GeoPRISMS

Newsletter - Issue No. 37, Fall 2016

In this Issue

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The GeoPRISMS Newsletter is published twice a year and is designed to provide to the GeoPRISMS community summaries of recent GeoPRISMS activities and meetings, synthesis articles, editorials, and discussion of science opportunities. Archives of the Newsletter are available on the GeoPRISMS website.

From the Chair

It is a distinct pleasure to announce the transition of the GeoPRISMS office to Penn State University. The office officially opened on November 1, although the transfer has been a gradual process that began last spring. We have worked closely with outgoing Office Chair Peter van Keken and Science Coordinator Anaïs Férot over the past several months to hand off planning and logistics responsibilities to ensure a smooth transition. Please join me in thanking Peter for his outstanding leadership of the program over the past three years. Among many other tasks, Peter oversaw preparation for the program's mid-term review. The office's enormous efforts in developing the review documents were instrumental in conveying the exciting, integrative, and societally relevant science that lie at the heart of GeoPRISMS, as well as highlighting the successes of the program in engaging a diverse and broad community. The GeoPRISMS community is as vibrant as ever, and this is due in large part to the continued efforts of the Michigan office and the Steering and Oversight Committee in facilitating interdisciplinary meetings, including the Subduction Cycles and Deformation TEI and numerous AGU mini-workshops.

I am also deeply grateful to Peter for his advice and help with the logistics of the office transfer over the past year. He has provided valuable guidance throughout the transition, as have former GeoPRISMS and MARGINS office chairs Juli Morgan and Geoff Abers. I am thrilled to share that Anaïs will be staying on as the Science Coordinator for the Penn State office, though working primarily remotely from our West Coast branch in Eugene, Oregon. Anaïs is a large part of the reason that the office transition has gone so smoothly; her knowledge of the program and deep connection to the GeoPRISMS science community are irreplaceable. I look forward to working with her in the coming years. I'd also like to welcome Jo Ann Lehtihet, the new administrative staff member for the office, who will assist with logistics, planning, and on-site support for meetings. Jo Ann is new to GeoPRISMS but has significant management experience both at Penn State and in the private sector.

I'm also pleased to introduce four new members of the Steering and Oversight Committee: Kyle Straub, Rob Harris, Katie Keranen, and Becky Bendick. Thanks in advance for your contributions! Thanks to outgoing committee members Harold Tobin, Gene Yogodzinski, Jeff Freymueller, and Maureen Long for their service over the past three years. Finally, we have several new Distinguished Lecturers this year who join Beatrice Magnani (Southern Methodist University) in the second year of her stint. Our new speakers are Brandon Schmandt (University of New Mexico), Heather Savage (Lamont Doherty Earth Observatory), and Esteban Gazel (Virginia Tech.).

As in previous years, this issue of the newsletter will be electronic only, and the spring edition will be published both online and in print. In addition to highlighting recent and upcoming meetings, funding opportunities, and special sessions, this issue features a report from the field on the Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip (HOBITSS) and a science report from Eric Mittelstaedt and Aurore Sibrant highlighting their ongoing project to investigate controls on volcano spacing along the East African Rift System.

> Continued p. 3

Cover Photograph: Deployment of an ocean bottom seismometer during the Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip (HOBITSS) experiment. Photo credit: Takeo Yagi

Newsletter Production: Anaïs Férot

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The GeoPRISMS program continues to tackle first-order questions about Earth's most active tectonic, mass transfer, and sedimentary systems, and which are as relevant as ever to geohazards, coastal processes, and Earth's surface and climate. I am excited to build on the success of GeoPRISMS, particularly as an intellectual incubator for the exchange of ideas, new collaborations, and the engagement of students and early career scientists. Beyond the upcoming GeoPRISMS Townhall and mini-workshops at this fall's AGU meeting, a Theoretical and Experimental Institute on Rift Initiation and Evolution is on the horizon in February, 2017. In addition to continued support of mini-workshops at AGU and other similar venues, a second significant synthesis and integration meeting is planned for 2018, so stay tuned. I look forward to working with such a vibrant community in the coming years, and hope to see you at one of these upcoming events.

Demian Saffer
Chair, GeoPRISMS Program

Message from NSF

This year saw the GeoPRISMS Office move from the University of Michigan under the leadership of Peter van Keken to Penn State University with Demian Saffer taking over the reins. We take this opportunity to thank Peter for his superb support for the program over the past few years and wish him all the best in his new position at the Carnegie Institution for Science. We welcome Demian into his new role as GeoPRISMS chair and look forward to working with him. We should also note that GeoPRISMS office staff member Anaïs Férot will be continuing to work with the office ensuring a seamless transition.

In September, many here at NSF attended the Subduction Zone Observatory Workshop in Boise and were pleased to see so many GeoPRISMS investigators at the workshop as well as the strong enthusiasm for subduction zone science from so many angles. Earlier in the year, the GeoPRISMS Program, in coordination with the Marine Geology and Geophysics Program of the Ocean Sciences Division, and the EarthScope Program of the Earth Sciences Division, put out a Dear Colleague Letter (DCL) for research in the Alaska/Aleutian megathrust region to take advantage of the EarthScope Transportable Array deployment in Alaska over the next two years. As a result, the 2016 GeoPRISMS solicitation featured both the Alaska/Aleutian region and New Zealand as the two focus sites for field programs along with the existing themes.

Unfortunately, just as last year, we are currently working under a Continuing Resolution until Dec 9th (and possibly beyond that). This means we must wait for a budget appropriation followed by the internal NSF program allocations before we know what the final budget will be for the Program. Consequently, we are not able to finalize our decisions from the last panel meeting until the NSF budget becomes official. And, the big news in terms of the federal scene is of course the recent election of a new President and thus a new administration. Despite this uncertainty however, we are confident that exciting, cutting edge science will remain a hallmark of the GeoPRISMS program into the future.

Jennifer Wade & Maurice Tivey
GeoPRISMS Program Directors,
National Science Foundation

Funding Opportunities for GeoPRISMS-Related Proposals

Prediction of and Resilience against Extreme Events (PREEVENTS) | NSF 16-562

Full proposal deadline: January 4, 2017

https://www.nsf.gov/pubs/2016/nsf16562/nsf16562.htm

PREEVENTS is designed as a logical successor to Hazards SEES and is one element of the NSF-wide Risk and Resilience activity, which the overarching goal of improving predictability and risk assessment, and increasing resilience, in order to reduce the impact of extreme events on our life, society, and economy. PREEVENTS will provide an additional mechanism to support research and related activities that will improve our understanding of the fundamental processes underlying natural hazards and extreme events in the geosciences.

PREEVENTS is focused on natural hazards and extreme events, and not on technological or deliberately human-caused hazards. The PREEVENTS portfolio will include the potential for disciplinary and multidisciplinary research at all scales, particularly aimed at areas ripe for significant near- or medium-term advances.

PREEVENTS seeks projects that will (1) enhance understanding of the fundamental processes underlying natural hazards and extreme events on various spatial and temporal scales, as well as the variability inherent in such hazards and events, and (2) improve our capability to model and forecast such hazards and events. All projects requesting PREEVENTS support must be primarily focused on these two targets. In addition, PREEVENTS projects will improve our understanding of the effects of natural hazards and extreme events and will enable development, with support by other programs and organizations, of new tools to enhance societal preparedness and resilience against such impacts.

NSF Earth Sciences Postdoctoral Fellowships (EAR-PF) | NSF 15-568

Full proposal deadline: January 10, 2017

https://www.nsf.gov/pubs/2015/nsf15568/nsf15568.htm

The Division of Earth Sciences (EAR) awards Postdoctoral Fellowships to recent recipients of doctoral degrees to carry out an integrated program of independent research and education. The research and education plans of each fellowship must address scientific questions within the scope of EAR disciplines. The program supports researchers for a period of up to two years with fellowships that can be taken to the institution of their choice, including facilities abroad. The program is intended to recognize beginning investigators of significant potential and provide them with research experience, mentorship, and training that will establish them in leadership positions in the Earth Sciences community. Because the fellowships are offered to postdoctoral scientists early in their career, doctoral advisors are encouraged to discuss the availability of EAR postdoctoral fellowships with their graduate students early in their doctoral programs. Fellowships are awards to individuals, not institutions, and are administered by the Fellows.

EarthScope | NSF 17-511

Full Proposal Target Date: February 10, 2017

https://www.nsf.gov/pubs/2017/nsf17511/nsf17511.htm

EarthScope is an Earth science program to explore the 4-dimensional structure of the North American continent. The EarthScope Program provides a framework for broad, integrated studies across the Earth sciences, including research on fault properties and the earthquake process, strain transfer, magmatic and hydrous fluids in the crust and mantle, plate boundary processes, large-scale continental deformation, continental structure and evolution, and composition and structure of the deep Earth. In addition, EarthScope offers a centralized forum for Earth science education at all levels and an excellent opportunity to develop cyberinfrastructure to integrate, distribute, and analyze diverse data sets.

Marine Geology and Geophysics | PD 98-1620

Full Proposal Target Date: February 15, 2017

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11726&org=OCE&sel_org=OCE&from=fund

The Marine Geology and Geophysics program supports research on all aspects of geology and geophysics of the ocean basins and margins, as well as the Great Lakes.

And also...

Geophysics (PH) | 16-598

Full Proposal: December 9, 2016

https://www.nsf.gov/pubs/2016/nsf16598/nsf16598.htm

Petrology and Geochemistry (CH) | 15-557

Full Proposal: January 9, 2017

https://www.nsf.gov/pubs/2015/nsf15557/nsf15557.htm

Distinguished Lectureship Program

2016 - 2017

An opportunity for US colleges, universities, museums, and other institutions to host lectures by outstanding scientists.

The distinguished speakers present technical and public lectures on subjects related to the two GeoPRISMS science initiatives:

Subduction **C**ycles and **D**eformation & **R**ift **I**nitiation and **E**volution

As usual, we received strong interest in the program, with applications from 60 institutions.

Thank you for making this year's GeoPRISMS Distinguished Lectureship Program successful!

Visit the GeoPRISMS website to learn more about the speakers and their presentations

>>> GeoPRISMS is now on YouTube! Subscribe and watch hours of lectures given by the GeoPRISMS distinguished speakers in the past years.

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NMNH, Smithsonian Institution
University of Nevada, Las Vegas
University of Nevada, Reno
California State University East Bay

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Southern Methodist U

Tarleton State University
Appalachian State University
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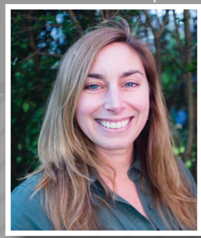

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Investigating mantle controls on volcano spacing along the East African Rift System

Eric Mittelstaedt & Aurore Sibrant

University of Idaho

The spatial variation in magma supply within a continental rift may determine the mode of lithospheric extension (active or passive) and the eventual pattern of oceanic spreading center segmentation (e.g., Hammond et al., 2013). As continental rifts evolve, volcanic centers within rift valleys often develop a characteristic spacing, or wavelength, such as observed in the Red Sea Rift (e.g., Bonatti, 1985) and within the Afar depression, the Main Ethiopian Rift (MER), and the Kenya (Gregory) Rift of the East African Rift System (EARS) (Fig. 1, 2; e.g., Mohr and Wood, 1976). Based primarily on observations, the surprisingly regular spacing of the volcanic centers within the EARS has been attributed to lithosphere thickness (Vogt, 1974; Mohr and Wood, 1976), pre-existing fault systems, and mantle processes similar to those at island arc and mid ocean ridges (Keer and Lister, 1988). In this project, we investigate the processes that control the spacing of volcanoes in the EARS. We are using numerical experiments to investigate if the surface expression of volcanism is primarily controlled by melt production (e.g., localized mantle instability, variations in mantle temperature and/or buoyancy) or by melt extraction (e.g., thickness of the lithosphere, pre-existing fractures).

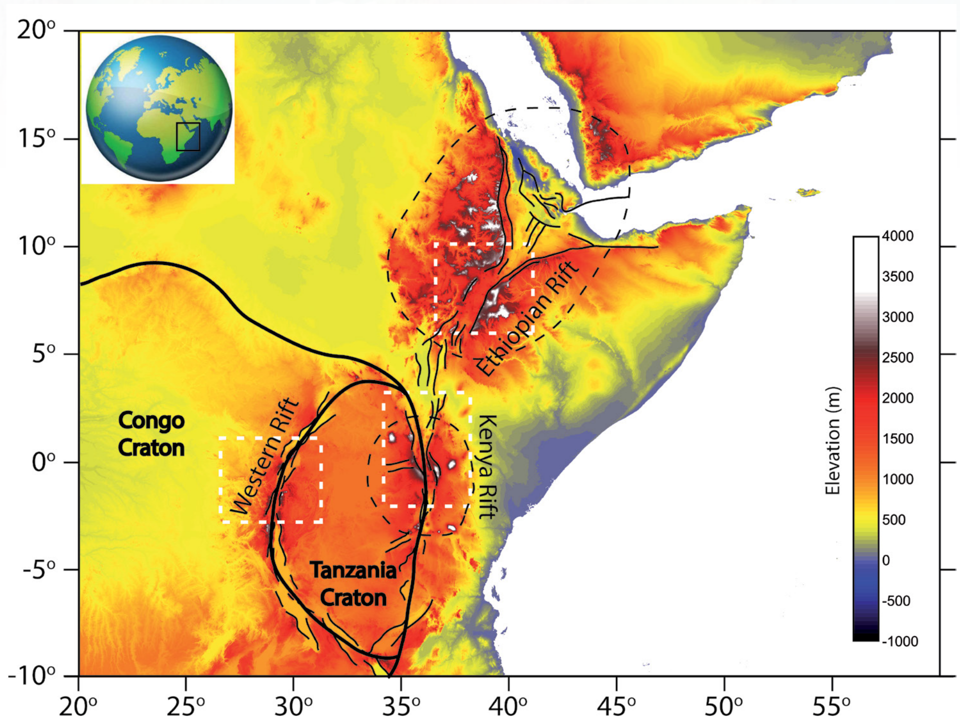


Figure 1. Digital Elevation model of the eastern part of Africa showing the main part of the East African Rift System (EARS). Solid black lines show major faults bounding rift depressions. The white dashed square shows the location of the focus rift and the black dashed elliptical lines indicates Ethiopian and Kenya domes. The thick black lines indicate the boundaries of the Congo and Tanzanian Craton.

The EARS is a perfect natural laboratory to test relationships between volcanism and parameters such as mantle temperature, lithosphere thickness, rift extension rate, and the presence of pre-existing structures. For example, the presence of one or two mantle plumes (Ebinger and Sleep, 1998; George et al., 1998) located primarily under the eastern rather than the western branch (e.g., Mulibo and Nyblade, 2013) suggests a role for anomalously warm, perhaps volatile-rich, mantle controlling the development of volcanic structures beneath the eastern branch rift segments. Additionally, decompression melting of upwelling mantle should be greater beneath the MER, where the opening rate is ~5 mm/yr (Saria et al., 2014), than beneath the Kenya rift, where the opening rate is ~3 mm/yr (Jestin et al., 1994; Saria et al., 2014). Differences in such tectonic and mantle parameters likely regulate magma supply throughout the EARS.

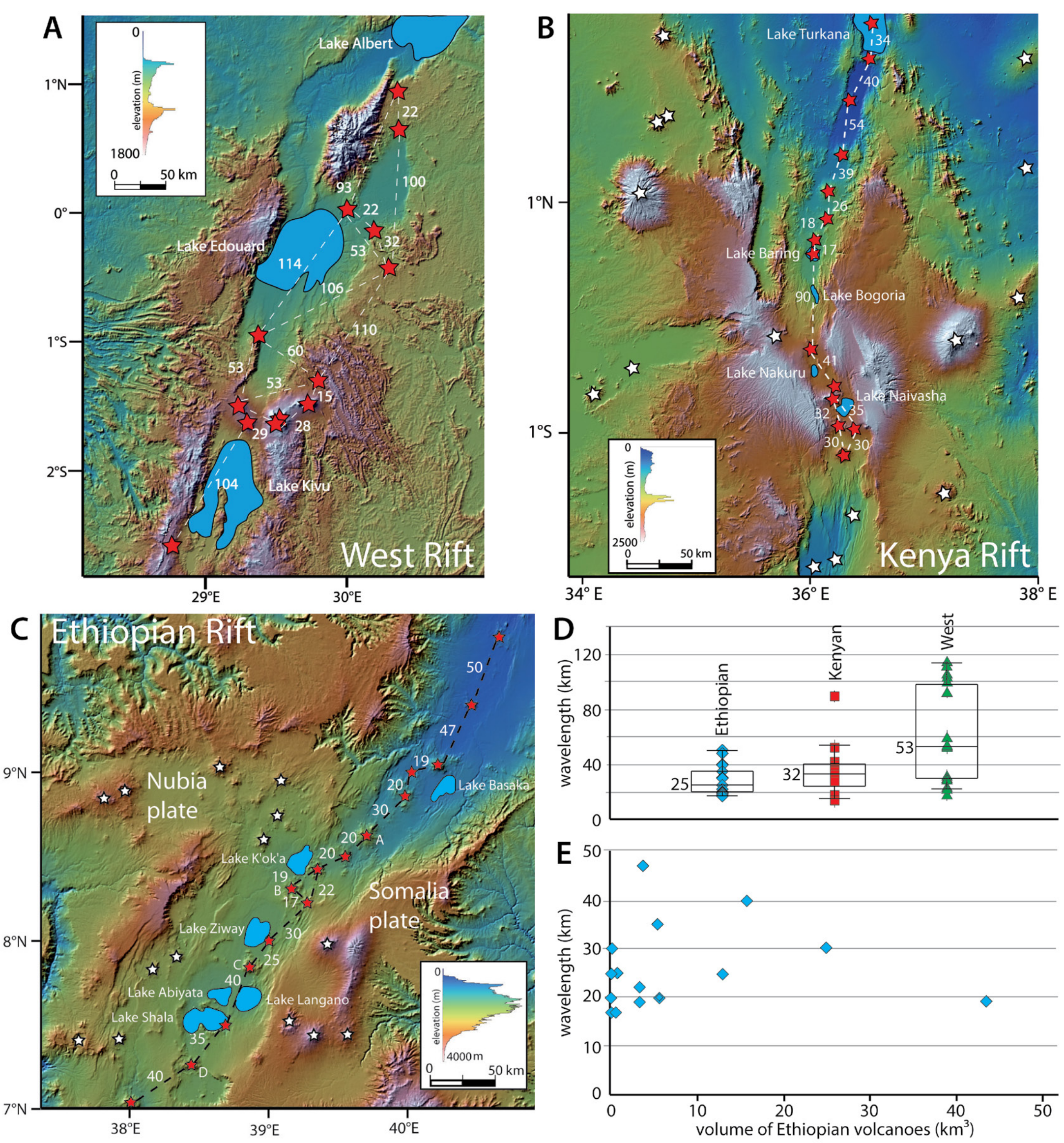
To constrain our experiments, we first examined the distribution of volcanoes throughout the EARS. We find that the median spacing of volcanoes in the Ethiopian and Kenya Rifts are similar (25 km and 32 km, respectively) and relatively uniform (e.g., small inter-quartile ranges, 15-16 km; Fig. 2). The median spacing of volcanoes in the Western Rift is much larger (53 km) and more irregular with an inter-quartile range of 68 km. We also found that volcano spacing may have some correlation with edifice volume, which could indicate a contribution of lithosphere flexure (e.g., Hieronymus and Bercovici, 1999).

For example, spacing of volcanic centers in the MER decreases with increasing volume of the largest volcanoes. However, for smaller volcanoes this trend does not hold; the spacing between volcanoes with a volume ~<10 km^3 shows no correlation with volcano volume. Thus, initial volcano formation is likely controlled by deeper processes.

The combination of regular volcano spacing in the Ethiopian and Kenyan Rifts and the presence of relatively warm plume mantle indicate that a Rayleigh-Taylor (RT) instability in the mantle could regulate magma supply along the rift axis. A RT instability occurs in the unstable situation where a dense fluid rests atop a less dense fluid and the interface between them is perturbed; this results in growth of an instability that forms regularly spaced upwelling and downwelling diapirs. The diapirs form at a dominant, or preferred wavelength (i.e., spacing) that is controlled by the fluid parameters (e.g., density contrast, viscosity contrast, layer thickness). For example, when both fluids are Newtonian a larger thickness of the lower fluid layer yields a larger preferred instability wavelength.

To test the hypothesis of a RT instability in the sub-EARS mantle, we developed numerical models of a less dense viscous material (e.g., warm plume mantle) underlying a relatively dense viscous fluid (e.g. non-plume mantle). Simulations are performed with the finite-difference, marker-in-cell code SiStER (Simple Stokes with Exotic Rheologies; e.g., Olive et al., 2016). We simulate the evolution of two fluid layers with different contrasts in density, temperature, and flow law exponent (Newtonian versus Non-Newtonian fluids). We initially perturb the layer interface by 1% of the imposed wavelength and set the box width to half of the imposed wavelength (Fig. 3). By examining a range of parameters, we will be able to address how variations in mantle properties along the Ethiopian and Kenyan rift and between East and West Rifts may control volcano spacing.

Figure 2. The active volcanoes during the last 10 ka of the (A) West, (B) Kenya, and (C) Ethiopian Rift axis. The red and white stars indicate volcanoes centered or offset from the rift axis, respectively. The white number indicates the spacing between volcanoes centered along the rift axis. (D) The median (marked) and inter-quartile range (boxes) in measured volcano spacing increases from the Ethiopian to West sections of the EARS. (E) No consistent relationship exists between spacing and the volume of each volcanoes of the Ethiopian Rift.



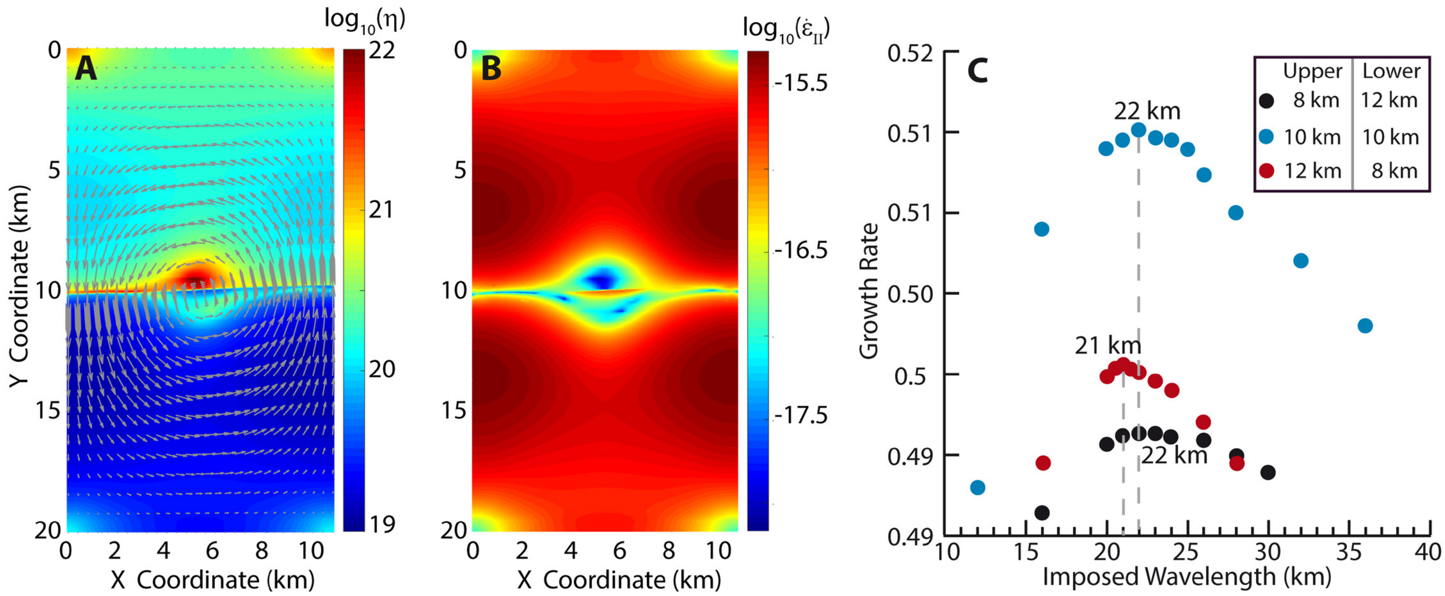


Figure 3. For numerical simulations of non-Newtonian fluids, the (A) viscosity is a strong function of the (B) second invariant of the strain rate field. In contrast to Newtonian cases, these sharp changes in viscosity yield a weak dependence on the (C) thickness of the lower layer (colors) for cases with intermediate layer thicknesses. Gray arrows in (A) are velocity vectors.

Our preliminary results with Non-Newtonian fluids demonstrate that the growth rate of instabilities is not controlled by the lower layer thickness as in Newtonian fluids, but by the characteristic distance over which viscosity changes away from the interface between the two fluids, in agreement with previous studies (Molnar et al., 1998; Miller and Behn, 2012). If the lower layer is significantly thicker than this characteristic distance, than the preferred wavelength of upwelling diapirs will not "feel" the effect of the layer limits. However, if the layer is smaller than the characteristic distance, layer thickness will alter the preferred wavelength. Thus, for relatively thick lower layers, the preferred wavelength depends upon other system parameters, such as the flow law exponent.

For values of the lower layer thickness (~10 km), flow law exponent (3-4), activation energy (E ~200-500 kJ.mol^{-1}), and density anomaly (3000 kg.m^{-3} in the lower layer and 3200 kg.m^{-3} in the upper layer) that resemble possible mantle conditions beneath the EARS, we find wavelengths on the order of those for the Ethiopian Rift and portions of the Kenya Rift. Although we have not yet incorporated the effect of background strain rate due to rift extension, spatially variable temperature, and more complicated rheologies (e.g., incorporation of a viscous yield stress), our preliminary results suggest that a RT instability in the upper mantle could conceivably control the volcano spacing along the EARS rift segments. In addition to incorporating the above complexities into our simulations, we plan to compare our predictions to seismic, petrographic, and structural studies in the EARS to further constrain the properties that may be required to form RT instabilities in the sub-rift mantle. ■

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GeoPRISMS AGU Townhall & Community Forum

Monday December 12 at 6:00pm

The Park Central Hotel *(formerly Westin Market Street)*

50 Third Street - Franciscan Ballroom

The event is open to all with interests in the GeoPRISMS Program and GeoPRISMS (or MARGINS) research. Come hear updates about the GeoPRISMS Program, the latest GeoPRISMS research projects & study areas, and ongoing GeoPRISMS research from student presenters.

- A short formal session (starting at 6:30PM) will include a welcome and opening remarks from the GeoPRISMS Chair Demian Saffer and updates from NSF Program Directors Jenn Wade and Maurice Tivey.
- Shuoshuo Han (UT Austin) will provide a summary of her ongoing research on Sediment consolidation at the Cascadia margin deformation front and its impact on shallow megathrust slip behavior.
- James Gaherty (LDEO, Columbia University) will present a report on field research conduted on rifting processes from unique onshore/offshore geophysical and geochemical datasets in the Northern Malawi (Nyasa) Rift
- Tobias Fischer (University of New Mexico) will provide a summary of the Theoretical and Experimental Institute for the Rift Initiation and Evolution Initiative that will be held in February 2017.

Students, welcome!

Student entrants for the GeoPRISMS Prize for Outstanding Student Presentations are also invited to display their AGU posters (or poster versions of their AGU talks) and discuss their research with event participants. This will be a great opportunity for students to share their results further and to interact with a wide spectrum of GeoPRISMS scientists.

Stay informed, get involved

There will be ample time to mingle and refreshments will be available. Among those present will be Demian Saffer (GeoPRISMS Chair), members of the GeoPRISMS Steering and Oversight Committee, and Program Directors for GeoPRISMS from the National Science Foundation.

We hope to see you there!

Questions should be directed to the GeoPRISMS Office:
info@geoprisms.org
More information can be found at:
http://geoprisms.org/meetings/agu-townhall-and-student-forum/

Rough seas off the shores of New Zealand. Photo credit: Justin Ball.

HOBITSS
Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip

Erin K. Todd (University of California Santa Cruz)
on behalf of the HOBITSS experiment team

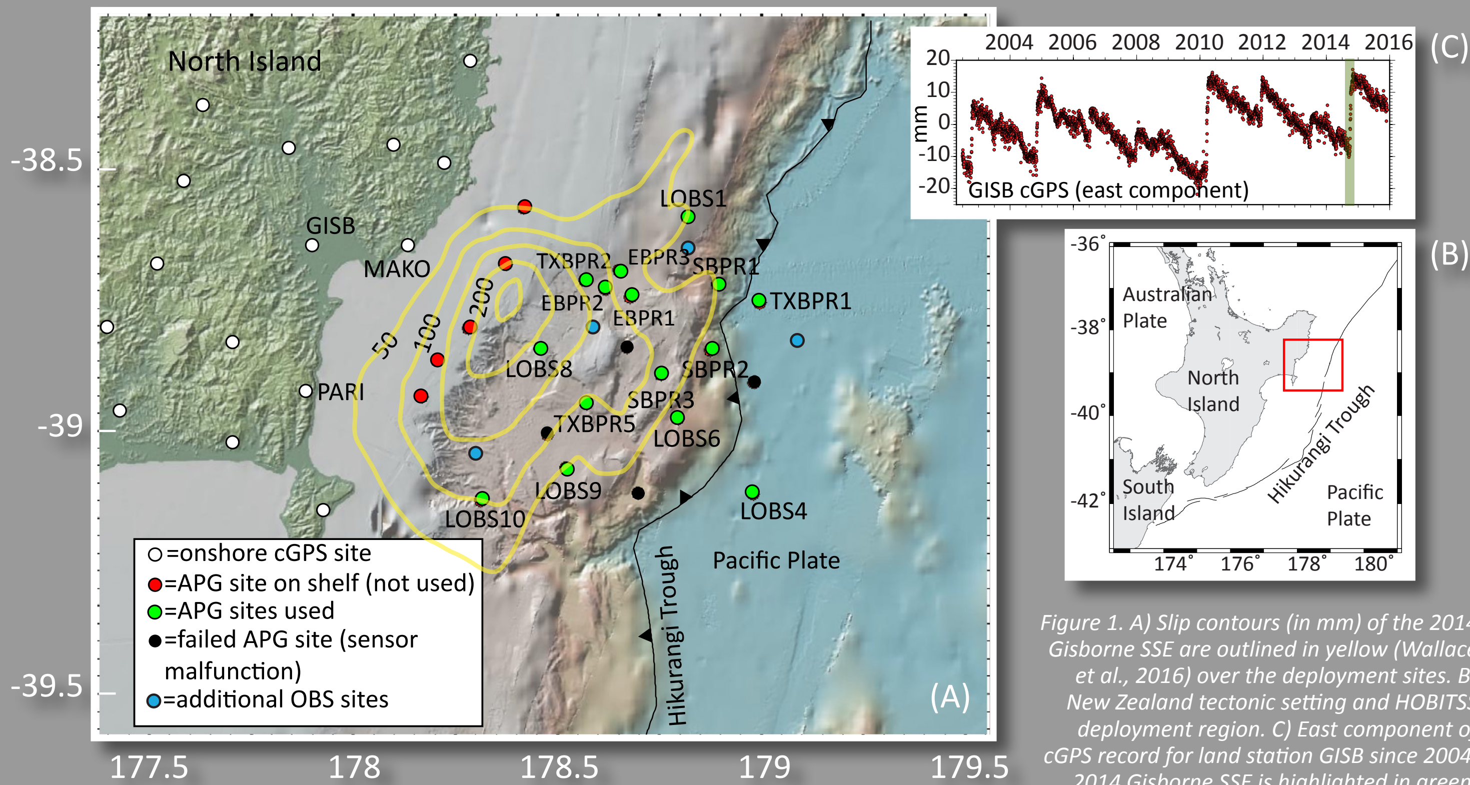

Figure 1. A) Slip contours (in mm) of the 2014 Gisborne SSE are outlined in yellow (Wallace et al., 2016) over the deployment sites. B) New Zealand tectonic setting and HOBITSS deployment region. C) East component of cGPS record for land station GISB since 2004. 2014 Gisborne SSE is highlighted in green. Modified from Wallace et al., 2016.

The Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip (HOBITSS) experiment is a multi-national collaborative offshore seismic and geodetic research project that explores the relationship between slow slip events (SSEs), tectonic tremor, and seismicity along the shallowest part of the northern Hikurangi Margin where the Pacific Plate is subducting beneath the North Island of New Zealand. An array of 24 absolute pressure gauges (APG), fifteen ocean bottom seismometers (OBS), and three ocean bottom electromagnetometers were deployed between the shoreline and the trench for thirteen months to capture deformation, seismicity, and conductivity changes during large SSEs offshore the North Island's east coast.

This offshore Gisborne region hosts shallow SSEs (<15 km depth) approximately every eighteen months that typically last from one to three weeks and release energy equivalent to Mw 6.5-6.8 earthquakes. However, to capture vertical deformation with the seafloor pressure sensors, the network needed to be in place during one of the larger SSEs, which only occur every four to six years. With the last very large SSE in the Gisborne region in March/April 2010, choosing the correct time for the deployment was definitely a gamble, as the timing of the large north Hikurangi SSEs is not particularly predictable! Thankfully, the anticipated SSE began in late September 2014 directly beneath the HOBITSS array (Fig. 1). The September 2014 SSE was the second-largest SSE observed on that part of the subduction zone, so we were incredibly lucky to have the seafloor instruments in place at just the right time.

Between the deployment and recovery expeditions, the science party consisted of researchers from the United States, Japan, and New Zealand, marine geophysical instrument engineers from the United States and Japan, and ten graduate students from the United States, Japan, and New Zealand. The experiment was funded by NSF Marine Geology and Geophysics in addition to Japanese and New Zealand funding agencies. These expeditions were the first seagoing experience for many of the graduate students, myself included.

May 2014 – The Deployment

New Zealand's Research Vessel Tangaroa was used for the deployment cruise. We set out from Wellington and began the 24-hour journey to our deployment site. Those 24 hours were very busy as the engineers began checking over every component of the instruments to ensure they were ready for deployment. As a graduate student on my first scientific cruise, I spent the first day learning my way around the ship, adjusting to ship life, and meeting all the members of the science and engineering parties. While a couple of the grad students had been on scientific cruises before, the rest of us had never been to sea before and didn't know what would be expected of us or how we would fit in to the deployment procedure. Thankfully, everyone in the science and engineering parties was extremely helpful and, by the time we reached the deployment site, we all knew what to do.

Once the deployment began, the mood on the ship changed. Everyone was focused on the task at hand. The first day of deployment was a whirlwind as we deployed fourteen instruments and recovered four that had been deployed the previous year as part of another experiment. Each step in the deployment procedure was well executed and it was fascinating to watch the exchanges between the leaders of the science party and the engineers as they worked together to determine which instrument would be ready for deployment next, how long it would take to transit to the deployment location, and how long it would take to survey the deployed instruments to pinpoint their final location (Fig. 2). So many moving pieces and steps needed to be completed in the correct order to successfully deploy the instruments with the time and resources available. Prior to the cruise, I had assumed that certain elements of the experiment like the order of station deployment had been pre-determined. I was surprised at the number of decisions that had to be made at the time of deployment based on the immediate resources and weather conditions. Once I was on the ship, I realized how quickly something could happen to change any pre-determined plans.

We were fortunate enough to have good weather for the first few days, but by day 4, the weather took a turn for the worse. Three days into the cruise, we had deployed 24 stations and seemed to be ahead of schedule, but our good fortune came to a swift end when a storm arrived early on the fourth day forcing us to hold position through the storm for 36 hours. With strong winds and heavy swells, deploying new instruments and surveying the locations of previously deployed instruments was out of the question. While some of the grad students had been to sea before, others of us had not and discovered if we were prone to seasickness or not. I was lucky enough to not get seasick, but for others, the storm brought some real challenges. Fortunately, everyone helped each other out to ensure that all essential tasks were covered. Calm weather returned for the last few days of the cruise and we were finally able to deploy the remaining instruments before turning back for Wellington Harbor.

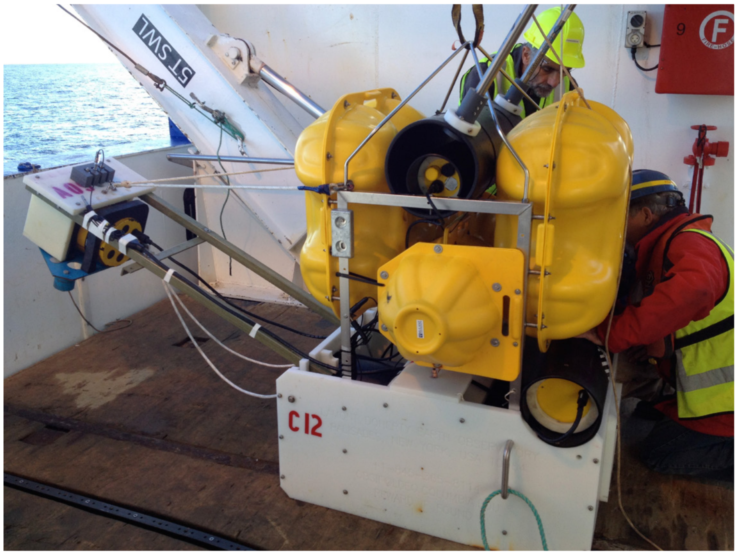

Figure 2. Performing the final checks before OBS deployment. Photo credit: Erin K. Todd.

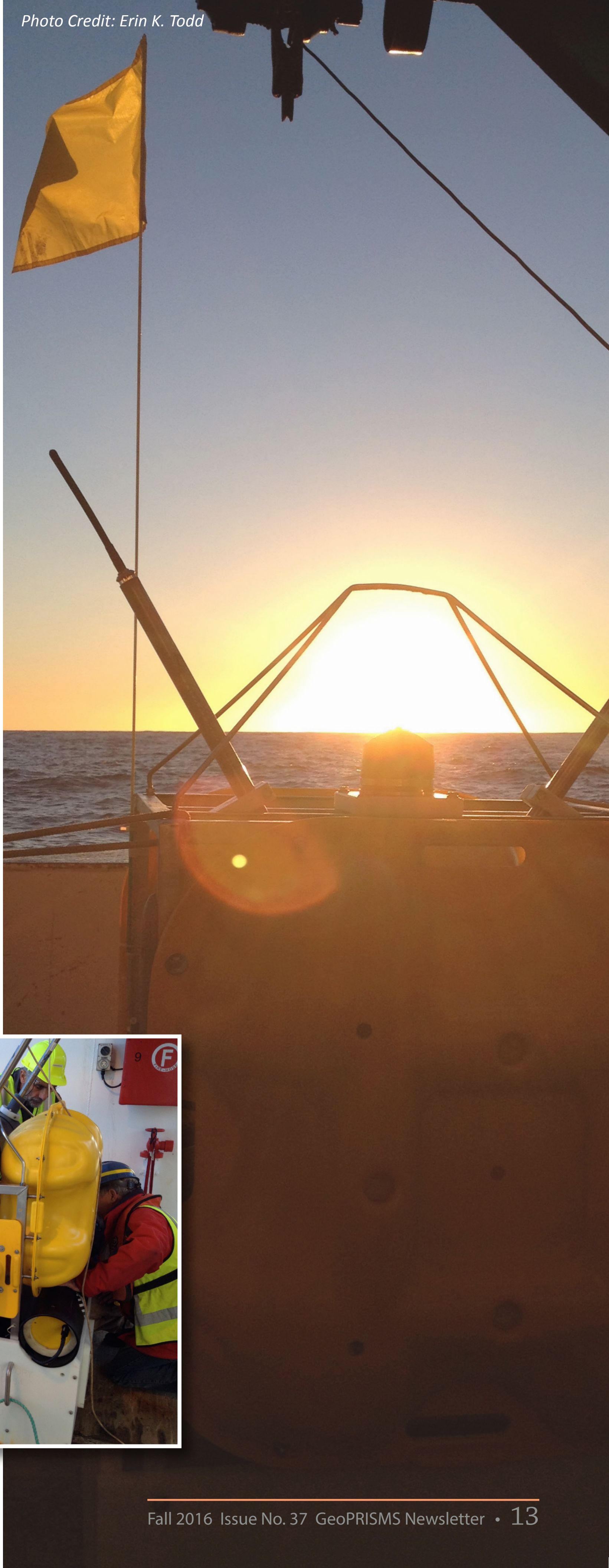

Photo Credit: Erin K. Todd

"I learned that if you are going to take sea-sickness medication, it should be well before the research vessel leaves the dock. Preventative measures are key. I learned a lot on the HOBITSS deployment cruise, especially what goes into determining simple parameters that data analysts and grad students like myself take for granted, for instance, the latitude, longitude, and depth of the instrument. Ocean bottom instrument deployment can be more complicated than land deployment, and it was enlightening to see the Principal Investigators work to figure out the next deployment site and manage the experiment. It was good experience to help with the cruise report and determine locations of instruments, as well as learn how to ping the instruments as they sunk to the ocean floor. My advisor arranged a series of science talks on the deployment, so I learned a lot about the context of the experiment, which is really helpful because I will be working with the data. I appreciated the opportunity to meet and work with a variety of scientists from Lamont-Doherty Earth Observatory, the Earthquake Research Institute in Tokyo, Japan, Tohoku University, University of Texas Austin, University of California Santa Cruz, and New Zealand. We had a very international team!"

- Jenny Nakai, Graduate Student, University of Colorado Boulder

"The HOBBITS cruise was quite an unique experience for me. Unlike previous cruises I participated to learn and observe as a student, on the HOBBITS deployment cruise I worked as part of the OBS technical team. My main responsibility was to assemble and service ocean bottom seismometers and pressure gauges to get them ready for a yearlong deployment.

Working together with the OBS team on the deck on a nut and bolt level make me realize the amount of work and level of dedication that goes into deploying each OBS. For example, in order to make sure that the instrument can return to the surface following an acoustic command, two redundant release systems are put in place, both equipped with two sets of redundant wiring. Only one of the four needs to work properly for the system to function, but all four systems need to be quadruple-checked before deployment. Given the harsh environment at the sea floor, we can't take any chances."

- Yang Zha, former Graduate Student, LDEO, Columbia University

Photo Credit: Takeo Yagi

June 2015 – The Recovery

Figure 3. The shallow trawl-resistant absolute pressure gauges were covered in mud and marine life and had to be completely cleaned before returning to shore. Photo credit: Erin K. Todd

From the perspective of those of us who had never been on an OBS recovery cruise, the idea of successfully recovering 35 instruments that had been sitting on the ocean floor for thirteen months, accumulating sediment and marine life, seemed daunting. We knew the main Gisborne slow slip event under the array had occurred four months into the deployment and a second slow slip event had been recorded to the south of the array, so there was a lot of anticipation and the Principal Investigators were very eager to get a look at the data.

The United States' Research Vessel Roger Revelle was used for the instrument recovery cruise. This time, the expedition began and ended in Napier, which is a famous "Art Deco" city on the New Zealand's east coast. Most of Napier was destroyed in an earthquake in 1931 and was completely rebuilt right after that in the Art Deco style of the time. Napier is very close to the HOBITSS experiment location, so the transit to retrieve our instruments was shorter than for the deployment.

There was a lot of nervous excitement among the team as we arrived on site and prepared to recover the first instrument. What if the instrument was buried by sediment? What if the receiver on the instrument didn't recognize the release command? What if marine life or sediment had damaged the instrument in some way and it didn't float back to the surface? What if the battery died during the deployment? What if the pressure case leaked and the instruments were exposed to seawater? The seafloor is a harsh environment for sensitive electronics and there were many things that could have gone wrong.

After the first instrument was brought on board, the tense mood that had gripped the team relaxed and we started to recover instruments in earnest. The seas were calm and the winds were light for the first full day of recovery and nine instruments were recovered. Recovering instruments is a tricky process – even if everything works and the instrument rises to the surface, there are still challenges to getting it on board. As the ship arrives on site, we use the ship's hull-mounted transducer to communicate with the instrument and send the correct signal for the instrument to release its weights and start rising toward the surface. Depending on the ocean depth, the ascent can take over an hour. During that hour, the ship and instrument communicate back and forth to track the progress of the ascent. Once it is clear that the instrument has reached the surface, we would send out spotters all over the ship to look for the instrument bobbing on the surface. Some of the instruments have small flags attached because when they rise off the ocean floor they would float just below the surface and it would be difficult to locate them without the small pennant flag. As the instrument is spotted, the captain would maneuver the ship alongside it. The technicians and engineers would then use long poles equipped with hooks on the end to grab the instrument and hook it up to the winch to pull it out of the water. Each step requires numerous people doing their part carefully and at exactly the right time.

We were keeping an eye on a storm that was heading our way, threatening to reach us in the middle of the cruise, so we worked quickly to recover as many instruments as possible before the seas got too rough. As the storm hit, we were forced to suspend recovery operations due to high winds and large swells. On one of my shifts, we hit a particularly large swell and everything that wasn't strapped down went sailing across the room. Chairs toppled over, notebooks and papers went sliding, and a large telephone fell of the table. Thankfully, after one or two stormy days, we were able to resume operations and recover the rest of the instruments. We successfully recovered 34 of 35 instruments: after many attempts over a few days, one of the ocean bottom electromagnetometers was considered lost after it never acknowledged the communication from the ship.

Most of our instruments were deep water (over a thousand meter depth), but five of them were on the shelf, less than one hundred meters water depth. One of the complications with having instruments at such shallow depths is that they quickly accumulate a lot of marine life (Fig. 3). In order to pass the agricultural inspection once back to port, all the instruments had to be thoroughly cleaned of any traces of mud, plant life, or animal life.

Cleaning these instruments became a large part of the graduate students' jobs during the second half of the cruise. Soft- and hard-bodied organisms, coating every inch of the instruments, had to be removed. The task was messy and smelly but very critical, as we would not have been allowed to re-enter New Zealand with dirty instruments. As we arrived back in to port and the agricultural inspector came on board to check the instruments, they found a small patch of mud about the size of your palm deep in the inside of one of the instruments that had to be cleaned with alcohol and paper towels and placed into a quarantine bag. After cleaning the remaining mud off the instrument, we were given the all clear!

Hard won results

All the hard work to deploy and recover the instruments really paid off in the end! The Absolute Pressure Gauge data showed that the SSE in September 2014 produced a clearly observed 2-7 cm of vertical deformation of the seafloor (Wallace et al., 2016), much more than any of us ever expected. The vertical deformation shows that slow slip occurred to within at least 2 km of the seafloor, and it is possible that slip went all the way to the trench (Fig. 1). The HOBITSS results really help to demonstrate that Absolute Pressure Gauges are a valuable tool for monitoring centimeter-level offshore tectonic deformation. In addition, preliminary results from the seismic data show the existence of tectonic tremor during the slow slip and that the previously observed seismicity increase during the last large Gisborne SSE in 2010 is also present for the 2014 SSE in similar locations (Todd et al. in prep).

Future Projects – 2017 & 2018

In addition to the HOBITSS experiment, there are a number of exciting future projects slated for the Hikurangi subduction margin in the coming years. The shallow nature of these slow slip events will be the target of IODP drilling in 2017 and 2018 (Expeditions 372 and 375), to better understand the physical origins of slow slip and to install borehole observatories to do near-field monitoring. In addition to the drilling experiment, the R/V Marcus Langseth will undertake an NSF-funded 3D seismic survey in early 2018 to image the shallow slow slip source area. Being able to tie the HOBITSS experiment results in with the results of co-located IODP drilling and 3D seismic imaging will be very exciting! ■

Photo taken in the Afar depression where a large volume dike intrusion triggered an explosive volcanic eruption. Photo credit: Cynthia Ebinger

GeoPRISMS at AGU Fall Meeting 2016 Mini-Workshop

Sunday December 11

1:30-5p | Volcanoes in Extensional and Compressional Settings

Conveners: Cindy Ebinger, Christelle Wauthier, Cliff Thurber, Maya Tolstoy, Einat Lev, James Muirhead, Josef Dufek

Grand Hyatt San Francisco
345 Stockton Street, San Francisco, CA
Union Square Room – 36th Floor

Questions should be directed to the GeoPRISMS Office: info@geoprisms.org
More information can be found at: http://geoprisms.org/meetings/mini-workshops/
A detailed description of the workshop is available p.25


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The Subduction Zone Observatory Workshop

Jeff McGuire[1], Terry Plank[2]

[1]Woods Hole Oceanographic Institution, [2]Lamont-Doherty Earth Observatory, Columbia University

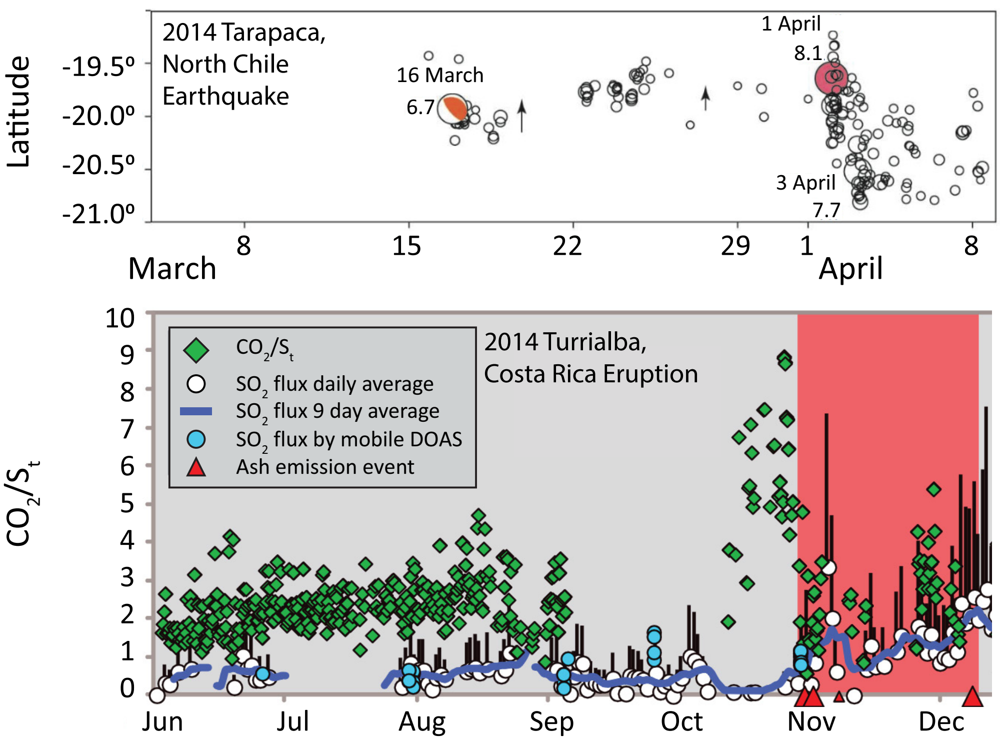
On September 29-October 1 2016 an International Workshop was held in Boise Idaho to discuss what a Subduction Zone Observatory initiative could accomplish and what form it might take. The workshop was proposed by the IRIS, UNAVCO, Earthscope, and GeoPRISMS offices in response to the high level of community interest over the past years. The SZO workshop was sponsored primarily by the U.S. NSF, with support coming from eight different programs within the GEO division as well as the Office of International Science and Engineering. Additionally, the USGS supported over twenty of its scientists to attend and the Earth Observatory of Singapore supported the attendance of over fifteen scientists from a number of countries in Southeast Asia. By design, the meeting was exceptionally diverse: of the 242 scientists in attendence, 67 were early career investigators and graduate students and 45 were from 21 different countries outside the U.S.

The workshop was organized around four themes:

- Deformation and the Earthquake Cycle;
- Volatiles, Magmatic processes and Volcanoes;
- Surface Processes and the Feedbacks between Subduction and Climate; and
- Plate Boundary Evolution and Dynamics.

Thirty-two breakout sessions over the course of the meeting gave attendees abundant opportunity to weigh in on the most important scientific opportunities, the key obstacles holding back discoveries, and the types of future community scale efforts that would best advance subduction zone science. Participants were asked "*What is new, exciting, and doable?*" and "*What can't we do now?*". Additionally, over sixty whitepapers were submitted with ideas about what an SZO might look like and four webinars were conducted that discussed opportunities afforded at different locations around the world. The presentations, break out reports, white papers, and webinars are all available for viewing on the workshop website.

Much of the scientific enthusiasm at the workshop resulted from recent examples of spectacular new types of datasets that provide a window towards a next generation approach to understanding Subduction Zones. Many phenomena that were previously captured as static snapshots are now starting to be shown as movies, in 4D. From the locking of the plate boundary fault, to the gases expelled from volcanoes prior to eruption, to the surface mass transport between forearc mountains and the trench, to geological records of past ruptures spanning back thousands of years, newly available observational time series are revealing dynamically evolving processes.



Examples of timeseries data prior to earthquakes and eruptions. 8.1 Tarapaca earthquake (from Brodsky and Lay, Science, 2014) and 2014 eruption of Turrialba volcano (from deMoor et al., JGR, 2016). Timeseries show notable events in the weeks preceeding the mainshock (1 April 8.1) and eruption (pink bar), in the form of migrating swarms of foreshocks and a rise in the CO_2/S ratio of gas, respectively. Such events are rarely captured, but generated excitement at the SZO Workshop as emergent phenomena that require a coordinated, multidisciplinary effort.

The key to understanding both the basic science and the societal hazard requires recording this 4D evolution and being able to quantitatively model it. Synergistically, the sensors deployed for basic research are finding evermore practical applications. Earthquake and tsunami early warning, volcanic ash observatories and dispersion models linked with global air traffic control, eruption warnings based on volcanic unrest, incipient landslides detected by satellites, all rely on sensor suites that now serve the dual purpose of a greater scientific understanding and a reduction in societal hazards. The technology for studying subduction zones is exploding in many ways but this has not yet been translated to the necessary scales to accelerate discovery and improve warning systems.

USGS scientists presented an overview of their plans for new research directions aimed at reducing geohazards from subduction zone eruptions, earthquakes, tsunamis, and landslides. There was considerable debate during the workshop about the relationship between basic science in subduction zones and mission-oriented science aimed at hazard reduction. An SZO initiative will undoubtedly have an impact on both and must carefully articulate its synergistic efforts with the USGS, NASA, and NOAA. In practice, there is considerable overlap between these two goals and many of the same fundamental questions and observational datasets are key to each. Moreover, it was recognized that hazard reduction will be the single most important driver of many of our international collaborators who will be critically important in making SZO a global scale initiative. Hazards will also form the key focus of many education and outreach efforts that could produce a significant impact if approached at the community scale. Overall, the workshop supported a primary driving goal of any SZO initiative to be the development of a deeper understanding of the physical and chemical processes that underlie subduction zone hazards.

The Cascadia and Alaska subduction zones lie within U.S. borders and present a pressing array of unsolved problems and opportunities in subduction zone science. Key hazards to U.S. populations drive the basic science community and the mission agencies to collaborate. However, the workshop participants also emphasized the need to go global to really understand subduction zone processes. Many regions present unique opportunities, such as the ability to drill the seismogenic zone, extremely active volcanic arcs, seismic gaps with centuries of strain accumulation, and likely tsunami earthquakes, that provide a natural potential to capture key phenomena. Moreover, many subduction processes have natural cycles on the scale of decades or centuries and the only way we will piece together a complete understanding of the whole cycle is to piece together what we can learn from different regions that are currently at different stages of that cycle.

Workshop participants recognized that a variety of programatic approaches will advance subduction zone science, that many styles have been successful in the past, and different aspects could be phased in over time. Three key components were identified:

1. A Community Modeling Collaboratory,
2. An Interdisciplinary Science Program, and
3. A Large Scale Infrastructure Program.

This combination over a 10-year effort could reveal new phenomena, integrate data with models, and lead to hazard forecasting that is informed by fundamental tectonic, physical, and chemical drivers. A diverse committee of scientists is currently writing up a detailed report on the priorities and strategies identified during the meeting. The report is on target to be put up for comment in late 2016 and finalized in early 2017. ■

Status Report on the GeoPRISMS Data Portal: October, 2016

Andrew Goodwillie and the IEDA Database Team

Lamont-Doherty Earth Observatory, Columbia University

The GeoPRISMS data portal (*http://www.marine-geo.org/portals/geoprisms/*) was established in 2011 to provide convenient access to data and information for each primary site as well as to other relevant data resources. Since the last newsletter report, highlighted below are recent contributions of data sets and field program information of interest to the GeoPRISMS community. Most of the data sets described are also available in GeoMapApp under the Focus Site menu (*http://www.geomapapp.org/*).

Analytical EarthChem geochemistry data tables were updated for all GeoPRISMS and MARGINS focus sites in GeoMapApp. The USGS-ANSS earthquake catalogues were also updated to include the most current events. A new United States mainland PACES gravity model of free-air and complete Bouguer anomalies covers the Cascadia and ENAM primary sites was added, along with updated geology-lithology maps of the western US.

ENAM

An updated USGS bathymetric compilation of the ENAM margin was added to GeoMapApp. Based upon 32 multibeam swath mapping surveys collected between 1990-2015, the new compilation covers 725,000 square kilometers of seafloor. Also added for this margin was basic field program information for the *MGL1514* active-source magneto-telluric/electromagnetic (MT/EM) experiment designed to map the presence and extent of freshwater in ENAM shelf sediments, an effort led by PIs Kerry Key and Rob Evans.

Gulf of California

As part of the their studies on the Neogene rifting history of the Gulf of California MARGINS focus site, PIs David Kimbrough, Marty Grove and Peter Lonsdale contributed Zircon U-Pb *geochronology data* for submerged and terrestrial continental crust rock samples (Fig. 1).

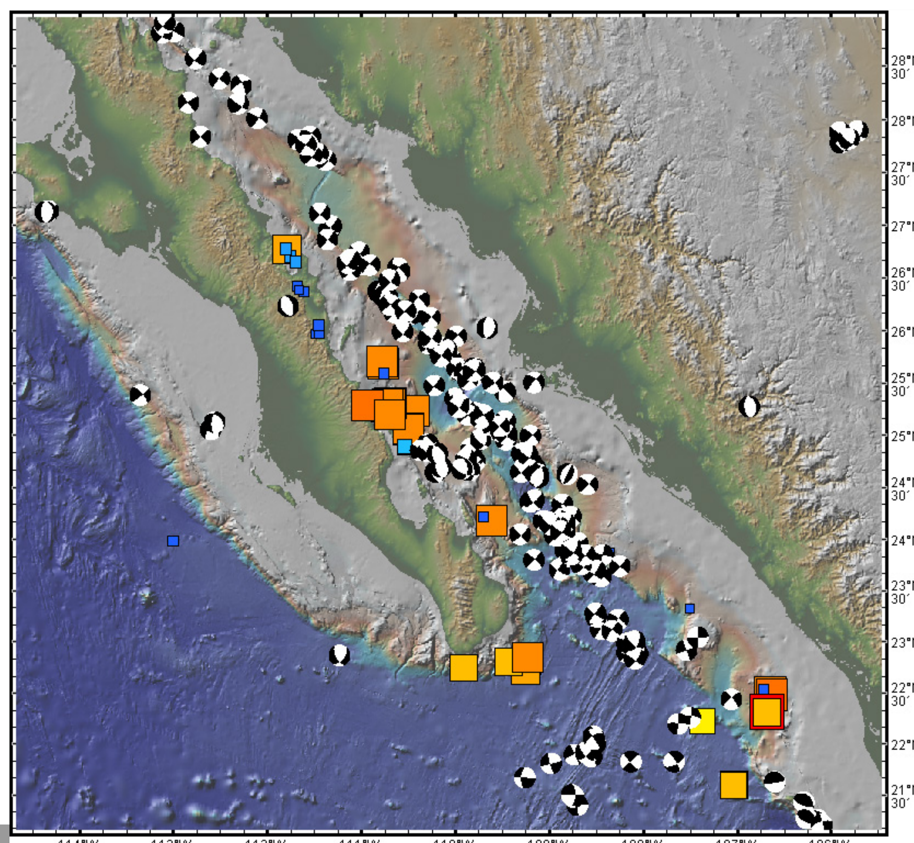


Figure 1. Weighted mean magmatic ages from zircon U^{238}-Pb^{206} analyses of submarine and onshore rock samples in the Gulf of California. PIs Kimbrough, Grove, and Lonsdale used ion microprobe and LA-ICPMS techniques to determine the crustal rock ages, plotted on the map as square symbols coloured and scaled on age. Focal mechanisms from the Global CMT catalogue indicate strike-slip motion along the transform faults. Image made with GeoMapApp. All of the data sets shown are accessible through the GeoMapApp menus.

The GeoPRISMS Data Portal team is here to serve the community

Please contact us at info@marine-geo.org

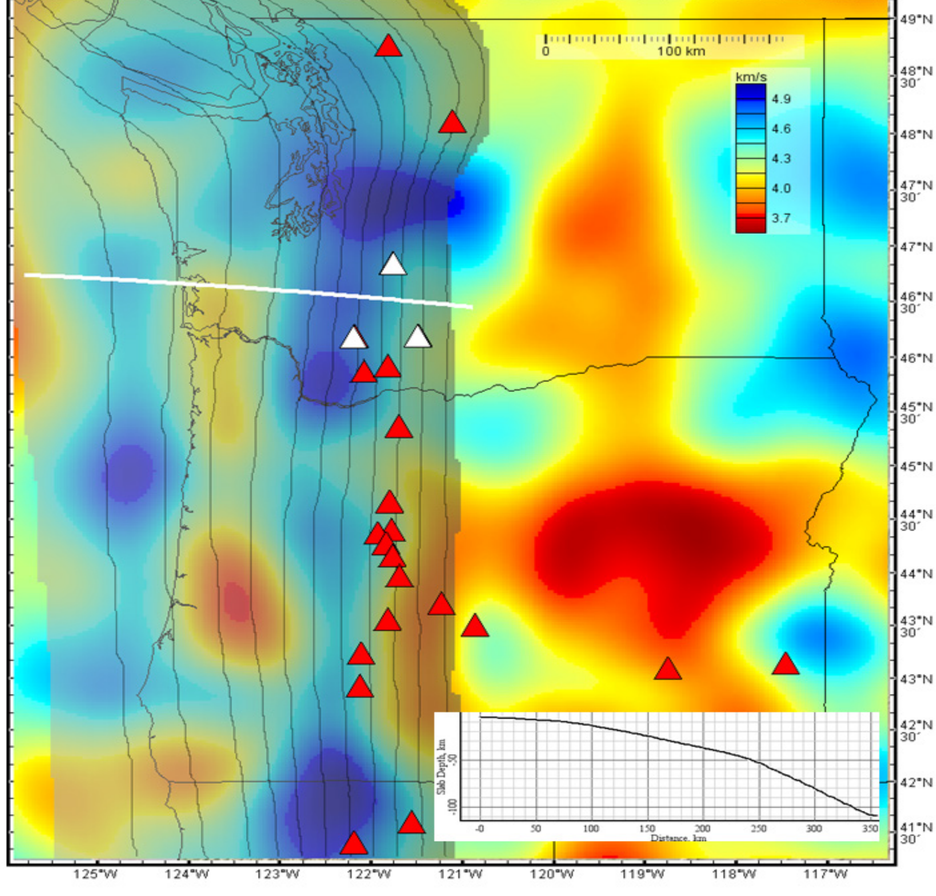


Figure 2. Cascadia lithospheric slab depth and upper mantle shear-wave velocity. The background tomographic data of Gao and Shen (2014) depicts Vs at a depth of 94 km. The seismic velocity colour scale is in the upper right. The western half of the map shows the partially-transparent depth to the top of the subducting Juan de Fuca slab from the McCrory et al. 2006 model. The 10 km contours denote slab depth between 10 km and 110 km. The planes of the tomography and slab depth models thus intersect near the eastern edge of the slab depth model where the descending slab dives through the tomographic slice. Red triangles are volcano locations from the Smithsonian Global Volcanism Project. Slab depth beneath the three highlighted white triangles marking the positions of Mount Rainier (north), Mount St. Helens (southwest) and Mount Adams (southeast) is 85 km, 68 km and 98 km respectively. The W-E white line near the Washington-Oregon border is the location of the slab depth transect shown in the lower right, taken from west to east. Image made with GeoMapApp. All of the data sets shown are accessible through the GeoMapApp menus.

Cascadia

A range of seismic velocity models of the Western US has been added to GeoMapApp, under the Focus Sites menu. Based upon tomographic techniques, the models include the 2014 Gao and Shen Cascadia 3-D shear-wave velocity model, the Porritt et al. (2011) PNW10-S Pacific Northwest dVs model and the Gilbert (2012) crustal thickness model derived from receiver function analysis of EarthScope USArray data. Also incorporated were the North American DNA-13 joint inversion model of Porritt et al. (2013) and the SAWum_NA2 Vs upper mantle velocity model of Yuen and Romanowicz (2011). Complementing these seismic tomography models is the McCrory et al. 2006 model of depth to the subducting Juan De Fuca slab beneath the Cascadia margin (Fig. 2).

GMRT base map

The Global Multi-Resolution Topography (GMRT) (*http://www.marine-geo.org/tools/GMRTMapTool/*) synthesis is the base map used in GeoMapApp, in the GMRT MapTool, and in other IEDA tools. The GMRT now includes processed multibeam swath bathymetry data from more than 270 cruises within GeoPRISMS primary sites.

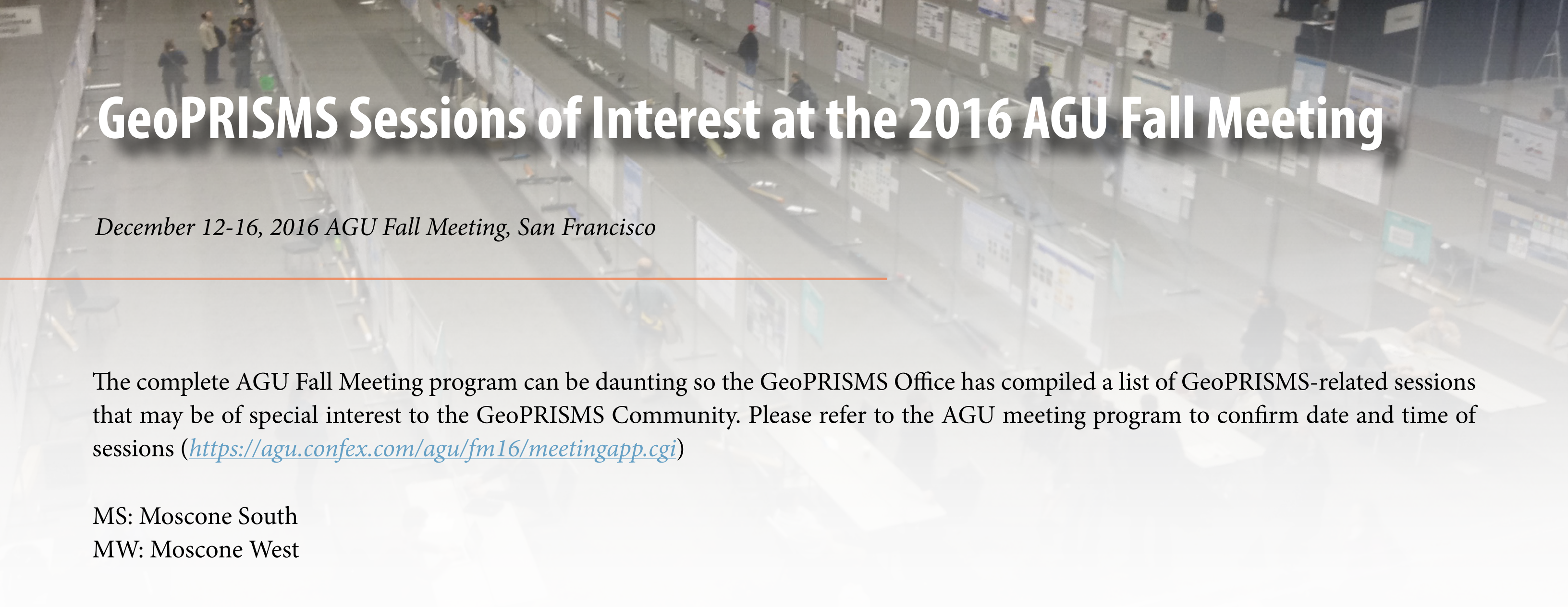
GeoPRISMS Data Portal Tools and Other Relevant IEDA Resources

Search For Data (*http://www.marine-geo.org/tools/new_search/index.php?funding=GeoPRISMS*) The GeoPRISMS search tool provides a quick way to find GeoPRISMS data using parameters such as keyword, NSF award number, publications, and geographical extent.

Data Management Plan tool (*www.iedadata.org/compliance*) Generate a data management plan for your NSF proposal. The on-line form can be quickly filled in, printed in PDF format, and attached to a proposal. PIs can use an old plan as a template to create a new plan. We also have developed a tool to help PIs show compliance with NSF data policies.

GeoPRISMS Bibliography (*http://www.marine-geo.org/portals/geoprisms/references.php*) With more than 1,130 citations, many tied to data sets, the references database can be searched by primary site, paper title, author, year, and journal. The citations can be exported to EndNote™. Submit your papers for inclusion in the bibliography – just the DOI is needed! *http://www.marine-geo.org/portals/geoprisms/ref_submit.php*

Contribute Data (*http://www.iedadata.org/contribute*) The web submission tools support PI contributions of geophysical, geochemical, and sample data. File formats include grids, tables, spreadsheets, and shapefiles. Once registered within the IEDA systems, the data sets become available to the broader community immediately or may be placed on restricted hold. Additionally, PIs can choose to have a DOI assigned to each submitted data set, allowing it to become part of the formal, citable scientific record. ■



GeoPRISMS Sessions of Interest at the 2016 AGU Fall Meeting

December 12-16, 2016 AGU Fall Meeting, San Francisco

The complete AGU Fall Meeting program can be daunting so the GeoPRISMS Office has compiled a list of GeoPRISMS-related sessions that may be of special interest to the GeoPRISMS Community. Please refer to the AGU meeting program to confirm date and time of sessions (https://agu.confex.com/agu/fm16/meetingapp.cgi)

MS: Moscone South
MW: Moscone West

TECTONOPHYSICS

T11F. T21C. Interpreting the Geometry, Rheology, and Deformation Mechanisms of the Slow Earthquake Source

Monday 8:00-10:00 (MS 306)
Tuesday 8:00-12:20 (MS Poster Hall)

Conveners: Ake Fagereng (Cardiff University), Matt Ikari (MARUM - University of Bremen), Yoshihiro Ito (Disaster Prevention Research Institute, Kyoto University), Kohtaro Ujiie (University of Tsukuba)

—

T13A. T21E. T22B. T23D: Bridging Tectonics and Earthquake Cycles

Monday 13:40- 18:00 (MS Poster Hall)
Tuesday 08:00- 10:00 (MS 102)
Tuesday 10:20-12:20 (MS 103)
Tuesday 13:40-15:40 (MS 103)

Conveners: Sylvain Barbot (Earth Observatory of Singapore), Ylona van Dinther (ETH Swiss Federal Institute of Technology Zurich), Romain Jolivet (Ecole Normale Supérieure Paris), Fabio Corbi (Deutsches GeoForschungs Zentrum GFZ)

—

T11D. T14C. The Aleutian-Alaska Arc: Volcanic and Tectonic Processes

Monday 8:00-12:20 (MS Poster Hall)
Monday 16:00-18:00 (MS 304)

Conveners: Aaron Wech (Alaska Volcano Observatory, Anchorage), Terry A Plank (Lamont -Doherty Earth Observatory), John A Power (Alaska Volcano Observatory), Donna J Shillington (Lamont -Doherty Earth Observatory)

T21B. Insights on the tectonic evolution of the Salton Trough and northern Gulf of California from recent multidisciplinary studies

Tuesday 8:00-12:20 (MS Poster Hall)

Conveners: John A Hole (Virginia Tech), Patricia Persaud (Caltech), Arturo Martin (CICESE), Rebecca J Dorsey (University of Oregon)

—

T31C. T31D. T31E. T31F. T41G. T42C. T43H. T51I. T52B. Subduction Top to Bottom (ST2B-2)

Wednesday 8:00-12:20 (MS Poster Hall)
Thursday 8:00-10:00 (MS 103)
Thursday 10:20-12:20 (MS 103)
Thursday 13:40-15:40 (MS 103)
Friday 8:00-10:00 (MS 104)
Friday 10:20-12:20 (MS 104)

Conveners: Gray E Bebout (Lehigh University), Robert J Stern (Univ Texas Dallas), Philippe Agard (University Pierre and Marie Curie), Laura Wallace (UTIG)

—

T32C. T33E. T41E. Origin, architecture, and dynamics of extensional basins

Wednesday 10:20-12:20 (MS 103)
Wednesday 13:40-15:40 (MS 103)
Thursday 8:00-12:20 (MS Poster Hall)

Conveners: John J Armitage (Institute de Physique du Globe de Paris), Jolante van Wijk (New Mexico Institute of Mining and Technology), Sascha Brune (University of Sydney), David Ferguson (Harvard University)

—

T42D. T51G. The Eastern North American Margin: Structure, dynamics, history, and processes

Thursday 10:20-12:20 (MS 304)
Friday 8:00-12:20 (MS Poster Hall)

Conveners: Margaret H Benoit (College of New Jersey), Maureen D Long (Yale University)

—

T43G. T44C. T51C. One Rift, Two Rift, Magma-Rich Rift, Magma-Poor Rift: Deformation, magmatism, volatile fluxes, and their consequences in the East African Rift System

Thursday 13:40-15:40 (MS 304)
Thursday 16:00-18:00 (MS 304)
Friday 8:00-12:20 (MS Poster Hall)

Conveners: Natalie J Accardo (Columbia University of New York), Donna J Shillington (Columbia University of New York), Tobias P Fischer (University of New Mexico), Juliet Biggs (University of Bristol)

STUDY OF THE EARTH'S DEEP INTERIOR

DI23B. DI44A. The distribution and pathways of melts, fluids, and volatiles in subduction systems: a multidisciplinary approach

Tuesday 13:40-18:00 (MS Poster Hall)
Thursday 16:00-18:00 (MS 303)

Conveners: Songqiao Shawn Wei (Scripps Institution of Oceanography), Ikuko Wada (International Research Institute of Disaster Science), Zach Eilon (Lamont -Doherty Earth Observatory), Jeffrey Alt (University of Michigan Ann Arbor)

EDUCATION

ED42B. ED43C. Sympathy for the Data: Novel approaches to the art of data visualization

Thursday 10:20-12:20 (MS 307)
Thursday 13:40-18:00 (MW Poster Hall)

Conveners: Martin Pratt (Washington University in St. Louis), Natalie Accardo (Lamont-Doherty Earth Observatory, Columbia University), Hannah Rabinowitz (Lamont-Doherty Earth Observatory, Columbia University), John Leeman (Pennsylvania State University)

OCEAN SCIENCES

OS12. OS13D. OS21A. Marine Geohazards

Monday 10:20-12:20 (MW 3002)
Monday 13:40-14:35 (MW 3011)
Tuesday 8:00-12:20 (MS Poster Hall)

Conveners: Daniel S Brothers (USGS Pacific Coastal and Marine Science Center Santa Cruz), Katherine L Maier (Pacific Coastal and Marine Science Center Santa Cruz), Janet Tilden Watt (USGS Pacific Coastal and Marine Science Center Santa Cruz)

SEISMOLOGY

S33A. S41C. S42A. S43D. Advances in understanding of tremor, slow slip and other slow earthquake phenomena

Wednesday 13:40-18:00 (MS Poster Hall)
Thursday 8:00-10:00 (MS 305)
Thursday 10:20-12:20 (MS 305)
Thursday 13:40-15:40 (MS 305)

Conveners: Abhijit Ghosh (University of California Riverside), Kevin Chao (MIT), William Frank (MIT), Brent G Delbridge (Berkeley Seismological Lab)

EARTH AND PLANETARY SURFACE PROCESSES

EP53B. EP54A. Connecting Geodynamics and Surface Processes: Theoretical and Field-Based Approaches

Friday 13:40-18:00 (MS Poster Hall)
Friday 16:00-18:00 (MW 2003)

Conveners: Phaedra Upton (GNS Science), Samual Roy (University of Maine), Jean-Arthur L Olive (Lamont -Doherty Earth Observatory), Luca Claude Malatesta (California Institute of Technology)

VOLCANOLOGY, GEOCHEMISTRY & PETROLOGY

V21B. V31C. Sulfur (Bio)geodynamic Cycles on Earth and Terrestrial Planets

Tuesday 8:00-10:00 (MS 303)
Wednesday 8:00-12:20 (MS Poster Hall)

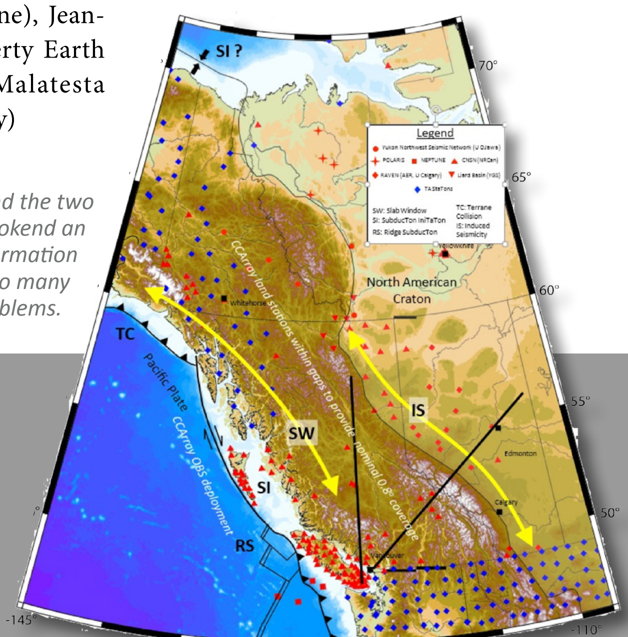
Conveners: Julia Ribeiro (Rice University), Shuo Ding (Rice University), Fabrice Gaillard (CNRS-Orléans), Paul J Wallace (University of Oregon)

—

V33E. V43G. V44A. The Nature of Magma Reservoirs

Wednesday 13:40-18:00 (MS Poster Hall)
Thursday 13:40-15:40 (MS 308)
Thursday 16:00-18:00 (MS 308)

Conveners: Allen F Glazner (University of North Carolinaat Chapel Hill), John M Bartley (University of Utah), Jamie Farrell (University of Utah)



The Earthscope Transportable Array, and the two nearby GeoPRISMS focus areas, bookend an understudied region where ongoing deformation and a complex tectonic history lead to many world-class geoscientific problems.

GeoPRISMS at AGU Fall Meeting 2016 Mini-Workshop

Sunday December 11

8a-1p | EarthScope-type Canadian Cordillera Seismic Array and GPS Network

Conveners: Rick Aster, Pascal Audet, Katherine Boggs, Julie Elliott, Roy Hyndman, Michael Schmidt, Derek Schutt

Grand Hyatt San Francisco
345 Stockton Street, San Francisco, CA
Union Square Room – 36th Floor

Questions should be directed to the GeoPRISMS Office:
info@geoprisms.org
More information can be found at:
http://geoprisms.org/meetings/mini-workshops/
A detailed description of the workshop is available p.25

GeoPRISMS Prize for Outstanding AGU Student Poster and Oral Presentations

The GeoPRISMS Program is offering two $500 prizes for Outstanding Student Presentations on GeoPRISMS- or MARGINS-related science at the AGU Fall Meeting in San Francisco, December 12-16, 2016.

The two prizes, one each for a poster and an oral presentation, will be awarded to highlight the important role of student research in accomplishing MARGINS- and GeoPRISMS-related science goals, and to encourage cross-disciplinary input.

GeoPRISMS Mini-Workshops at AGU Fall Meeting 2016

Grand Hyatt San Francisco, 345 Stockton Street
Union Square Room - 36th Floor

Sunday December 11, 2016 • 8 – 1pm

EarthScope-type Canadian Cordillera Seismic Array and GPS Network

Conveners: Rick Aster[1], Pascal Audet[2], Katherine Boggs[3], Julie Elliott[4], Roy Hyndman[5], Michael Schmidt, Derek Schutt[1]

[1]Colorado State University, [2]University of Ottawa, [3]Mount Royal University, [4]Purdue University, [5]Pacific Geoscience Centre

The purpose of this mini-workshop is to build terrestrial and marine partnerships to complement and frame the nascent EarthsCAN initiative, which seeks to fund ambitious large-scale geophysical studies in Canada across the next decade. This workshop will provide a timely and valuable US-based venue to convey and further discuss relevant results from three Canadian EarthCAN workshops being conducted in 2016, and promote future collaboration between the Canadian research community and their US and international colleagues.

Invited Speakers

Pascal Audet (University of Ottawa), and Katherine Boggs (Mount Royal University), will discuss the EarthsCAN initiative, potential pilot deployments in the Yukon and British Columbia, and the outcomes of the three Canadian EarthsCAN workshops.

Lindsay Worthington (University of New Mexico) will talk about the tectonics of the Gulf of Alaska and what understanding structures and processes in the Yukon-BC would bring to understanding of the broader region.

Roy Hyndman (Pacific Geoscience Centre) will discuss what is known and unknown regarding the tectonics and structures in the Yukon-B.C. region.

Mladen Nedimović (Dalhousie University) will discuss subduction-related water flux at the Juan de Fuca plate, and the benefits of extending work to the north of the Olympic Peninsula.

followed by

Sunday December 11, 2016 • 1:30 – 5pm

Volcanoes in Extensional and Compressional Settings

Conveners: Cindy Ebinger[1], Christelle Wauthier[2], Cliff Thurber[3], Maya Tolstoy[4], Einat Lev[4], James Muirhead[5], Josef Dufek[6]

[1]University of Rochester, [2]Penn State, [3]University of Wisconsin-Madison, [4]LDEO, [5]Syracuse University, [6]Georgia Tech

The over-arching goal of this mini-workshop is to bridge disciplines to address critical problems of magma and volatile transfer and their role in strain localization during plate boundary deformation, as well as to consider the role of tectonic stressing on volcanic eruption cycles and magma emplacement. The planned workshop will enable cross-disciplinary research, strengthen and link the GeoPRISMS community, and feature early career scientists. It will also enable comparison and contrasts between arcs, back-arcs, and continental rift zones, and facilitate discussions with numerical modelers keen to understand the role of magmatism and volatile release in lithospheric deformation processes. This workshop will allow the community to interact and develop linkages that will utilize new and existing data products from Alaska, East Africa, Cascadia (including Juan de Fuca ridge processes), and Hikurangi margin in New Zealand to maximize the scientific impact of GeoPRISMS and to guide new research initiatives.

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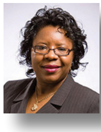

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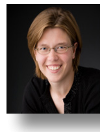

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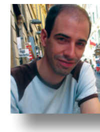

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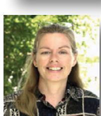

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The new GeoPRISMS Office in the Fall of 2016 in front of the Department of Geosciences at Penn State. From left to right: Anaïs Férot (Science Coordinator), Demian Saffer (GeoPRISMS Chair), Jo Ann Lehtihet (Administrative Coordinator).

Meet the GeoPRISMS Staff

GeoPRISMS Chair

Demian is a Professor at The Pennsylvania State University, whose research focuses on the role of fluids in geologic processes, including the interaction between pore fluid pressure, rock and sediment deformation, fault zone processes, and regional transport of heat and solutes. He has worked extensively on fault zone drilling projects, including the San Andreas Fault Observatory at Depth (SAFOD) and Alpine Fault Deep Fault Drilling Projects, and has been heavily involved in Scientific Ocean Drilling Projects at the Costa Rican, Nankai, and Hikurangi subduction zones. Demian was the recipient of the 2005 GSA Donath medal, and the 2009 Alexander von Humboldt Foundation Friedrich Wilhelm Bessel Research Award. He has served on a number of advisory panels, including the IODP New Science Plan writing committee, the MARGINS successor program steering committee, the MARGINS steering committee, and the IODP science evaluation panel.

GeoPRISMS Science Coordinator

Anaïs was part of the GeoPRISMS Offices based at Rice University and the University of Michigan, and continues as the GeoPRISMS Science Coordinator for the Office hosted by Penn State, working from University of Oregon in Eugene. Anaïs assists the Chair of the Program, facilitates the communication with the science community, plans and organizes workshops. She maintains and develops the GeoPRISMS website and produces the newsletter. She manages the Education & Outreach activities, in particular the Distinguished Lectureship Program, and oversees GeoPRISMS social media engagement. Anaïs holds a PhD in Experimental Petrology from Université Blaise Pascal, France. She aimed at constraining the combined effects of pressure, temperature, and composition on water solubility in olivine and pyroxene under upper mantle conditions.

GeoPRISMS Administrator

Jo Ann supports the Chair and Science Coordinator in logistics planning, implementation and on-site support. She holds a BA in International Affairs from the George Washington University and has held private sector management positions in international student programs and the IC chip card industry. Prior to joining the Penn State Geosciences Department, she served as a public relations manager in the cable industry.

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US and international participants at the GeoPRISMS Planning Workshop for the East African Rift System Primary Site, held in Morristown, NJ, in October 2012.

In February 2017, The GeoPRISMS Office will hold a Theoretical and Experimental Institute (TEI) focused on intermediate synthesis of RIE projects.

http://geoprisms.org/tei-rie-2017/