” (Snowmass mastodon) Project (Cristina Lugo, right). Two interns conducted research in national parks, including Yellowstone National Park and Great Sand Dunes National Park.

Research projects focused on topics in:



- Hydrology
- Seismology
- Geophysics
- Paleoenvironmental reconstruction
- Carbon storage in vegetation
- Karst hydrology
- Water quality in a bayou on the Mississippi Delta
- Soil chemistry related to forest fire
- Paleoclimatology
- Carbonate geology
- Fluid injection and its relationships with seismic activity

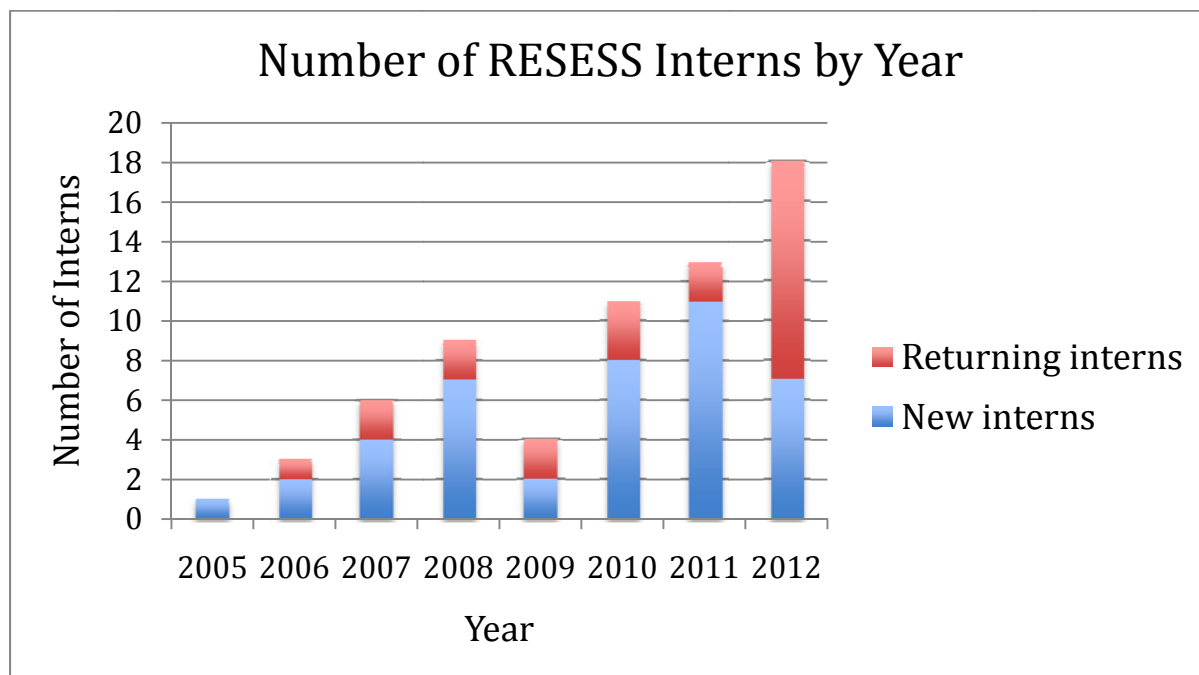
In the fall of 2011, interns gave 14 presentations at national meetings of scientific organizations. In particular, eight interns presented posters at the GSA (see chart).



Program Success Factors

The 2012 cohort includes 7 new interns and 11 returning interns (5 of whom are assigned elsewhere in the U.S.). A total of 37 students have attended the program to date. The graphs below show the history of the number of returning and new intern for the RESESS program since 2005 and the educational status of the 37 current and alumni interns of the RESESS program. Of the 37 that represent both the current cohort as well as alumni, 17 are enrolled in undergraduate programs in Earth science, Environmental Science, or Engineering, 10 have graduated with a B.S.

(five in 2012). Of those, four are in the geoscience workforce and three are intending to attend graduate school this fall. Of the 20 RESESS alumni, 50% are currently in graduate school.



Where do RESESS Interns Go after RESESS?

Institution	MS	PhD	Other
University of California at Santa Cruz		1	
University of Miami		1	
University of Michigan		1	
University of Minnesota		1	
University of North Texas	1		
University of Oklahoma		1	
University of Puerto Rico Mayaguez	1		
University of Texas at El Paso		2	
University of Tulsa: College of Law (JD)			1

Sustainability Plan

One of the goals outlined in the Track 2 RESESS Proposal was to develop external financial support for an increasing number of interns over the five-year period of the award. The award budget included support for the following number of interns for each of years one through five: 11, 13, 10, 7, and then 6 interns. At the same time, the proposal stated that “The total number of students will increase from 12 in Year 1 to a minimum of 12 in Year 5, through external support of the program.”

In the current year, Year 3, the RESESS program is projected to be supported by five non-RESESS projects or organizations in the amount of approximately \$ 90K . These include:

USGS – The USGS is paying the salary of three RESESS interns, through hiring them as students for the summer (23% of the total external funding).

Shell Oil – Shell Oil is paying the salary and travel of one RESESS intern, through hiring him as an intern (13% of the total external funding).

COCONet – The COCONet NSF Project is paying the salary of one RESESS intern and has purchased a laptop for a new intern (11% of the total external funding).

UNAVCO Facility CA – This award is covering travel for interns during the summer program (7% of the total external funding).

PBO Award – This award covers the salary for 3.5 interns, their domestic travel, and miscellaneous expenses (46% of the total external funding).

The projected total funding including NSF and external support for core staff and student program costs for Year 3 are provided in Table 1, below. The lower portion of the table illustrates the breakdown of support being provided for the student portion of the program by the RESESS grant and external funding. Out of projected year 3 costs of \$353k for the student program (not including core staff) for 18 interns, \$90k or 25% of that cost is being covered by the external funding sources listed above.

We strive to obtain a larger percent of support for the student program through additional collaborations and funds and are working towards the objective of broadening the base of long-term contributors to the success of RESESS. A twenty-five percent contribution to the student program by external projects and organizations is a healthy step in that direction. Future sponsors or collaborators may include CMMAP at CSU in Fort Collins, Colorado and ExxonMobil, amongst others.

Item	Projected Year 3 Spend Plan
NSF + External Funding for Year 3:	
Core staff and staff travel	\$141k
Student Program	\$353k
Total Program Cost	\$494k
NSF funding for student program through RESESS award	\$263k
External funding for student program	\$90k
Percent of student funding from external funding	25%

We anticipate that core sponsorship will be needed to stabilize RESESS beyond the track 2 award, yet industry and other organizational partners that provide support for individual student internships make the program extensible far beyond its core funding base. These partnerships have further strengthened interactions between the USGS and other organizations across all UNAVCO programs.

Subaward to the University of Colorado at Boulder

The Department of Geological Sciences at CU-Boulder received a subaward in 2012 from UNAVCO's RESESS program (CU P.I, Dr. Kevin Mahan) to provide support and enhance the internship experience in the following ways:

1. A RESESS Summer Fellowship for which a CU graduate student in Geological Sciences is employed to assist interns with feedback and support on their a) project definition and direction, b) poster and oral presentations, c) abstract preparation for conference submission and for the RESESS volume "Earth, Wind, Sea, and Sky." Dr. Mahan and Sloan (RESESS) solicited applications for the fellowship from current CU graduate students during Spring 2012 and conducted interviews of the three top candidates. This year, Erin Leckey (PhD candidate) is the recipient of the summer fellowship, and has been contributing to the Writing Workshop and will be meeting with students, individually.
2. A 2-day field trip for RESESS interns on geology, geomorphology, and Earth processes of Colorado's Front Range and the broader Rocky Mountain region, with an overnight stay at CU's high elevation Mountain Research Station. Dr. Mahan and 5 CU graduate students will lead the field trip, which is scheduled for June 16-17, 2012. This trip will provide much needed field experience for the interns, an opportunity to learn about the local geology, and a bonding experience for the cohort.

The Department of Geological Sciences at CU has been an active partner in RESESS since 2006. CU faculty are our most active RESESS mentors, have provided seminars on career development and graduate school, and have participated as judges at RESESS poster sessions. In June, the Chair of Geological Sciences and the RESESS Program Director initiated the writing of an MOU between the programs with the intent of strengthening the relationship.

Subaward to IRIS

Intern Recruitment and Selection

IRIS and UNAVCO staff coordinated recruitment and selection of interns for RESESS and the IRIS REU site. The *Geophysics Minority Recruitment Lecture Series*, jointly funded by RESESS OEDG and the IRIS REU awards, proved to be a fruitful recruiting tool. This year's lectures resulted in RESESS receiving 10 applications from students at schools where the lectures were delivered. Ultimately RESESS accepted one of these students into the program. Meanwhile the IRIS REU received two student applications as a result of the lecture series, but ultimately did not accept either student into the program.

The speakers for the 2011 – 2012 lecture series were :

- Justin Brown - 2004 IRIS Internship Alumnus & PhD Student at Stanford University, School of Earth Science
- Stephen Hernandez – 2006 - 2008 RESESS Alumnus and 2009 IRIS Internship Alumnus, NSF Graduate Research Fellow, & PhD student at UC Santa Cruz
- Sandra Saldana - 2005 IRIS Internship Alumnus & Geophysicist, Noble Energy

To advertise the lecture series, over 30 physics departments at Historically Black Colleges and Universities (HBCU) and geoscience and/or physics departments Hispanic Serving Institutions (HSI) around the country received emails announcing the program, plus follow-up phone calls. This year, 7 lectures were delivered in the physics department of minority serving institutions:

10/13/11 U. of Puerto Rico at Mayaguez - Hernandez
10/18/11 Southern University - Saldaña
10/27/11 North Carolina Central University - Brown
11/4/11 Alabama A&M University - Brown
11/8/11 Morehouse College - Brown
11/17/11 Morgan State University - Hernandez
2/6/12 Elizabeth City State University - Saldaña

Evaluation

To support continual improvement of the RESESS program, Michael Hubenthal, coordinator of the IRIS intern program, worked with Val Sloan from UNAVCO and Joan Ruskus from the American Institutes of Research (AIR) to refine existing resources and combine these together to create a broad evaluation plan. This work featured a new post-internship evaluation instrument for the 2011 cohort as well as a new logic model that will guide the evaluation process in the future. Due to delays with the IRB process the 2011 post evaluation was not completed until May 2012. Ten out of thirteen participants completed the evaluation and an analysis of this data is underway.

Subaward to UC Santa Cruz

During 2011-2012 Susan Schwartz accomplished the following tasks as UNAVCO Community Liaison and program recruiter.

1. Advertised the 2012 RESESS program and recruited potential interns at the SACNAS National Meeting, San Jose California October 2011. UC Santa Cruz was a sponsor of the 2011 SACNAS meeting and invited meeting registrants to tour the campus. She hosted a seismology lab visit for participants visiting our campus with a stated interest in physics/geophysics and spoke to them about the RESESS program.
2. Provided RESESS recruitment reminders and information to all contacts made the prior year at California State Universities and University of California campuses.
3. Because both the number and qualifications of RESESS applicants for the 2012 program increased substantially over prior years, it has become clear that recruitment through this subaward is no longer the highest priority for the RESESS program. In order to determine where efforts will have the most impact on RESESS in future years, Dr. Schwartz (UCSC subaward PI) and RESESS staff at UNAVCO revised the subaward plan to focus on curriculum development for summer interns and fostering interest among researchers engaged in geodetic research to become science mentors.
4. To find out what areas of curriculum development to focus on, Dr. Schwartz engaged in discussions with future RESESS science mentors at the 2012 UNAVCO science workshop. Scientific computing skills are currently missing from the summer intern cohort. This summer Dr. Schwartz plans to develop computer modules to teach important computer skills to future RESESS interns. The intention of the RESESS Director is to include both active instruction that she will deliver to incoming interns in Boulder during the summer of 2013 and self-paced tutorials that students can conduct on their own. These skills will be immediately useful and applicable to the intern's summer research project but will also be valuable for graduate school or future employment.

Outreach Activities

Recruiting and Mentoring Visit to UTEP, December, 2011

Sloan and Haacker-Santos of SOARS visited the University of Texas at El Paso in December of 2011 to recruit applicants for interns, and to visit RESESS alumni and doctoral students, Ezer Patlan and Lennox Thompson, in the high schools where they were teaching as a part of a NSF GK-12 program. Their passion for engaging and encouraging students in their STEM courses was palpable. Sloan and Haacker-Santos also met with RESESS alumni, Ashley Grijalva (2011) and Andrew Lopez (2010) who are still completing their undergraduate programs.



Targeted recruiting during this past year has included RESESS participation in meetings where the primary purpose is the support of historically underrepresented students in the geosciences, as well as other scientific and educational meetings. RESESS interns and staff participated in the following:

- National Association of Black Geologists and Geophysicists (NABGG) 2011 Annual Meeting
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) including a UNAVCO and IRIS-funded geosciences field trip prior to the SACNAS national meeting that provided 50 students with the opportunity to broaden their geosciences experience.
- GSA 2011 Annual Meeting in Minneapolis
- AGU 2011 Annual Meeting in San Francisco
- 2011 GEO REU Workshop in San José



Presentations and Publications

Sloan, V. , R. Haacker-Santos, R. Pandya. 2011. Building a Network of Internships for a Diverse Geoscience Community presented at the 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec. [Abstract.](#)

Sloan, V. and D. Carlson. 2011. Successful recruitment strategies for a summer internship program, presented at 2011 Annual Meeting of the GSA, Minneapolis, MN, 9-12

Oct. http://gsa.confex.com/gsa/2011AM/financialprogram/abstract_194154.htm. Vol. 43, No. 5, p. 192