

GeoPRISMS Steering and Oversight Committee
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Introduction

The annual GeoPRISMS Steering and Oversight Committee Meeting provides GSOC members and NSF representatives the opportunity to share updates on GeoPRISMS and related activities and programs, research funding and outcomes, and to discuss and address programmatic issues and planning. The Spring 2018 meeting included discussion of the Program Solicitation for FY18, updates on the upcoming Alaska Amphibious Community Seismic Experiment (AACSE), planning for the upcoming synthesis and integration TEI to be held in San Antonio, TX in 2019, and discussion of strategies for GeoPRISMS program legacy activities and products. The committee also received updates on the GeoPRISMS office activities, current GeoPRISMS and GeoPRISMS-related research efforts via presentation of materials provided by PIs, the GeoPRISMS data portal, the emerging Subduction Zone 4D (SZ4D) initiative, and AGU workshops and activities.

NSF Update

OCE Division Director Rick Murray, acting EAR Division Director Lina Patino and GeoPRISMS Program Director Maurice Tivey (OCE) provided updates from NSF. EAR Division Director Carol Frost has departed and Lina Patino is serving as acting EAR Division Director, with a search for the new Division Director underway. Murray's term will end in 2018, and the search for a new OCE Division Director will be announced soon. Regardless of these leadership transitions, both the OCE and EAR Divisions remain strongly committed to GeoPRISMS research directions.

Murray noted that the President's budget request for FY19, anticipated to be released in February, could be more challenging than that for FY18. However, Murray emphasized that NSF does not act on these requests, because budget appropriations are made by congress after considerable negotiation. For example, although the FY18 request for NSF represented a 10% reduction, Congress's appropriation was continued funding at the FY17 level. Murray

encouraged the Community to contact their congressional delegations to share any concerns about the President's budget request.

Patino summarized reorganizations within the EAR Division. The division is divided into two sections: a Disciplinary Programs Section that includes all of the core programs, and an Integrated Activities Section that includes cross-disciplinary programs such as GeoPRISMS, EarthScope, Education, and Infrastructure. This reorganization is intended to facilitate cross-sectional discussions.

OCE Program Director Maurice Tivey summarized the current state of NSF-GeoPRISMS for both the OCE and EAR divisions, as EAR Program Director Jenn Wade was unable to attend the meeting. Tivey noted that both EAR core programs and OCE-MGG have moved to a model with no deadlines for proposals. NSF is adjusting to this transition, especially for the scheduling of panels in order to deal with the continuous submission of proposals throughout the year. As a solicitation-driven program, GeoPRISMS does not plan to move to this model; however, co-funding of proposals with other EAR or OCE programs will impact the review process. Tivey also noted that he will be leaving in August 2018 as his term as a rotator comes to an end. Whether or not his replacement will serve as the new OCE program officer for GeoPRISMS will depend on their background.

GeoPRISMS Solicitation in FY18 and beyond

The phased funding model is now complete. Since 2017, proposals that focus on preparatory work, data analysis & synthesis, and thematic studies are being considered for all primary sites. Last year's solicitation targeted field projects that could fill key gaps in existing datasets. This year's solicitation won't include large field programs, as there are already several field programs underway (one in Alaska and several in New Zealand) but will focus on integrating results and the synthesis of GeoPRISMS Science (solicitation available at <https://www.nsf.gov/pubs/2018/nsf18559/nsf18559.htm>; see also p. 35 of this Spring 2018 issue)

AGU Mini-workshop Reports

Three GeoPRISMS mini-workshops were sponsored by GeoPRISMS at the 2017 AGU Fall Meeting in New Orleans, and took place on the Sunday before AGU. Reports from the mini-

workshops are available on the GeoPRISMS website at: <http://geoprisms.org/meetings/mini-workshops/>.

ENAM Science Advances: Progress and Outlook

Conveners: Colton Lynner (University of Arizona) and Zach Eilon (UC Santa Barbara)

GSOC member Luc Lavier presented a report from the ENAM Mini-Workshop. The goal of this mini-workshop was to showcase mature research projects that span the entirety of the margin, from the Appalachian Mountains to the offshore region. The workshop featured products of the amphibious broadband seismic and multi-channel seismic acquisitions, as well as the integration of the EarthScope Transportable Array with the ENAM-Community Seismic Experiment. 34 participants attended the meeting; more than 50% of the participants were graduate students and postdocs. Talks were organized in three sessions: Appalachian Mountains and the Onshore Margin (Keynote Lectures by Lara Wagner and Ben Murphy), Offshore Margin (Keynote Lecture by Anne Becel), and Margin-Wide Synthesis (Keynote Lecture by Roger Buck). “Pop-up” talks were given in each session by early career scientists.

The mini-workshop talks and discussion led to the recognition of several common threads and key emerging results. The margin appears to be highly active, which is perhaps surprising given that it is widely considered to be a mature rift. New data provide constraints on a wide range of processes and key structural elements of the margin, including: the lithosphere-asthenosphere boundary (LAB); crustal thickness; mantle composition and potential temperature; and the origin, pathways, and amount of fluid and melt impregnating the continental lithosphere as it extends.

The workshop also identified a set of emerging and outstanding questions where future effort could be directed. For example, melt migration in the lithosphere remains poorly understood. The discrepancy between lithospheric thickness defined by magnetotelluric and seismic data raises questions about the nature of the lithosphere and the structure of the LAB. Participants also noted that further investigation is needed to understand variability in crustal thickness, and the implications of seaward dipping reflectors for rift initiation and progression.

Early-Career Scientists/Faculty: Introduction to GeoPRISMS/MARGINS Data Resources, Mini-Lessons, and Effective Broader Impacts

Conveners: Juli Morgan (Rice University) and Andrew Goodwillie (LDEO, Columbia University)

Andrew Goodwillie presented a report of the second mini-workshop. 30 participants from a range of fields registered for the event. The mini-workshop focused on early career and educational resources relevant to GeoPRISMS. John Taber (IRIS), Shelley Olds (UNAVCO), and Andrew Goodwillie (IEDA) provided demonstrations of data resources, including seismic monitoring, ground motion visualization animations, 3-D earthquake browsing, and real-time seismicity data displays. Juli Morgan (Rice), Jeff Marshall (CSU Pomona), Eliza Richardson (Penn State), Bob Stern (UT Dallas) and Jeff Ryan (USF) then presented examples of Mini-Lessons for each of the MARGINS initiatives. The mini-lessons present a suite of peer reviewed learning modules that highlight key science results and are designed to integrate those results in undergraduate geoscience curricula. Discussions at the end of the mini-workshop focused on strategies to improve the impact and effectiveness of proposed broader impacts with a focus on the generation of accessible mini-lessons and data sets.

Amphibious community experiments in Alaska and related opportunities

Conveners: Lindsay Worthington (University of New Mexico), Spahr Webb (LDEO, Columbia University), Susan Schwartz (UC Santa Cruz), Emily Roland (University of Washington), Aubreya Adams (Colgate University), and Geoff Abers (Cornell University)

GSOC member Katie Keranen presented the outcomes of this mini-workshop, which focused on the planned Alaska Amphibious Community Seismic Experiment (AACSE), with the main goal of informing the community of upcoming opportunities. About 80 participants from a wide range of backgrounds attended the workshop; participants included over 40 early career investigators and students. Geoff Abers (Cornell) gave an overview of previous work in the Alaskan Subduction Zone. Emily Roland (UW) provided a history of the AACSE and plans for the execution of the project, and highlighted several opportunities for the community to get involved. Jeff Freymueller (UAF) gave an overview of ongoing volcano activity and seismology monitoring along the subduction zone. Shanshan Li (UAF) provided a review of recent geodesy studies and state of deformation in the region. Members of the community then gave “lightning talks”, highlighting related projects in Alaska and other subduction zones.

SCD and RIE Initiative updates

GSOC members, with input from GeoPRISMS PIs, provided updates on a wide range of ongoing and recent GeoPRISMS research projects. Updates provide a key opportunity for the

GSOC and the NSF Program Officers to see the breadth of exciting science conducted within GeoPRISMS, recognize links with other NSF and major international efforts, assess progress towards key questions in the Science Plan, and identify gaps and new opportunities. These updates provide also an opportunity for the GeoPRISMS community to demonstrate the value of interdisciplinary and societally relevant research to NSF Program Managers in the GEO directorate. All current and previous GeoPRISMS-funded projects, along with brief summaries of results of completed studies, are listed on the GeoPRISMS website:

(<http://geoprisms.org/research/list-of-awards/>)

RIE Initiative Updates

GSOC members Jessica Warren and Kyle Straub provided updates on RIE GeoPRISMS-funded and related projects at the two GeoPRISMS Focus sites (ENAM and EARS). The updates were organized by themes that emerged from discussions at the 2017 RIE TEI and highlighted studies for each theme. These themes include: (1) *Tracking fluids (volatiles and magmas) through the lithosphere and with time*; (2) *Controls on deformation and localization at different temporal scales*; and (3) *Surface mass sedimentary fluxes and feedbacks with rifting*. The RIE updates included summaries of the CRAFTI project, which aims to quantify the flux of magma and volatiles during early stage rifting and to assess the effects of volatile fluxes on crustal properties along the Kenya-Tanzania border; numerical modeling studies focused on understanding controls on the partitioning of slip on normal faults and investigating the feedbacks between rifting and surface processes using landscape evolution models; a study of rifting in the Salton Trough; and a series of projects making use of active and passive source seismic data collected as part of the ENAM community seismic experiment.

SCD Initiative Updates

GSOC members Kerry Key and Chad Deering provided an overview of active and recent SCD GeoPRISMS-funded and related projects. The summary included updates on projects focused on volcanic processes and volatile cycling, as well as those focused on subduction thrust earthquake and slip processes. Summaries of studies of volcanic systems and volatile fluxes included those aimed at: understanding the flux and migration of volcanic fluids at the Katmai Volcanic Cluster in Alaska via a multidisciplinary geochemical and seismological approach (Taryn Lopez, postdoctoral fellowship); two projects quantifying the origin and ascent

processes of volatile-bearing magmas (including Megan Newcombe, postdoctoral fellowship); investigating the relationships among subduction character, volatile cycling and eruptive activity along the Aleutian Arc; assessing variations in magma storage in the Taupo Volcanic Zone, New Zealand; a magnetotelluric and seismic investigation of Okmok Volcano, AK; and an experimental Investigation of the electrical properties of hydrous silicate melts, aimed at better understanding the transport properties of melts and volatiles in subduction zones as imaged by geophysical (electromagnetic) surveys.

A number of studies focused on subduction earthquake and fault processes were also summarized, including: postdoctoral fellowships to conduct experimental investigations of sediment deformation behavior in the Nankai, North Sumatra, and Aleutian Subduction zones (Tamara Jeppson) and analysis of seismic reflection data to elucidate the hydrogeologic role of faults in the downgoing plate on subduction processes through comparison of several subduction zones (Shuoshuo Han); a study aiming to integrate of laboratory, geophysical and geological data to characterize the Aleutian megathrust from trench to base of the seismogenic zone; a project aimed at developing a new GPS Velocity Field for the Alaska Peninsula from the Shumagin Gap to the northeast; a modeling study aimed at inversion of geodetic data to characterize slow slip and locking behavior in time and space at the Cascadia and Hikurangi margins; seafloor geodesy studies in Alaska and Cascadia; an analysis of seafloor geodetic and structural data to understand the environment of shallow slow slip along the Hikurangi margin; a project focused on understanding dehydration in the mantle wedge and the role of fluids in intermediate-depth seismicity and mantle wedge anisotropy in Cascadia and Alaska; and an upcoming field program that will integrate marine geophysical data and geodynamic modeling of subduction initiation at the Puysegur trench, New Zealand.

Allied Programs and Partner Organizations Updates

Terry Plank called in to give an update on the status of the SZ4D initiative (previously the SZO, or Subduction Zone Observatory initiative). The SZ4D Vision Document (https://www.iris.edu/hq/files/workshops/2016/09/szo_16/sz4d.pdf) was completed in May 2017 and presented to NSF. The organizing committee received input spanning OCE and EAR and was encouraged to continue to sharpen the focus on key science objectives and to move toward a more concrete implementation plan that might define the scope of a future program. Several presentations have been given at various international meetings since then (IAVCEI, GSA, AGU). The SZ4D Initiative aims at understanding the physical and chemical processes that

underlie subduction zone hazards, with the goal of improving understanding of tsunamis, earthquakes, eruptions and landslides by capturing and modeling emergent phenomena and by collecting datasets in 4D (in real time and through geological time). Following an email to the GeoPRISMS Community (<http://geoprisms.org/listserv-01-15-18/>), many grassroots activities have been identified or are underway, including workshops (funded or proposed), community response, and experiment proposals.

Sarah Penniston-Dorland provided an update on the ExTerra initiative. ExTerra is a self-organized group of geoscientists, with the aim of investigating core themes in the GeoPRISMS science plan through the study of exhumed rocks. As part of this broader initiative, the “ExTerra Field Institute and Research Endeavor (E-FIRE)” proposal was submitted to NSF PIRE (Partnerships in International Research and Education) and was funded for 5 years starting in Fall 2016. E-FIRE guiding research questions are directly derived from white papers that the community developed during workshops and are linked to the key SCD questions in the GeoPRISMS Science Plan. The objective of the Field Institute is to investigate metamorphic rocks in the Western Alps that span from the shallow to deep reaches of the subduction zone. E-FIRE partners with ZIP (Zooming in between Plates), a European collaborative research and training project that aims to understand processes occurring along the plate interface of subduction zones. ZIP faculty and students led field excursions during a 2017 field institute in the western Alps. The samples and data from the effort are being shared among the group. The group will meet in summer 2018 to share research results, and conduct a second field institute in 2019. More info about ExTerra and E-FIRE can be found at: <http://geoprisms.org/externa/>

Maggie Benoit (NSF-EAR) provided an update on EarthScope. NSF is currently planning internally and having conversations with the EarthScope community through the EarthScope National Office to plan synthesis and integration for the program over its final years. The activities of the EarthScope National Office are focused on capturing the program’s legacy and facilitating synthesis and integration through small to medium sized workshops, as well as via a legacy website.

In addition, the GSOC received brief updates on a suite of major allied field projects at the New Zealand primary site, including the SHIRE project (funded by NSF-IES, with international partners in Japan and New Zealand), a 3-D seismic survey (funded by NSF, with international partners in Japan, the UK, and New Zealand), and multiple IODP drilling expeditions. The SHIRE project (Seismogenesis at Hikurangi Integrated Research Experiment) aims at understanding the mechanics governing fault slip behavior along the subduction thrust interface by combining large-scale seismic imaging, paleoseismology and geomorphology, and

numerical modeling to investigate along-strike variations in megathrust locking and slip. This 4-year project is in its first year. The New Zealand 3D community seismic experiment focuses on acquisition of new high-resolution 3D seismic reflection data across the northern Hikurangi margin offshore of the North Island of New Zealand to understand slow slip events (SSE). The data will be open access. Two linked IODP expeditions (372 and 375) also focus on the Hikurangi subduction margin. These drilling expeditions aim to investigate slow slip events by collecting logging data and sampling material from the sedimentary section and oceanic basement of the subducting plate and from primary active thrusts in the outer accretionary wedge; and through installation of borehole observatories to monitor hydrologic, chemical, and physical processes during the SSE cycle.

Finally, GSOC member Danny Brothers summarized several USGS research activities that are strongly aligned with the GeoPRISMS science plan. These include major efforts focused on geophysical data acquisition along the US Atlantic margin, the Queen Charlotte Fairweather Fault System, and upcoming efforts at the Cascadia subduction zone, with three cruises planned for 2018.

Plans for Upcoming Meetings

GeoPRISMS will be at the 2018 AGU Fall Meeting in Washington, DC with a Townhall on Monday evening and planned Mini-Workshops for Sunday, Dec. 9. A call for Mini-Workshop proposals has been sent out to the Community; the GSOC will select the successful mini-workshop proposals in late summer. The GSOC also discussed planning for the upcoming Integration & Synthesis TEI scheduled for February of 2019 (see page 47 of the Spring 2018 issue). A primary objective of this major workshop will be to integrate ongoing work and results across themes and between focus sites, with the goal of identifying advances on the cross cutting science themes in the Science Plan, defining emerging questions, and positioning the community for new initiatives while also shaping the program's legacy over its final years. As details for this major workshop materialize, announcements will go out via the listserv and the application portal will open on the GeoPRISMS website, so please stay tuned.