

28 Aug 2019

Issues in Geosciences, Geosc 500

Meetings:

T: 4 – 5 pm (Colloquium) 22 DEIKE

W: 8 – 9:50 (Class meeting) 341 DEIKE

Today:

1st half:

Introduction to Issues in the Geosciences

2nd half:

Responsible Conduct of Research (RCR)

Scholarship and Research Integrity (SARI)

Internship or career in the Energy Industry Companies visit in early Fall

2019 Fall Recruiting Schedule

Recruiting
information:

[www.geosc.psu.edu/
industry-recruiting](http://www.geosc.psu.edu/industry-recruiting)

Nicole Stocks,
512 Deike

e-career system:

[eng-psu-
csm.symplicity.com/
employers/](http://eng-psu-csm.symplicity.com/employers/)

COMPANY	INFORMATION SESSION	INTERVIEWS
Diamondback Energy <i>(Dave Cannon*)</i>	September 13 5:00pm, 541 Deike	September 12 343 Deike
BP Corporation <i>(Tony Riccardi*)</i>	September 16 5:00pm, 541 Deike	<i>(info session only; online interview process)</i>
Chevron of North America Exploration & Production <i>(Chris Guzofski*)</i>	September 17 5:00pm, 541 Deike	September 18 th 343 Deike
Shell <i>(Beth Strickland*)</i>	September 18 5:00pm, 541 Deike	<i>(info session only; online interview process)</i>
Exxon Mobil Upstream Research <i>(Will Hoffman*)</i>	September 30 5:00pm, 541 Deike	October 1 & 2 343 Deike
Berry Petroleum <i>(Kurt Neher, Sneha Patel, Greg Craley* and Brandon Clark*)</i>	October 9 5:00pm, 541 Deike	October 9 & 10 343 Deike

Issues in Geosciences, Geosc 500
Fall Term, 2019

Check out the course web site:

<http://www3.geosc.psu.edu/Courses/Geosc500/>

We'll run the course from there.

Reading, exercises, course syllabus and other expectations will be found on the course web site.

Issues in Geosciences, Geosc 500

Fall Term, 2019

<http://www3.geosc.psu.edu/Courses/Geosc500/500SyllabusFall2019.html>

[Issues in Geosciences](#), GEOSC 500 Fall Term, 2019

Meetings: T: 4 – 5 pm (Colloquium)
W 8:00 - 9:50 (Class meeting)

[22 Deike](#)
[341 Deike](#)

Goals: This course is designed to provide graduate students with the skills and breadth of perspective needed for a successful career in the field of Geosciences.

Book: *The Art of Being a Scientist*. This book has many practical skills for working with mentors and developing effective research habits. You can get a used copy for ~ \$20.

Lunch with colloquium speakers: The course is integrated with the weekly Dept. seminar series. A group of you will join the speaker for lunch each week. You are required to schedule lunch with at least two speakers during the fall semester.

Weekly classroom meetings will start with a discussion of the previous colloquium talk and then proceed to the topic listed below.

Care and maintenance of your advisors! Several of our activities throughout the semester will focus on developing a healthy, scientifically meaningful relationship with your advisor and thesis committee. This will include interviews, activities in research topic selection, and your research proposal.

Required Reading: 1) *The Art of Being a Scientist*, 2) each of the [papers suggested by the colloquium speakers](#). Read the paper in preparation for the colloquium and come to our **weekly classroom meeting prepared to lead a discussion** of the paper for the previous colloquium. 3) additional reading for each meeting is noted in the table below.

Tentative Syllabus. Details here: <http://www3.geosc.psu.edu/Courses/Geosc500/>

Issues in Geosciences, Geosc 500

Fall Term, 2019

<http://www3.geosc.psu.edu/Courses/Geosc500/>

Fall 2019, Penn State Department of Geosciences

Read and be prepared to lead a discussion on the papers listed below each date:

Sep. 4

[The Colloquium paper](#)

[Responding to Possible Plagiarism](#)

[Benka: Who is listening? What do they hear?](#)

Sep. 11

[The Colloquium paper](#)

Issues in Geosciences, Geosc 500

Fall Term, 2019

<http://www3.geosc.psu.edu/Courses/Geosc500/>

Research Proposal for Geosc500 Issues in Geosciences, Fall Term, 2019

Goals and rationale for the assignment This exercise provides experience summarizing a current issue in the Geosciences and will help you develop the research plans needed to advance the state of knowledge in your area. Writing research proposals is an important skill for any career in Geosciences, including those in academia, industry, or government. During your time in graduate school, most of you will conduct research that is funded by government agencies (e.g., National Science Foundation, Department of Energy, etc.) or industry, and some of you will be asked to participate in the development of a research proposal to generate further funding. We hope that you will see how the process of writing a proposal can help clarify your thoughts on a topic, hone your ability to present cogent arguments for the underlying processes and logic, and develop testable hypotheses. One of our goals is to help you get started with a thesis proposal (MS students) or second paper/proposal for the PhD candidacy exam. Thus, we encourage you to discuss your ideas for this assignment with your research advisor(s). However, the proposal should be written and produced by you alone.

Proposals should address a topic in the Geosciences. If you are unsure about your topic, please feel free to ask one of us.

Deadlines (Submit as one pdf file named in our normal format.)

1. 2-3 page executive summary and introduction due Oct. 23rd. This should include references to two or three papers, and ideally one of these will be as a recent paper published in *Science*, *Nature*, *Geology*, or another leading journal.
2. Final proposal due Nov 20th. Strict 10 page limit.

Issues in Geosciences, Geosc 500

Fall Term, 2019

<http://www3.geosc.psu.edu/Courses/Geosc500/>

Research Proposal for Geosc500 [Issues in Geosciences](#)

Proposal Evaluation Panels: Each proposal will be evaluated by a panel of your peers.

Panels will be responsible for evaluating 5 proposals. Panels will meet in early December.

Panels will write a summary of each proposal, based on their panel meeting, using the format below. Panel summaries will be distributed prior to our final class meeting.

Each panel will choose a top proposal from their group.

Marone & Fisher will also evaluate each proposal, for grading purposes.

Key dates and items for Panel Review.

Due Date (on or before), activity

- Nov. 22 Proposals distributed to panels.
- Nov. 25 Panel members assign a lead reviewer for each proposal. This is a group activity and we expect that you will self organize.
- Dec 3 Panels schedule a 1.5 to 2 hour minute meeting.
- Dec 4 Panels assignments and meeting plan due (submit a copy via email). **This is a required activity.** One person from each panel will submit this information.
- Dec 10 Panels meet and discuss proposals. The lead panel member for each proposal drafts a summary and each panelist reads and comments on the summary prior to the end of the meeting.
- Dec 10 Panel summaries due (submit a copy via email).
- Dec 11 Each panel will lead a discussion of their evaluation process with examples of highlights from the proposals they evaluated.

Responsible Conduct of Research (RCR) aka... Scholarship and Research Integrity (SARI)

Integrity training, 28 Aug 2019

Dept. of Geosciences,
Penn State University

Scholarship and Research Integrity

[SARI/RCR Information](#)

Required on-line Training You must complete this training and [submit the completion certificate](#) (mailto: marone@psu.edu with subject line: CITI/SARI Certificate, my file is named correctly), as a pdf file, prior to the end of term.

Responsible Conduct of Research/Scholarship and Research Integrity

Origin of RCR/SARI: America COMPETES Act

America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act



The screenshot shows the NSF website interface. At the top left is the NSF logo with the tagline "WHERE DISCOVERIES BEGIN". To the right is a search bar with "NSF Web Site" selected in a dropdown menu and a search button. Below the search bar is a navigation menu with links: HOME | FUNDING | AWARDS | DISCOVERIES | NEWS | PUBLICATIONS | STATISTICS | ABOUT | FastLane. Underneath the navigation menu are links: Search Awards • Managing Awards • About Awards. The main content area features a sidebar on the left for the "Office of Budget, Finance and Award Management (BFA)" with a "DIAS Home" link. The main content area has a heading "Responsible Conduct of Research (RCR)" followed by a paragraph: "This page provides resources on NSF's implementation of Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act. The responsible and ethical conduct of research (RCR) is critical for excellence, as well as public trust, in science and engineering. Consequently, education in RCR is considered essential in the preparation of future scientists and engineers."

America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act: The America COMPETES Act

- Legislative History
 - Introduced - May 10, 2007
 - Passed House - May 22, 2007
 - Passed Senate - July 19, 2007
 - Differences Resolved - Aug 2, 2007
 - Signed by President - Aug 9, 2007



RCR/SARI at Penn State

Some topics for RCR

- Acquisition, management, sharing, and ownership of data
- Publication practices and responsible authorship
- Conflict of interest and commitment
- Research misconduct
- Peer review
- Mentor/trainee responsibilities
- Collaborative science
- Human subjects protections
- Animal welfare

Each Department Must Have an Approved SARI Plan

RCR/SARI Plan, Dept. of Geosciences, PSU

**Department of Geosciences
Scholarship and Research Integrity**

Student: _____

Penn State requires first-year graduate students to participate in online training provided by the Collaborative Institutional Training Initiative (CITI), by means of Penn State's institutional subscription. Graduate students at Penn State must also engage in a total of five hours of discipline-specific, discussion-based training.

Geoscience graduate students matriculating January 2009 or later must use the table below to indicate completion of RCR, with each element verified by signature of the supervising instructor. Students must attach a certificate of completion of online training from CITI.

Activity	Date	Supervising Instructor Signature
CITI on-line training Please attach original certificate		
Discussion-based Training (5 hours)		
New-Student Orientation 1 hour		
Issues Course 2 hours		
Subdisciplinary Program 2 hours		
_____ Name of activity, group or course		

I certify _____ has completed training in the responsible conduct of research and has fulfilled the Penn State SARI requirements.

Signature of Graduate Program Officer

Date

RCR/SARI Plan, Dept. of Geosciences, PSU

Department of Geosciences Scholarship and Research Integrity

Student: _____

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New-Student Orientation 1 hour		
Issues Course 2 hours		

RCR/SARI Plan, Dept. of Geosciences, PSU

**Department of Geosciences
Scholarship and Research Integrity**

Student: _____

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Activity	Date	Supervising Instructor Signature
CITI on-line training Please attach original certificate		

Discussion-based Training (5 hours)

New-Student Orientation
1 hour

Issues Course
2 hours

Subdisciplinary Program
2 hours

Name of activity, group or course

I certify _____ has completed training in the responsible conduct of research and has fulfilled the Penn State SARI requirements.

Signature of Graduate Program Officer

Date

RCR/SARI Plan, Dept. of Geosciences, PSU

Discussion-based Training (5 hours)	
New-Student Orientation 1 hour	Today, now
Issues Course 2 hours	During semester
Subdisciplinary Program 2 hours	With your advisor and research group
Name of activity, group or course	

I certify _____ has completed training in the responsible conduct of research and has fulfilled the Penn State SARI requirements.

Signature of Graduate Program Officer

Date

RCR/SARI at Penn State

Some topics for RCR

- Acquisition, management, sharing, and ownership of data
- Publication practices and responsible authorship
- Conflict of interest and commitment
- Research misconduct
- Peer review
- Mentor/trainee responsibilities
- Collaborative science
- Human subjects protections
- Animal welfare

RCR/SARI at Penn State

Some topics for RCR

- **Acquisition, management, sharing, and ownership of data**
- **Publication practices and responsible authorship**

Data are like gold, diamonds and rubies.....

Preserve the data you collect.

It's the most important thing you have and it belongs to everyone (e.g., taxpayers, your colleagues, et al.)

Share your data, it belongs to everyone....

• Conflict of Interest, Publication Agreements

Authorship Form and Statement on Real or Perceived Conflicts of Interest for

Slow earthquakes, preseis

I. Authorship:

The authorship policies of all *Science* journals follow those recommen (<http://www.nap.edu/catalog/12192.html>). In particular, we note that "j included as an author, although such contributions... may be recogniz

In order to meet our requirements for authorship of a paper, you must these criteria by indicating your contribution to all of the following des

Authors of Reviews, Perspectives, and other papers not presenting o

All comment fields are limited to 1000 characters.

I participated in the design and/or interpretation of the reported exp

I participated in the acquisition and/or analysis of data. Please s
data:

I participated in drafting and/or revis

I was primarily responsible for a particular, specialized role i
statistical analysis, crystallography, preparation of cell lines). Pleas

I provided administrative, technical or supervisory support tha
substantial intellectual contributi

Slow Earthquakes, Preseismic Velocity Changes, and the Origin of Slow Frictional Stick-Slip

Bryan M. Kaproth and C. Marone

Earthquakes normally occur as frictional stick-slip instabilities, resulting in catastrophic failure and seismic rupture. Tectonic faults also fail in slow earthquakes with rupture durations of months or more, yet their origin is poorly understood. Here, we present laboratory observations of repetitive, slow stick-slip in serpentinite fault zones and mechanical evidence for their origin. We document a transition from unstable to stable frictional behavior with increasing slip velocity, providing a mechanism to limit the speed of slow earthquakes. We also document reduction of *P*-wave speed within the active shear zone before stick-slip events. If similar mechanisms operate in nature, our results suggest that higher-resolution studies of elastic properties in tectonic fault zones may aid in the search for reliable earthquake precursors.

Slow earthquakes represent one mode of the spectrum of fault slip behaviors ranging from steady aseismic slip at plate tectonic rates (a few millimeters per year) to normal earthquakes with rupture propagation at a few kilometers per second and fault slip speeds of 1 to 10 m/s, which is consistent with elastodynamic theory (1–6). Like normal earthquakes, slow earthquakes can accommodate most of a fault's slip budget, with equivalent magnitudes of 8 or larger; yet, this slip occurs slowly, over days to years, rather than the few tens of seconds for normal earthquakes (1–4). Slow earthquakes often occur adjacent to traditional seismogenic zones (5, 7) and may load these earthquake-prone areas. Moreover, recent work suggests that slow earthquakes may abet potentially devastating earthquakes, such as the 2011 M_w 9 Tohoku Oki earthquake (7), and thus, understanding the physics of slow earthquakes and

identifying possible precursory changes in fault zone properties are increasingly important goals.

Although observations of slow earthquakes abound, the underlying processes that produce these self-sustaining, quasi-dynamic ruptures remain poorly understood (3–8). A particularly vexing aspect of slow earthquakes is the mechanism that limits slip speed yet allows self-sustained rupture propagation. One possibility is that slow earthquakes represent prematurely arrested normal earthquakes with slip-speed limited by a mechanism such as dilatant hardening or a transition in friction constitutive behavior with increasing slip speed. Several mechanisms have been proposed (4–12), but the origin of slow earthquakes remains elusive. Additionally, if slow earthquakes initiate like normal earthquakes they may exhibit precursory effects, such as accelerating fault slip or changes in elastic wave-speed within the rupture nucleation region.

Here, we describe laboratory observations of fault-zone materials showing repetitive, slow stick-slip friction events that are reminiscent of slow

earthquakes (Fig. 1). We sheared layers of lizardite-rich serpentinite at constant normal stress of 1 MPa (supplementary text). Each experiment includes 50+ stick-slip events, with durations ranging up to 35 s (Fig. 2). Our experiments show that the laboratory fault zones undergo a transition from velocity-weakening to velocity-strengthening friction behavior above slip rates of $\sim 10 \mu\text{m/s}$ (Fig. 3). During each slip event, the fault zone shows large changes in elastic wave speed (2 to 21% decrease), with precursory changes of 1 to 3% starting up to 60 s before failure (Fig. 4).

Like natural earthquakes, fault slip velocity during stick-slip events exceeded the imposed far-field velocity. The full record for one experiment shows the character of stress drops and the corresponding stair-step pattern of fault displacement (Fig. 1A). Stick-slip events have durations of 1 to 35 s, average slip velocities of 15 to 280 $\mu\text{m/s}$, average displacements of 10 to 900 μm , and evolve from small to large events with increasing shear (Fig. 1B). We observed slow stick-slip events at a range of loading velocities (Fig. 2). Each event generally released tens of kilopascals of shear stress—roughly a 5 to 10% stress drop (Fig. 1A). Maximum slip velocities ranged from 60 to 1300 $\mu\text{m/s}$, but peak velocities were generally sustained for < 1 s, with longer acceleration and deceleration periods (Fig. 2B). The events resemble results from experiments conducted on halite (12) but are distinguished by their consistent, repetitive nature.

To investigate the processes responsible for these slow-slip events, we conducted additional experiments under stiff loading conditions, including slide-hold-slide (SHS) (fig. S2) and velocity-step tests (fig. S3). We determined the friction rate parameter ($a-b = \Delta\mu/\Delta\sigma V$, where V is the velocity) and critical slip distance (D_c) using standard techniques (13). With increased shear strain and hold time, ($a-b$) generally decreased, and D_c increased (fig. S2A). At slip velocities

Department of Geosciences, and Energy Institute Center for Geomechanics, Geofluids and Geohazards, Pennsylvania State University, University Park, PA 16802, USA.

Publication practices

RCR/SARI at Penn State

science_editors@aaas.org

August 25, 2019 at 7:16 PM

S

To: Chris Marone

Reply-To: science_editors@aaas.org

Successful Submission of a Manuscript to Science (aaz2602)

Manuscript Title: Universal Mechanism for Slow Earthquakes rooted in Laboratory Friction

Author: Marone

Manuscript Number: aaz2602

Dear Dr. Marone:

You are listed as a coauthor on the above manuscript, which has recently been submitted to Science. According to Science policy, all authors must have seen and approved the submission of their manuscript. If you have seen the manuscript and approved its submission, no action is necessary.

If you have not read this paper or do not approve its submission to Science, please let us know as soon as possible. Please refer to the manuscript number listed above in any correspondence (you can just reply to this message).

You can see the status of your manuscript at any time by logging into your account at the Science Journals Submission and Information Portal at <https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcts.sciencemag.org&data=02%7C01%7Ccj38%40psu.edu%7C96498cf9f08a4dc3b12708d729b2406e%7C7cf48d453ddb4389a9c1c115526eb52e%7C0%7C0%7C637023717879172691&data=WimncSNhZj0jZZG2OQZ1goD OMR1mA8JDDYAFprmw1jU%3D&reserved=0>.

<https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcts.sciencemag.org&data=02%7C01%7Ccj38%40psu.edu%7C96498cf9f08a4dc3b12708d729b2406e%7C7cf48d453ddb4389a9c1c115526eb52e%7C0%7C0%7C637023717879172691&data=WjJMBPIj%2BJQQHuQ6XqNkii%2F3JdMtes%2B9Y5rdpYwvdY%3D&reserved=0> and use the email at which you received this correspondence because that is linked to your manuscript.

If you do not yet have an account, please go to <https://nam01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcts.sciencemag.org&data=02%7C01%7Ccj38%40psu.edu%7C96498cf9f08a4dc3b12708d729b2406e%7C7cf48d453ddb4389a9c1c115526eb52e%7C0%7C0%7C637023717879172691&data=WjJMBPIj%2BJQQHuQ6XqNkii%2F3JdMtes%2B9Y5rdpYwvdY%3D&reserved=0>

password&data=02%7C01%7Ccj38%40psu.edu%7C96498cf9f08a4dc3b12708d729b2406e%7C7cf48d453ddb4389a9c1c115526eb52e%7C0%7C0%7C637023717879172691&data=WjJMBPIj%2BJQQHuQ6XqNkii%2F3JdMtes%2B9Y5rdpYwvdY%3D&reserved=0 and use the email at which you received this correspondence because that is linked to your manuscript. Then, follow the prompts to set your password and login. After login, you can access your manuscript and monitor its status.

Once you are registered, we encourage you to link your account to your ORCID ID, an identifier that facilitates the correct attribution of your publications to you. To learn more about ORCID or to obtain an ORCID ID, visit their site at:

<https://nam01.safelinks.protection.outlook.com/?url=http%3A%2F%2Forcid.org&data=02%7C01%7Ccj38%40psu.edu%7C96498cf9f08a4dc3b12708d729b2406e%7C7cf48d453ddb4389a9c1c115526eb52e%7C0%7C0%7C637023717879172691&data=sqFf8KKJvAPxFmRojm9sAeiBtgN6mHwbe%2B%2ByXw%2F0ZI4%3D&reserved=0>

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Your manuscript is now undergoing an initial screening to determine whether it will be sent for in-depth review. If the manuscript is sent to review, its status will change to "To Review".

Sincerely,
The Editors
Science

Publication practices

RCR/SARI at Penn State

• Conflict of Interest, Publication Agreements

Authorship Form and Statement on Real or Perceived Conflicts of Interest for

Chris Marone

An author on Manuscript # 1239577

Slow earthquakes, preseismic velocity changes, and the origin of slow frictional stick-slip

I. Authorship:

The authorship policies of all *Science* journals follow those recommended by the report "On Being a Scientist", 3rd Edition, published by the US National Academy of Sciences (<http://www.nap.edu/catalog/12192.html>). In particular, we note that "just providing laboratory space for a project or furnishing a sample used in the research is not sufficient to be included as an author, although such contributions... may be recognized in a separate acknowledgement section."

In order to meet our requirements for authorship of a paper, you must have participated significantly in the reported research or writing of the paper. Please affirm that you meet these criteria by indicating your contribution to all of the following descriptions (**0 means you did not participate; 5 means you were 100% responsible**):

Authors of Reviews, Perspectives, and other papers not presenting original research only need to address the third criteria.

All comment fields are limited to 1000 characters.

	0%					100%
I participated in the design and/or interpretation of the reported experiments or results.	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5
I participated in the acquisition and/or analysis of data. Please specify what types of data: <input type="text" value="lab results and analysis"/>	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5
I participated in drafting and/or revising the manuscript.	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5
I was primarily responsible for a particular, specialized role in the research (e.g. statistical analysis, crystallography, preparation of cell lines). Please briefly state which specialized role: <input type="text"/>	<input checked="" type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
I provided administrative, technical or supervisory support that made a direct and substantial intellectual contribution to this research.	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5

Authorship Form and Statement on Real or Perceived Conflicts of Interest for

Chris Marone

An author on Manuscript # 1239577

Slow earthquakes, preseismic velocity changes, and the origin of slow frictional stick-slip

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In order to meet our requirements for authorship of a paper, you must have participated significantly in the reported research or writing of the paper. Please affirm that you meet these criteria by indicating your contribution to all of the following descriptions (**0 means you did not participate; 5 means you were 100% responsible**):

Authors of Reviews, Perspectives, and other papers not presenting original research only need to address the third criteria.

All comment fields are limited to 1000 characters.

0%  100%

I participated in the design and/or interpretation of the reported experiments or results.

0 1 2 3 4 5

I participated in the acquisition and/or analysis of data. Please specify what types of data:

0 1 2 3 4 5

I participated in drafting and/or revising the manuscript.

0 1 2 3 4 5

I was primarily responsible for a particular, specialized role in the research (e.g. statistical analysis, crystallography, preparation of cell lines). Please briefly state which specialized role:

0 1 2 3 4 5

I provided administrative, technical or supervisory support that made a direct and substantial intellectual contribution to this research.

0 1 2 3 4 5

Science/AAAS Authorship Form and Statement of Conflicts of Interest for Chris Marone

An Author on:

Manuscript# 1239577

Title: Slow earthquakes, preseismic velocity changes, and the origin of slow frictional stick-slip

First Author: Bryan Kaproth-Gerecht

I. Authorship:

In order to meet our requirements for authorship of a paper, you must have participated significantly in the reported research or writing of the paper. Please affirm that you meet these criteria by indicating your contribution to all of the following descriptions (0 is you did not participate; 5 is you were 100% responsible):

I, Chris Marone

	Level of participation
Participated in the design and/or interpretation of the reported experiments or results.	5
Participated in the acquisition and/or analysis of data. <i>lab results and analysis</i>	5
Participated in drafting and/or revising the manuscript.	5
Was primarily responsible for a particular, specialized role in the research, e.g. statistical analysis, crystallography, preparation of cell lines; please briefly state which.	0

RCR/SARI at Penn State

Who Will Pay for Public Access to Research Data?

[Francine Berman](#),
[Vint Cerf](#)

<http://www.sciencemag.org/content/341/6146/616.short>

POLICYFORUM

SCIENCE PRIORITIES

Who Will Pay for Public Access to Research Data?

Francine Berman¹ and Vint Cerf²

On 22 February, the U.S. Office of Science and Technology Policy (OSTP) released a memo calling for public access for publications and data resulting from federally sponsored research grants (1). The memo directed federal agencies with more than \$100 million R&D expenditures to “develop a plan to support increased public access to the results of research funded by the Federal Government.” Perhaps even more succinctly, a subsequent *New York Times* opinion page sported the headline “We Paid for the Research, So Let’s See It” (2). So who pays for data infrastructure?

The OSTP memo requested agencies to provide plans by September 2013 that describe their strategies for providing public access to both research publications and research data. Plans are expected to be implemented using “resources within the existing agency budget,” i.e., no new money should be expected. Currently, federal R&D agencies are working hard to foster approaches to public access, to assess needs for supporting partnerships and enabling infrastructure, and to develop timetables and approaches for implementation. We focus here on the research data portion of the OSTP memo, rather than on publications.

Digital data are ephemeral, and access to data involves infrastructure and economic support. In order to support the download-



Research data of community value are supported today in a variety of ways. Some of them, like those in the Protein Data Bank (PDB) (3)—a database of protein structure information used heavily by the life sciences community—are supported by the public sector. (In particular, U.S. funding from the National Science Foundation (NSF), the National Institutes of Health (NIH), and the U.S. Department of Energy for the Research Collaboratory for Structural Bioinformatics (RCSB) PDB is \$6.3 million annually.) Other data, as from the Longitudinal Study of American Youth (LSAY) (4)—a longitudinal study of student attitudes about science and careers—are available through subscrip-

When economic models and infrastructure are not in place to ensure access and preservation, federally funded research data are “at risk.”

tion from the Inter-university Consortium. What happens to valuable data when project funding ends? Consider, for example, a 3-year research project in which valuable sensor data are collected from an environmentally sensitive area. Those data may be useful not just for the duration of the project but for the next decade or more to collaborators and a broader community of researchers. For the first 3 years, the costs of stewardship (including development of a database that supports analysis, access to the data for the community through a portal, adequate storage and management of the data collection, and so on) may be paid for by the grant. But who pays for subsequent support? In such cases, research data may become more valuable just as the economics of stewardship become less viable.

Up to this point, no one sector has stepped up to take on the problem alone, and it is unrealistic to expect as much. In the public sector, federal R&D agencies are unlikely to allocate enough resources to support all federally funded research data. The costs of infrastructure would absorb too great a portion of a budget that must support both innovation and the infrastructure needed to drive innovation. The private sector, especially

RCR/SARI at Penn State

Funding agencies require data management plans

DOE Control number: 1956-1518

Machine Learning Approaches to Predicting Induced Seismicity and Imaging Geothermal Reservoir Properties

Chris Marone, Derek Elsworth, Parisa Shokouhi, Jing Yang and Tieyuan Zhu

The Pennsylvania State University
536 Deike Building
University Park, PA 16802

Data Management Plan

Overview: This project will develop machine learning (ML) methods to advance geothermal exploration and geothermal energy production. The work will focus on ML methods to use microearthquake (MEQ) data from operating geothermal sites and on the extension to reservoir scale of our recent success in using ML to predict laboratory earthquakes.

Data Types and Sources: The data generated in the proposed project will include: machine learning codes and metadata, digital lab data and metadata, and analyses of field data sets. These data will be digital measurements and numerical output. In addition, we will generate C, Java, Python and HTML5 code, Web sites and Journal papers.

Content and Format: All sample information and manual measurements will be kept in laboratory notebooks that will be secured in the PI's personal labs. All digital data from the lab

- Authorship/Plagiarism, Publication practices and responsible authorship

At the PSU SARI/RCR web site:

What should be published?

- * Are the results complete enough?

- * Are the results significant enough?

- * How much of the research should be published?

- * Has any of the work been previously published?

Who should be named as an author and who should be acknowledged?

Has credit been adequately attributed those whose former works or ideas contributed to the research and/or publication?

How should research results be explained to minimize misleading statements and/or bias?

- Authorship/Plagiarism, Publication practices and responsible authorship

<https://www.nature.com/nature-research/editorial-policies/plagiarism>

nature > nature research > editorial policies > plagiarism and duplicate publication

MENU ▾

nature research



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Editorial policies

Authorship

Competing interests

Confidentiality

Plagiarism and duplicate publication

Image integrity and standards

Preprints & Conference Proceedings

Peer-review policy

Reporting standards and availability of data, materials, code and protocols

Ethics and biosecurity

Correction and retraction policy

Press and embargo policies

Self archiving and license to publish

Plagiarism and duplicate publication

On this page

- [Plagiarism and fabrication](#)
- [Due credit for others' work](#)
- [Nature Research journals' policy on duplicate publication](#)
- [Nature Research journals' editorials](#)

Plagiarism and fabrication

Plagiarism is unacknowledged copying or an attempt to misattribute original authorship, whether of ideas, text or results. As defined by the [ORI](#) (Office of Research Integrity), plagiarism can include, "theft or misappropriation of intellectual property and the substantial unattributed textual copying of another's work". Plagiarism can be said to have clearly occurred when large chunks of text have been cut-and-pasted without appropriate and unambiguous attribution. Such manuscripts would not be considered for publication in a Nature Research journal. Aside from wholesale verbatim reuse of text, due care must be taken

- Authorship/Plagiarism, Publication practices and responsible authorship

At the PSU SARI/RCR web site:

AND that's just part of it. Truth is stranger than fiction..

<http://news.sciencemag.org/2013/03/nsf-audit-successful-proposals-finds-numerous-cases-alleged-plagiarism>

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ScienceInsider

Breaking news and analysis from the world of science policy



JEFFREY MERVIS Jeff reports on and coordinates coverage of science policy for *Science*.

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NSF Audit of Successful Proposals Finds Numerous Cases of Alleged Plagiarism

2013-03-08 14:35 | [34 Comments](#)

The National Science Foundation (NSF) is investigating nearly 100 cases of suspected plagiarism drawn from a single year's worth of proposals funded by the agency.

The cases grow out of an internal examination by NSF's Office of Inspector General (IG) of every proposal that NSF funded in fiscal year 2011. James Kroll, head of administrative investigations within the IG's office, tells *ScienceInsider* that applying plagiarism software to NSF's entire portfolio of some 8000 awards made that year resulted in a "hit rate" of 1% to 1.5%. "My group is now swamped," he says about his staff of six investigators.

- Authorship/Plagiarism, Publication practices and responsible authorship

At the PSU SARI/RCR web site:

AND that's just part of it. Truth is stranger than fiction..

<http://news.sciencemag.org/2013/03/nsf-audit-successful-proposals-finds-numerous-cases-alleged-plagiarism>

http://www.sciencenews.org/view/generic/id/41458/title/Study_finds_lots_of_apparent_plagiarism

<http://www.nature.com/nature/journal/v451/n7177/full/451397a.html>

Some useful tools:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2686470/?tool=pubmed>

<http://etest.vbi.vt.edu/etblast3/>

RCR/SARI at Penn State

Some topics for RCR

- Acquisition, management, sharing, and ownership of data
- Publication practices and responsible authorship
- Conflict of interest and commitment
- Research misconduct
- Peer review
- Mentor/trainee responsibilities
- Collaborative science
- Human subjects protections
- Animal welfare

<https://www.research.psu.edu/training/sari>

- **Mentor/trainee responsibilities**

<https://www.research.psu.edu/training/sari>

Avoiding ambiguity in expectations and roles can help maintain a professional working relationship

- * **How much time the trainee is expected to spend on research**

- * How much interaction the trainee can expect from the mentor, and what form that interaction will take

- * How responsibilities are shared or divided

- * How credit is assigned (for ideas, work, or publications)

- * Who owns data or results

- * **When does the trainee become independent**

- * **Set clear expectations**

- <https://www.research.psu.edu/training/sari>

The screenshot shows the website for the office of the vice president for Research at Penn State. The header includes the Penn State logo and the text "office of the vice president for RESEARCH AT PENN STATE". A navigation bar contains buttons for Home, About Us, Research Capabilities, For Industry, Patents & Licensing, and Funding, Prop Awards. Below the navigation bar, a breadcrumb trail reads "YOU ARE HERE >> Home » Education & Training » SARI » Teaching Tools » General RCR Education". A left sidebar menu is open to the "SARI" section, listing "Online Training Program", "About SARI", "SARI Program Plan", and "Development for Colleges". The main content area displays the heading "General RCR Education Resources" and a sub-heading "PowerPoint Presentations". A list item is shown: "Ethics in Science: Responsible Conduct of Research" with a PDF icon, attributed to "By Kent E. Vrana, Pennsylvania State University".

PENNSSTATE
office of the vice president for
RESEARCH AT PENN STATE

Home **About Us** **Research Capabilities** **For Industry** **Patents & Licensing** **Funding, Prop Awards**

YOU ARE HERE >> Home » Education & Training » SARI » Teaching Tools » General RCR Education

SARI

- Online Training Program
- About SARI
- SARI Program Plan
- Development for Colleges

General RCR Education Resources

PowerPoint Presentations

- [Ethics in Science: Responsible Conduct of Research](#) 
By Kent E. Vrana, Pennsylvania State University

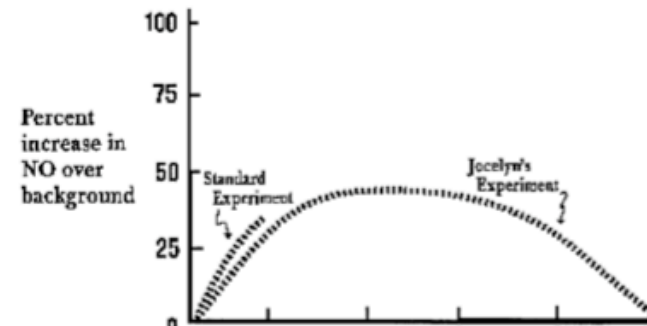
PowerPoint Presentations

* Ethics in Science: Responsible Conduct of Research

By Kent E. Vrana,
Pennsylvania State
University

Jocelyn Fox, a second-year graduate student, has just begun the experimental phase of her training program. She has initiated studies of novel agents on nitric oxide (NO) synthase, most recently in a controlled experiment involving a compound identified as SR582. In her first attempt at the experiment, Jocelyn made an error in dilution causing her inadvertently to test the compound at a concentration much higher than called for in the protocol. This yielded results quite different from those expected. She showed the data to her mentor, Professor Collins, who suggested in essence that she ignore the experiment because of the error. "In testing each compound, we always stop at a one nanomolar concentration," he said, "and have been able to compare stimulators and inhibitors quite well."

Jocelyn repeated the experiment, starting with the correct dilution, but then extended the experimental range all the way to a five nanomolar concentration (see Figure 1).



- We want you to know what's in this document, we expect that you do already, but please check.
- We expect that you are SO interested (sufficiently interested) in your work that you want to get the right answer. Cheating, fabricating, falsifying etc..... None of these things will produce the right answer.
- You will be happier if you do things the right way; Science and discovery are FUN!

d as a
fect she
Collins
the next

- **Professional conduct**

- should I text in class?
- email etiquette (complete sentences, capitalize?)
- etiquette for making appointments
- taking initiative to communicate (research progress, problems, personal travel, etc).
- time management, how much time should I spend on classes, research
- am I expected to work at night, on weekends, holidays?
- Should I bring my laptop to class?
- <http://wireless.psu.edu/wireless.html>

RCR/SARI Training Online (CITI)

<https://www.research.psu.edu/training/sari>

Online Training Program through CITI

Most SARI programs at Penn State require students to complete online training offered through the Collaborative Institutional Training Initiative (CITI) program.

Students must take the CITI course specified by their program's SARI plan

For some SARI programs, the CITI course in Human Subject Research has been designated. Students should check with their graduate program director for information on which CITI course to take.

Responsible Conduct of Research (RCR) courses include:

- Biomedical Science
- Social and Behavioral Sciences
- Physical Sciences and Engineering
- Humanities

To access the CITI courses:

1. Register for Penn State's CITI courses at www.citiprogram.org.
2. Select "Pennsylvania State University" as the participating institution, and complete the rest of the enrollment information.
3. On the "Curriculum Selection" page, choose the CITI course that is required for your SARI program.
4. Once you have registered, you may enter and leave the course at any time, completing modules as time permits.
5. Students who have successfully completed a CITI course (with a grade of 80% or higher) will receive a certificate at the end of the course.

RCR/SARI Training Online (CITI)

- Register
- Fill in PSU information
- Answer more questions
- Questions about curriculum
- Choose: **Responsible conduct of research (RCR) courses**
- Choose: **Physical Science RCR Course**

- Register
- Fill in PSU information
- Answer more questions
- Questions about curriculum
- Choose: Responsible conduct of research (RCR) courses
- Choose: Physical Science RCR Course

Chris Marone (Member ID: 2392047)

CITI Collaborative Institutional Training Initiative

[Resources](#)

[Main Menu](#) | [Select Language](#) | [Logoff](#)

Main Menu



- This is the email address we have for you: cjm38@psu.edu. If this is not correct, click [here](#) to edit your email address and other account information including your security question and answer.
- You are affiliated with 1 participating institution(s) on the CITI website. You will have at least one **grade book** per institution to track your progress in meeting the institution's coursework requirements (see below).


[Affiliate with another institution](#)  | [Change login information](#) | [Click here to Apply for CME/CEU Credits](#)

Pennsylvania State University



 [View Pennsylvania State University instructions page](#)

You have enrolled for the following courses:

 My Courses	Status	Completion Reports	CME/CEU Credits	 Voluntary Satisfaction Survey
Physical Science Responsible Conduct of Research Course 1., RCR	Not Started - Enter	Not Earned	N/A	Not Available

 [Add a course or update your learner groups for Pennsylvania State University](#)

Pennsylvania State University Learner Utilities

-  [Optional Modules](#) (completion is completely voluntary and will not count toward a completed course)
-  [Update my profile information for Pennsylvania State University](#)

- Print Completion Report and send to marone@psu.edu

CITI Collaborative Institutional Training Initiative (CITI)

Responsible Conduct of Research Curriculum Completion Report
 Printed on 10/28/2010



Physical Science Responsible Conduct of Research Course 1.: This course is for investigators, staff and students with an interest or focus in Physical Science research. This course contains text, embedded case studies AND quizzes.

Stage 1. Basic Course Passed on 10/28/10 (Ref # 5170566)

Required Modules	Date Completed	Score
The CITI Course in the Responsible Conduct of Research	10/28/10	no quiz
Introduction to the Responsible Conduct of Research	10/28/10	no quiz
Research Misconduct 3-1495	10/28/10	4/5 (80%)
Data Acquisition, Management, Sharing and Ownership 3-1524	10/28/10	4/5 (80%)
Publication Practices and Responsible Authorship 3-1527	10/28/10	5/5 (100%)
Peer Review 3-1528	10/28/10	5/5 (100%)
Mentor and Trainee Responsibilities 01234 1250	10/28/10	6/6 (100%)
Conflicts of Interest and Commitment 3-1623	10/28/10	3/6 (50%)
Collaborative Research 3-1514	10/28/10	4/6 (67%)
The CITI RCR Course Completion Page.	10/28/10	no quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
 Professor, University of Miami
 Director Office of Research Education
 CITI Course Coordinator

- **Some tips for your tenure as a Grad Student at Penn State... (1 of 2)**

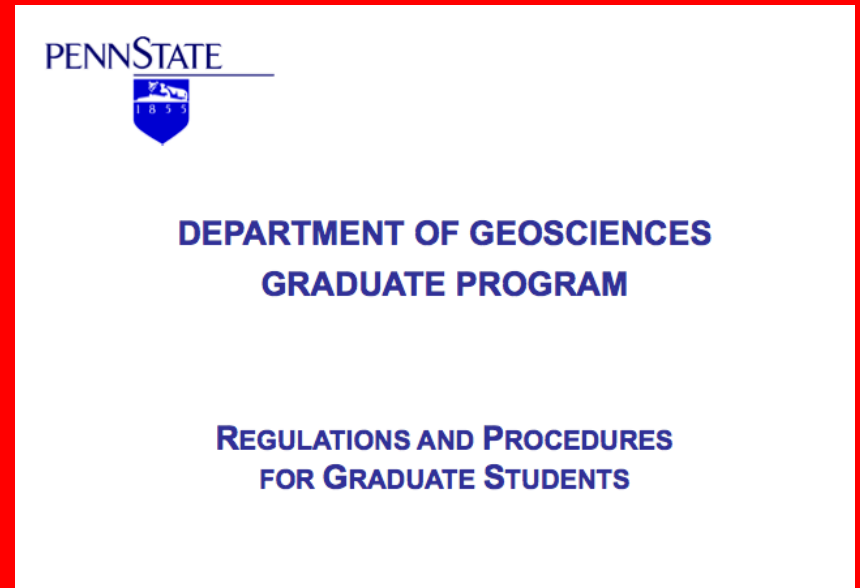
1. Form a committee early and meet with them often.

- How do I go about doing that?

- How do I set up an appointment if my advisor is busy?

- Who can be an academic/research Advisor?

2. Complete an Annual Progress Review



<https://www.geosc.psu.edu/graduates>

- **Some tips for your tenure as a Grad Student at Penn State... (1 of 2)**

1. Form a committee early and meet with them often.

-How do I go about doing that?

-How do I set up an appointment if my advisor is busy?

-Who can be an academic/research Advisor?

M.S. Committees

For students pursuing the M.S. degree, a committee of at least three graduate faculty members must be appointed *by the middle of the second semester*. A majority must be members of the Geosciences Graduate Faculty.

To form this committee, the student and his/her proposed advisor should submit the tentative title of the thesis and a list of committee members to the Associate Head for approval.

The M.S. Committee will first meet with the student at or before the progress report meeting (deadline: March 1). Prior to the end of the second semester of study, the student should submit and orally present a brief (5-page maximum) statement of the proposed thesis research. This meeting will normally coincide with the Annual Progress Report meeting. The student, advisor, and committee should agree to a tentative schedule for completion of the degree. The scope of the work in the thesis proposal should be consistent with this schedule.

The thesis committee must meet at least once during each academic year to participate in the Annual Progress Report. However, the student is advised to meet with her/his committee frequently, to discuss research progress and problems. Although the primary guidance of the student's program should be provided by the advisor, the thesis committee should assist by providing oversight on courses and on planning and conduct of the research, as appropriate.

It is the responsibility of the committee to judge viability of the proposed research, the plausibility of the time frame, and the validity of the project's aim. Committee members are often involved for

- **Some tips for your tenure as a Grad Student at Penn State... (1 of 2)**

1. Form a committee early and meet with them often.
 - How do I go about doing that?
 - How do I set up an appointment if my advisor is busy?
 - Who can be an academic/research Advisor?

academic standing, and progress towards degree.

Annual Review of Progress

Every graduate student is required to submit an annual progress report documenting research and academic progress, plans for the coming year, and feedback from their thesis committee. The report should include the [Annual Progress Report](#), a concise summary of achievements, and a plan for coursework to fulfill degree requirements.

Students should schedule a meeting with their Thesis Committee to review The Progress Report. The final Report should include feedback from the Thesis Committee. The following deadlines will be used.

The completed report should be submitted to the Geosciences Grad. Program Office. Failure to submit a report can lead to termination of financial support.

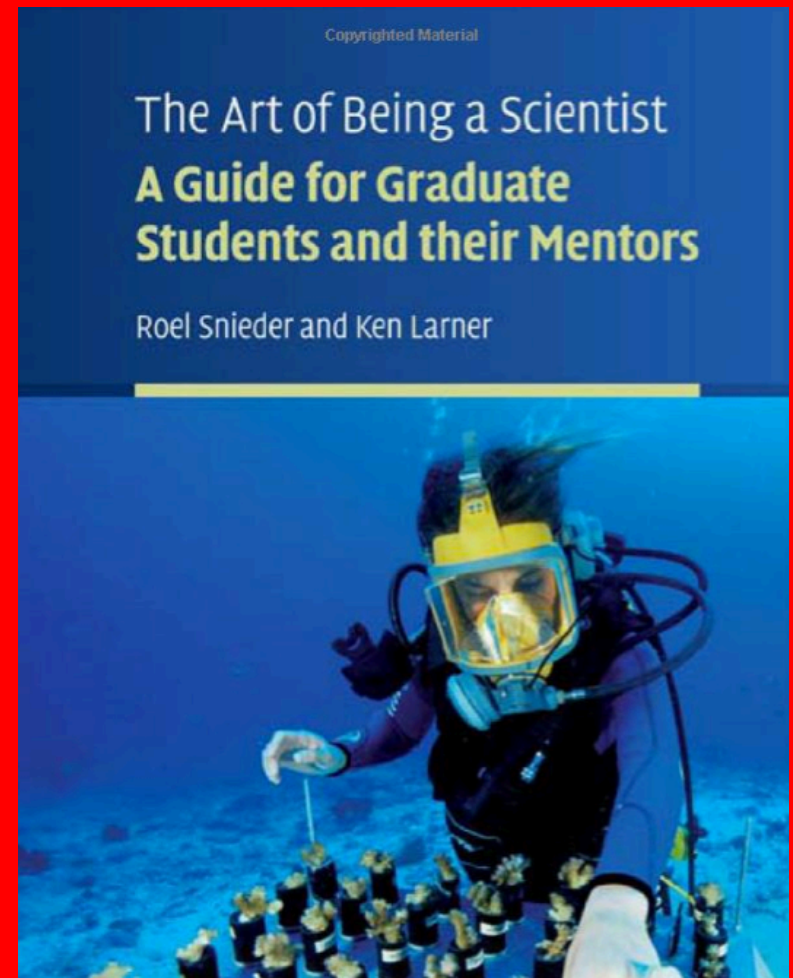
Student Degree (status)	Report Deadline
M.S.	March 1
Ph.D.	April 1

Students who have formally scheduled a thesis defense date are exempted from the requirement to submit an annual report. ***Other milestone events (candidacy, comprehensive exams) may or may not fulfill the requirement; in some cases a separate committee meeting is necessary.***

The Associate Head will review reports and make a determination of progress. When progress is deemed unacceptable, reports will then be reviewed by the Graduate Program Committee, which will recommend academic and financial consequences. The student will be informed of the results of the evaluation, and a copy will be placed in the official student file.

- **Some tips for your tenure as a Grad Student at Penn State... (2 of 2)**

3. Questions drive research. What are the research questions you are working toward?
4. How is my research being funded? Ask your advisor for a copy of the proposal.
5. Research work and research fun. The tasks we need to do and those that we do for fun. Playing around with research can lead to discovery!





New faculty: More SARI@PSU options!

Beginning September 1, 2011, Penn State's Scholarship and Research Integrity (SARI) program began including new faculty. In response to feedback from participants, **the requirement for new faculty has been modified to accommodate the varied experiences and backgrounds of new hires, and to allow more flexibility for faculty.** The requirements for undergraduate researchers, graduate students, and postdoctoral fellows have not changed. The table below summarizes the updated SARI@PSU format:

Targeted group	Part 1: Online training (CITI)	Part 2: Discussion-based training	Tracking mechanism
Undergrad researchers	yes	no	Faculty advisor
Graduate students	yes	5 hours before graduation	Graduate program and ORP
Postdoctoral fellows	yes	no	Faculty advisor
New full-time faculty	optional	2 hours; 1 hour continuing education every three years	Self-reporting to ORP via website

SARI@PSU Frequently Asked Questions

Are all faculty required to participate in SARI@PSU?

Only faculty hired on or after September 1, 2011, are included. They will receive a letter from ORP that describes the program and provides an individual login ID to the SARI tracking system.

How much time will this require?

Faculty may design their own SARI@PSU program that fits their schedule and discipline. Options include taking a full-length CITI course (approximately 4 hours) or a shorter refresher course (1-2 hours). Users may log in to CITI as often as they like to complete the course as their schedule allows. The CITI human subjects course also fulfills SARI, if faculty need that course for IRB approval. SARI@PSU participation can also be fulfilled through teaching or attending appropriate workshops or seminars at PSU or other institutions or conferences. Workshop participation may be combined with CITI courses to fulfill the two-hour requirement.

January 2012 SARI@PSU News

- ➔ SARI program changes
- ➔ Tracking forms due in June
- ➔ Spring workshops
- ➔ Contact us

New faculty will receive a letter from ORP describing the SARI program and what they need to do. Within the first year of employment, faculty should complete two hours of SARI program participation. Appropriate activities are determined by the faculty member, and may include (but are not limited to):

- Online CITI course completion. Any of the many Penn State CITI course options will satisfy this requirement, including human subjects research (IRB) courses, RCR courses, and refresher-length courses. *Note that CITI courses are no longer a required component of SARI@PSU for faculty, but remain an available option.*
- Participation in (or leading) workshops or seminars focusing on the responsible conduct of research, or similar professional ethics-related content. These activities may take place at PSU, or at another institution, or at a professional conference (for example).

In their letter from ORP, new faculty will be given instructions for navigating to the SARI Resource Portal to access a personalized website, where they can provide information about their participation in SARI@PSU activities.

SARI Program Plan

Department of Geosciences

College of Earth and Mineral Sciences

Part 1: CITI online RCR training program:

- A) Students will be made aware of the requirement through new-student orientation (offered each fall, the week before the start of the fall semester), and it will be included in our graduate student handbook, which is available to students on the web and in paper.
- B) All M.S. and Ph.D. students will be expected to complete the requirement by the end of their first year of graduate studies.
- C) Students will notify the graduate program office of their completion in the on-line CITI program by providing a printed copy of the completion certificate. All first year students are required to take Geosc 500, so completion of this course will be documented by student transcripts submitted with each student's annual progress report (it is an existing departmental requirement that all students turn in a progress report and meet with their committee annually). In addition, the form for reporting annual progress will be modified to include specifics for reporting information about completion of the discussion-based training within research groups affirmed by faculty signature.

Part 2: Five hours of discussion-based RCR education:

Discussion-based RCR education will take place in three steps:

A one-hour discussion during new-student orientation.

- 1) A two-hour discussion during Geosc 500, a course required of all graduate students in Geosciences.
- 2) A two-hour discussion to be offered through specialized research groups within the department. These might include the paleobiology group, the astrobiology group, the ice and climate group, AfricaArray students, etc.

RCR topics to be discussed will be organized as follows:

- 1) During new-student orientation, discussion will focus on acquisition, management, sharing, and ownership of data and mentor/trainee responsibilities
- 2) During the Geosc 500, discussion will focus on: publication practices and responsible authorship, conflict of interest and commitment, research misconduct and peer review
- 3) During research group discussions, the topics will include: sub-discipline related concerns in data acquisition, management, sharing, for example such as the different nuances of reporting of lab or field data. It will also cover collaborative science and interdisciplinary concerns as appropriate.

Discussion will be facilitated by faculty instructors, who will be aided by readings that highlight case studies and materials on RCR provided by the graduate program office (drawn, for example, from teaching tools available through the Rock Institute website). We request that all faculty members have access to the content of the on-line module to facilitate complementary coverage of topics.