

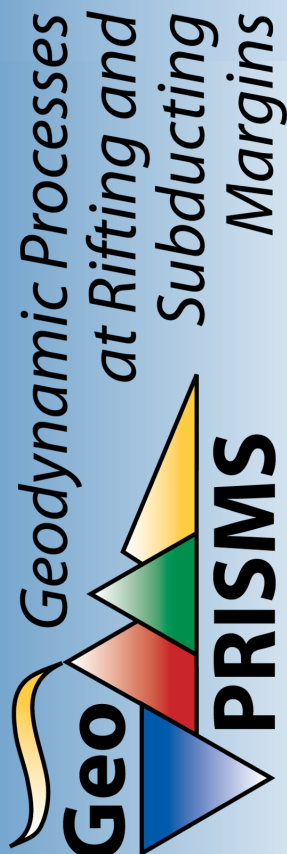
# GeoPRISMS Newsletter

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## From the GeoPRISMS Chairs

### Goodbye from the Outgoing GSOC Chair

*Julia Morgan, Outgoing GeoPRISMS Steering and Oversight Committee Chair (Rice University)*

On September 30, 2013, my term as Chair of the GeoPRISMS Steering and Oversight Committee came to an end. These last three years have been an extremely exciting and rewarding time, with the launch of GeoPRISMS accompanied by the extraordinary growth of a most active and creative GeoPRISMS community. During this time, the Rice GeoPRISMS Office oversaw seven major GeoPRISMS workshops, and numerous smaller events, including the well-attended AGU mini-workshops. All of these gatherings enabled substantial community planning and decision making, and the development of new collaborations, and I extend a broad thank you to everyone who attended and contributed to those workshops. As a result, the GeoPRISMS Implementation Plan is nearly complete, establishing the guidelines for ongoing and future GeoPRISMS research.

None of this would have been possible without the amazing efforts of the staff of the Rice GeoPRISMS Office, including Alana Holmes, Charles Bopp, and Alison Henning, and more recently, Anaïs Férot, August Costa, and Suzanne Haveman. It has been a delight working with all of them, and I am greatly appreciative of everything they have done to keep the office running, and to ease the way for these critical community activities. Also, the success of the GeoPRISMS Program and its early accomplishments would not have been possible without the strong support of the GeoPRISMS community, the input and help of the GeoPRISMS Steering and Oversight Committee and so many meeting organizers and implementation plan writers, and also the informed advice of the staff of the National Science Foundation. I thank you all for contributing to the achievements of these last three years.

## Apply to Participate in the

### GeoPRISMS Eastern North America Community Seismic Experiment

#### Application Deadlines:

- January 7, 2014 for Broadband OBS Deployment Cruise
- March 1, 2014 for Explosion Seismic Shoot, Active-Source Seismic Cruise, and Active-Source OBS Deployment Cruise, Broadband OBS Recovery Cruise

For more information about the objectives and design of the ENAM CSE, eligibility, and how to apply, see:

<http://geoprisms.org/enam/community-seismic-experiment.html>

I would also like to welcome Peter van Keken, who took over as Chair of the GeoPRISMS Steering and Oversight Committee on October 1, 2013, and will manage the new GeoPRISMS Office at the University of Michigan. The office transition is taking place gradually, with the Rice office continuing to coordinate many GeoPRISMS activities, in particular events at the upcoming AGU Meeting, as the Michigan office gets up and running. Further smoothing the transition, Anaïs Férot, GeoPRISMS science coordinator, has moved with the office to Michigan, and August Costa and Susi Haveman will continue on at Rice through the fall and AGU. We expect to have transferred all office responsibilities away from Rice by the end of the calendar year.

Note, the ongoing office transfer will not deter our usual GeoPRISMS activities. AGU 2013 promises to be as busy as ever for us. The GeoPRISMS Townhall and Student Forum will take place on Monday, December 9 at the Westin Market Street Hotel (page 4). GeoPRISMS-related special sessions will take place all week (page 21), as will

the popular GeoPRISMS best student presentations competition (page 11). And importantly, we invite you to register to participate in one or more of the four GeoPRISMS-sponsored mini-workshops designed to enable advance planning and coordination for upcoming research activities (pages 9, 16 and 22).

Our education and outreach programs also continue apace. The 2013-2014 Distinguished Lectureship Program is now underway, with a great group of speakers from across the disciplines. Demand for this program remains high, with more than 65 applications from schools across the US, as well Canada and elsewhere. I thank all of the speakers for donating their time to this cause! The new NSF TUES Mini-Lesson Project, "Bringing NSF MARGINS Continental Margins Research Into the Undergraduate Curriculum" is also going along swimmingly; we held our first in-person workshop at Carleton College in September), finalizing plans for development and in-class testing of a suite of new MARGINS mini-lessons (page 19). I am delighted to be working

with such an energetic team of mini-lesson authors and contributors, and look forward to trying out all the finished products.

While there are so many people who have contributed to GeoPRISMS accomplishments in the last three years, I wish to extend a special thank you to several members of the GSOC who served throughout my term and just rotated off, Peter Flemings, John Jaeger, Matt Pritchard, Donna Shillington, and Lori Summa, all of whose extraordinary efforts were crucial to getting GeoPRISMS up and running. I would also like to thank Maggie Benoit for her service on both GSOC and GEAC, and wish her an exciting rotation at NSF starting this past August. A broad thank you goes to all other members of GSOC and GEAC who have been instrumental in running recent workshops and student symposia, along with volunteers from the community. All of you are what makes GeoPRISMS work!

## Relevant Funding Opportunities for GeoPRISMS-Related Proposals

### **Integrated Earth Systems (IES) [Solicitation 12-613]**

([http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504833](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504833))

Full Proposal Deadline(s): November 14, 2013 and annually thereafter

Multidisciplinary research into the operation, dynamics and complexity of continental, terrestrial and deep Earth subsystems of the whole Earth system.

### **Coastal SEES: Science, Engineering and Education for Sustainability [Solicitation 14-502]**

[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504816](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504816)

<http://www.nsf.gov/pubs/2014/nsf14502/nsf14502.htm>

Full Proposal Deadline: January 21, 2014

Coastal SEES is focused on the sustainability of coastal systems, addressing the broad and intimately interconnected natural and human processes.

## Greetings from the Incoming Chair

*Peter van Keken (University of Michigan)*

It is a pleasure to use this opportunity to announce the opening of the GeoPRISMS Office at the University of Michigan. As indicated by Juli above, the transfer is taking place over a somewhat extended period due to budgetary and logistical issues. The office effectively drove up from Houston in early November with Anaïs Férot and is now open and running in parallel with the Rice office. We are in the process of hiring the Administrative Coordinator which will finalize the staffing of the office.

It's been a privilege working with Juli and her staff during the Michigan office start up. I'd like to extend a very grateful "Thank You!" to Juli. She has completed the Herculean task in getting GeoPRISMS up and running. I cannot describe the true appreciation I have for the enormous effort she has made together with her office and the GSOC in the last three years. With three years of workshops and the establishment of a strong science plan and implementation plans for the focus sites we've started our community effort on very solid footing. While she has been looking forward to October 1 as the date to hand over the responsibilities she has been extremely generous and gracious in allowing for the somewhat drawn out office transition that is dictated by outside circumstances (see below). I

was delighted to hear that Juli's strong effort has also been highly appreciated by the broader community and that she will receive the Paul Silver award for outstanding service to the fields of geodesy, seismology, or tectonophysics. I hope you will all be available to help celebrate this award at the upcoming AGU meeting.

During the office transition the work by Susi Haveman, August Costa and Anaïs Férot has been invaluable. I'm am delighted that Anaïs has been willing to accept to move to Michigan and continue as the GeoPRISMS Science Coordinator in the far and distant North. It is hard to imagine how we could have worked towards all AGU activities without the current and ongoing work by the Rice office and the continuity that Anaïs provides. The longish time period of the transition is dictated in part by the Fall activities of Congress which has delayed the initiation of the office budget at Michigan.

I would like to welcome several new members on the Steering and Oversight Committee. Some have been pretty active in the planning for GeoPRISMS primary sites and research directions and your commitment to our community effort is greatly appreciated. The new members are Tyrone Rooney (Michigan State

University), Liz Hajek (Penn State), Harm van Avendonk (University of Texas), Estella Atekwana (Oklahoma State University), and Sarah Penniston-Dorland (University of Maryland). All bring a diverse set of interests, backgrounds, and expertise to the table. Sarah will do double duty by also serving on the GeoPRISMS Education Advisory Committee. I look very much forward working with all of you.

I will use the Spring newsletter to provide a more detailed view of how the office and GSOC are working with our community to move the GeoPRISMS science objectives forward. Now that the planning workshops are completed we will turn to future workshops such as the Theoretical and Experimental Institutes that will provide a mid-term evaluation of the Initiatives. The phased funding scheme, where the large data collection proposals can be submitted for each focus site for only a limited period, remains an important topic of discussion. We will also continue to highlight related funding opportunities through the core programs and new initiatives such as IES and Coastal SEES (page 2). I look forward to meet you all at the Fall AGU Townhall meeting or any of the mini-workshops that will

### Stay Informed!

- Sign up for the GeoPRISMS newsletter
- Like us on Facebook and follow us on Twitter
- Follow all the opportunities through our Listserv
- Attend the annual GeoPRISMS Townhall Meeting at AGU

### Contact Us!

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## GeoPRISMS AGU Townhall and Community Forum

Monday, December 9 at 6 PM

Franciscan Ballroom

Westin San Francisco Market Street, 50 Third Street

Join us for the GeoPRISMS Townhall Meeting and Community / Student Forum at the 2013 AGU Fall Meeting. The event is open to all with interests in the GeoPRISMS Program and GeoPRISMS (or MARGINS) research. Come hear all about the latest goings-on in GeoPRISMS, including reports on the most recent primary site planning meetings (East African Rift System, New Zealand) and new field activities, and upcoming events and opportunities to become involved.

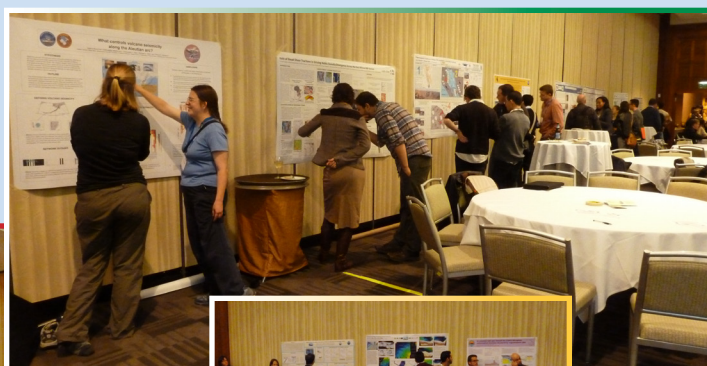
### Bring your students along as well!

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.

There will be ample time to mingle, and refreshments will be available. Among those present will be Peter van Keken (GeoPRISMS Chair), members of the GeoPRISMS Steering and Oversight Committee, and Program Managers for GeoPRISMS from the National Science Foundation (NSF).

For more information about the the AGU Townhall, Student Prize Competition, Mini-Workshops, and GeoPRISMS-related sessions please visit:

<http://geoprisms.org/agu-townhall.html>





# The New Zealand Primary Site Implementation Planning Workshop

Wellington, New Zealand, April 14-16 2012

*Workshop conveners: Laura Wallace (University of Texas, Austin), Susan Ellis (GNS Science, New Zealand), Adam Kent (Oregon State University), Nicola Litchfield (GNS Science, New Zealand), Kathleen Marsaglia, (California State University at Northridge), Demian Saffer (Pennsylvania State University), Susan Schwartz (University of California, Santa Cruz), Richard Wysoczanski (NIWA, New Zealand)*

An implementation planning workshop was held for the New Zealand Primary Site on 14-16 April, at Te Papa Museum in Wellington, New Zealand. There were ~170 participants from ten different countries, demonstrating the outstanding opportunities for international collaboration at this Primary Site. The large number of participants and high-quality white papers submitted (38 white papers - more than for any of the other GeoPRISMS Primary Site Workshops) reflected the high level of enthusiasm among both the US and international subduction zone communities for future studies in New Zealand. The workshop consisted of a number of keynote and invited talks, and break-out sessions to discuss and prioritize the main scientific objectives and most suitable GeoPRISMS goals.

## Workshop topics and agenda

After a welcome to the workshop from Prue Williams (New Zealand Ministry for Business, Innovation, and Employment), Kelvin Berryman (New Zealand Natural Hazards Platform), Bilal Haq (NSF) and Julia Morgan (GeoPRISMS Program), the science program kicked off with a keynote presentation from Nick Mortimer (GNS Science) on the history of subduction in New Zealand since the Paleozoic. For much of the remainder of the first day, we heard from keynote speakers on the four main topics to be addressed at the New Zealand Primary Site. These include:

- What are the geological, geochemical and geophysical responses to subduction initiation and early arc evolution and how do they affect subduction zone formation?



Figure 1. Group picture in front of the colorful Marae at Te Papa Museum, Wellington.

- What are the pathways and sources of magmas and volatiles emerging in the arc and forearc, and how do these processes interact with upper plate extension?
- What controls subduction thrust fault slip behavior and its spatial variability?
- What are the feedbacks between climate, sedimentation, and forearc deformation?

The keynote talks provided background on how these questions could be addressed in New Zealand, as well as global perspectives on the important outstanding questions. Keynote talks on the first day helped to set the stage for discussions held during the rest of the workshop. On the afternoon of Day 1, we held our first set of breakout sessions. The sessions were organized around the four key topics above, and were focused on identifying the most exciting science that can be done in New Zealand to address these topics.

At the beginning of the second day, the breakout session leaders reported back to the rest of the workshop on the outcomes of their breakout session discussions. Following the breakout leader reports, we heard a series of talks on existing infrastructure and datasets in New Zealand that could be brought to bear on any future GeoPRISMS studies at the New Zealand Primary Site. The range of datasets and available infrastructure at the New Zealand Primary Site is particularly impressive. Among these are comprehensive cGPS and seismic networks ([www.geonet.org.nz](http://www.geonet.org.nz)), extensive, high-quality marine geophysical data that is publicly available, recent geological mapping of the entire country at a 1:250,000 scale, and a world-class database of active faults. Participants also heard about IODP projects and proposals that are in the works for the New Zealand region that have strong relevance to the SCD topics.

The IODP efforts included:

- Drilling at the offshore Hikurangi subduction margin to understand slow slip events,
- Drilling in the Lord Howe Rise area between New Zealand and Australia to investigate the consequences of Tonga-Kermadec-Hikurangi subduction initiation, and
- Drilling at Brother's Volcano in the Kermadec Arc to understand submarine volcano hydrothermal processes.

After lunch on Day 2, we were also reminded of the potentially important societal implications of future GeoPRISMS SCD research in New Zealand by a series of talks on the role of science in the understanding of seismic (Russ Van Dissen, GNS Science), volcanic (Gill Jolly, GNS Science), and tsunami hazards (David Johnston, Massey University) in the New Zealand region. These talks were followed by a series of short, topical science talks on a variety of studies being undertaken in New Zealand and elsewhere to address questions relevant to the GeoPRISMS SCD. For the rest of the afternoon on Day 2, participants divided into four breakout sessions that represented the four main geographical areas of the New Zealand Primary Site:

- Hikurangi Margin,
- Fiordland,
- Kermadec Arc, Havre Trough, and vicinity,
- The Taupo Volcanic Zone.

These breakout sessions discussed the main science priorities in each of these geographic areas, and identified data gaps that need to be filled to undertake the science. Synergies that exist across the four Topics in each of these locations were also discussed.

At the beginning of Day 3, we heard reports from the Day 2 breakout leaders, and had a plenary discussion on the

*Figure 2. Participants at the New Zealand Planning Workshop in Wellington, 2013.*



Day 2 outcomes. Following the reports, we heard a series of talks from potential international partners in Japan (Shuichi Kodaira, JAMSTEC), Germany (Achim Kopf, Bremen), the UK (Lisa McNeil, Southampton), and Canada (Kelin Wang, Pacific Geoscience Center) about their countries' ongoing research interests in subduction and the potential infrastructure that they could bring to bear on studies at the New Zealand Primary Site. Bilal Haq also gave an overview on the structure of GeoPRISMS, and potential NSF infrastructure, such as marine geophysical vessels, that could be utilized for NSF-funded studies in New Zealand. One of the most exciting aspects of the New Zealand Primary Site is the huge potential for US collaboration with New Zealand and other international partners which will greatly amplify the outcomes of any GeoPRISMS-funded studies conducted in New Zealand.

The remainder of the final day was spent in Breakout sessions and plenary discussions to refine the plans for future GeoPRISMS-funded studies within the main geographic focus areas. For the final set of breakout sessions, the conveners decided to stray from the original plan and organized the breakouts into geographic regions (rather than topically), so that the participants could focus in on planning for the main experiments to be conducted at the New Zealand Primary Site. One very controversial decision by the conveners was to put the Hikurangi and Taupo Volcanic Zone participants together in a single breakout session to discuss potential corridors across from the subduction thrust through to the arc to consider the Hikurangi subduction zone as a complete system. Although

forcing these two groups together was a challenge, we hope that it initiated some discussions that will lead to more thinking about the Hikurangi subduction zone as a complete system in the future.

### **Identification of geographic corridors and priorities within those corridors.**

Four geographic regions emerged as focus areas where several of these topics could be well addressed.

#### *The Puysegur Trench*

The Puysegur Trench elicited significant enthusiasm at the workshop, as it is arguably the best-expressed example on Earth of a subduction zone being "caught in the act" of initiating, providing a globally unique opportunity to define the geodynamic boundary conditions to test models for subduction initiation. Key questions include: How does the new slab first enter the mantle? What is the fluid expression and thermal structure of subduction initiation? Focused geophysical surveys can tackle fundamental questions about the onset of convergence and associated vertical motions, offshore thermal and crustal structure, newly developing arc volcanism, as well as the geometry of subduction initiation. These new datasets will be underpinned by the uniquely well-constrained plate kinematic history during subduction development and a complete Miocene rock uplift history onshore Fiordland that records the vertical deformation response to subduction initiation.



### *The Hikurangi subduction margin*

The Hikurangi subduction margin offers an outstanding opportunity to address the controls on variability in megathrust slip behavior, due to strong along-strike variations in interseismic coupling and slow slip event behavior observed there. Participants also recognized the outstanding opportunities to assess feedbacks between climate, sedimentation and forearc deformation, which can build upon previous MARGINS S2S studies in the Waipaoa catchment. Other questions to be addressed at Hikurangi include: How do topography, thermal structure, and material properties of incoming plate control fault zone structure, slip behavior, accretionary wedge evolution, and uplift and erosion of the forearc? What are the pathways and timescales of sediment input? What is the slip behavior and rheology of the near-trench portion of subduction fault?

Discussions for future work emphasized integrated geophysical, geological, and geochemical studies of the on-shore and offshore forearc and incoming plate to discern the major controls on variations in subduction interface behavior and overall margin evolution. Moreover, a series of IODP proposals are currently in the system to investigate the mechanisms behind shallow slow slip event occurrence at North Hikurangi, and these provided an important focal point for discussions on future studies. Future studies at Hikurangi will leverage on existing datasets and scientific infrastructure such as a comprehensive geodetic and seismic network ([www.geonet.org.nz](http://www.geonet.org.nz)), as well as significant ongoing and planned efforts by international partners in NZ, Japan, and Europe.

### *The Taupo Volcanic Zone*

The Taupo Volcanic Zone elicited significant excitement as the most productive rhyolitic system on Earth, which

also coincides with an extensional fault system. Some of the major questions to be addressed there include: How does the mafic flux from the mantle translate to voluminous rhyolitic magma production? How does arc volcanism interact with upper plate extension? World-class datasets bearing on the distributions, age, geochemistry, physical volcanology and petrology of many rocks from the Taupo and adjacent arc volcanoes have already been acquired by New Zealand-based researchers. As a result, substantial scope exists to supplement and synthesize these data and combine them with integrative geophysical and geochemical investigations. Moreover, comparison of the Kermadec Arc corridors with outcomes from the TVZ affords an opportunity to assess the influence of the continental/oceanic crust transition in the overlying plate on arc development, as well as changes in the nature of the subducting plate. An opportunity to link with the Hikurangi margin group also exists, and a targeted geochemical, geophysical, and geological corridor would enable assessment of controls on magmatism and volatile cycling for the entire subduction system, from the incoming plate and forearc through to the arc.

### *The Kermadec Arc*

The Kermadec Arc offers a prime setting for addressing questions relating to magmatic and volatile fluxes at a well-developed volcanic arc from the forearc through to the backarc. The Havre-Lau backarc system, which progresses from oceanic spreading in the north to rifting and disorganised spreading in the south, also offers in-

sights into backarc extension dynamics and the reorientation of arc systems. The effect of Hikurangi Plateau subduction on the magmatic products of the arc is also a topic of interest, requiring some along-strike comparisons. Moreover, it was also recognized that an outstanding record of Eocene subduction initiation at the Tonga-Kermadec-Hikurangi Trenches exists in the region west of the Kermadec Trench. The Kermadec Arc working group recognized that a key initial part of the project will be to identify corridors across the arc in which to target their field programs. Targeted field programs would include shipboard geophysics (passive and active seismic, electromagnetic, among others), rock sampling for geochemistry, petrology, and chronology, and hydrothermal fluid sampling. Results from an upcoming GeoMar/Sonne cruise in the Kermadec Arc will provide results to help define which corridor(s) should be focused on. The marine-based science plan developed by a Kermadec working group would complement ongoing and planned efforts by New Zealand, Japanese and German colleagues, and these international collaborations will amplify outcomes of GeoPRISMS goals in the Kermadec Arc.



Figure 3. Animated discussion around the giant geological map of New Zealand.

In addition to these geographically-focused efforts, there was strong support for GeoPRISMS studies of exhumed terranes in New Zealand, which provide unique exposures of Mesozoic subduction in the Fiordland and Otago regions of the South Island, as well as parts of the eastern North Island. It was recognized that the only pristine Cretaceous arc section in the Circum-Pacific exists in Fiordland in the South Island, offering a prime locale to investigate the root zones of an ancient arc, at outcrop scale.

### International Collaborations

The New Zealand Primary Site already is the focus of significant research efforts within the international community. This affords a wide range of opportunities for linking GeoPRISMS studies with a vast body of previous work on subduction systems in NZ, leveraging existing infrastructure, and collaboration in numerous ongoing and planned investigations. These ongoing endeavors include significant investments from the NZ government and efforts within the highly productive NZ geosciences community, as well as active research programs led by Japanese and European-based investigator groups. Any GeoPRISMS studies in New Zealand should build on these substantial existing and ongoing studies. We were pleased to see concrete plans for future experiments develop between the international partners and US investigators during the workshop. Although the science priorities identified at the New Zealand Primary Site are many and varied, we expect that most of these can be realistically accomplished due to the additional resources of the broader, international community that can be brought to bear on these topics.

### Student Participation

20 students from the US, New Zealand, and the United Kingdom participated



Figure 4. Students gathered around Nicola Litchfield and Tim Little at Petone Wharf - Upper Hutt. Major uplift of the Wellington Basin occurred after the 1855 Wairarapa Earthquake.

in the workshop. A student symposium was held the day before the workshop, on the campus of Victoria University in Wellington. A series of talks were given by some of the conveners and other invited scientists to introduce the students to the New Zealand subduction setting and outline the GeoPRISMS scientific goals. The students brought posters on their research which they each presented to the group in two minutes pop-up talks. The student presentations were extremely informative and polished. On the last day of the main workshop awards for poster presentation were given to 6 students (Best Overall Poster & Presentation: Katie Jacobs, Besim Dragovic, Melissa Rotella; Honorable Mention for Verbal

Presentation: Laurel Childress; Honorable Mention for Poster Layout & Visual Aesthetics: James Muirhead, Simon Barker). After the student symposium, Tim Little (Victoria University) and Nicola Litchfield (GNS Science) led an outstanding fieldtrip to see the Wellington Fault (an active dextral strike-slip fault) at various locations throughout the Wellington region.

Overall, the extremely high level of engagement and input at the workshop by the students was impressive. On the final day, the students presented a well-organized implementation plan for the New Zealand Primary Site, which was a valuable guide in the crafting of the final implementation plan.

## The GeoPRISMS Implementation Plan for the New Zealand Primary Site is now available!

The GeoPRISMS Science Plan has been revised based on the outcomes of the GeoPRISMS Workshop on New Zealand, held in Wellington in April 2013.

You can access the New Zealand section of the GeoPRISMS Implementation Plan at:

<http://www.geoprisms.org/past-meetings/newzealand-apr2013.html>

and the entire updated Implementation Plan at:

<http://www.geoprisms.org/science-plan.html>



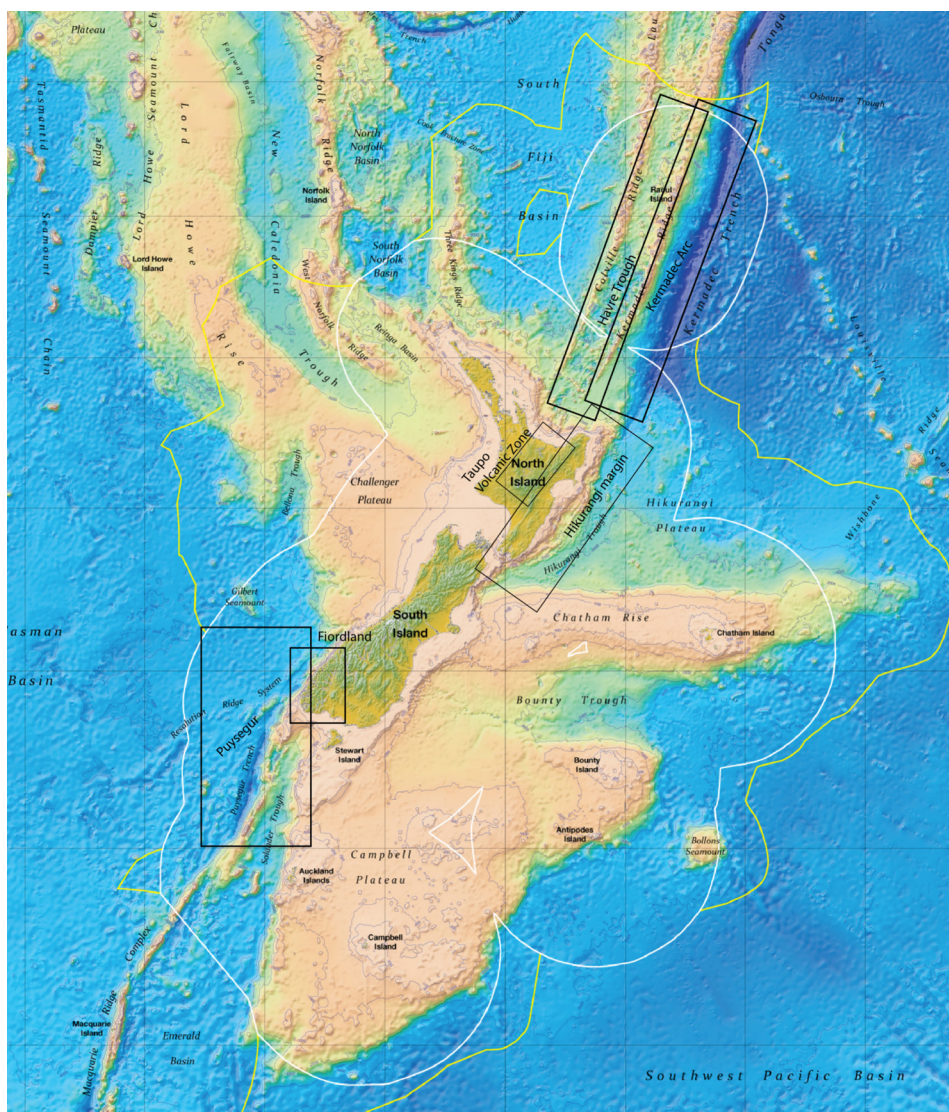


Figure 5. Bathymetry and Topography of the New Zealand region, with major tectonic and geographic features labeled, as well as boxes labeled for the main regions of SCD GeoPRISMS interest selected for focused investigation. Bathymetry from GNS Science.

## Concluding Remarks

We would like to thank the meeting attendees for their enthusiastic participation, which made the workshop a great success. We would also like to thank the speakers for the stimulating and informative talks, and the breakout leaders for their key role in steering discussions. The white paper authors made major contributions by sharing their ideas for future work, which have also provided an important resource for development of the draft implementation plan. The enthusiastic participation of the graduate students and post-docs was extremely impressive, and bodes well for the future of subduction studies in the New Zealand region. The draft implementation plan has been released for public comment, and should be finalized by the end of the year, if not sooner, well in time for the upcoming GeoPRISMS NSF deadline of July 1, 2014. Finally, a successful workshop would not have been possible without generous financial support from NSF/GeoPRISMS, the New Zealand Ministry for Business, Innovation and Employment, the Consortium for Ocean Leadership, GNS Science, and the New Zealand Earthquake Commission.

**Do you want to learn more about the New Zealand Primary Site?  
Join us at the AGU mini-workshop:**

## “Kermadec Arc - Havre Trough Planning Mini-Workshop”

Sunday, December 8, 2013, 8:00 am – 12:00 pm  
Fillmore ABC, Grand Hyatt San Francisco (345 Stockton Street)

**Conveners:** A. Kent<sup>1</sup>, M. Reagan<sup>2</sup>, L. Montési<sup>3</sup>, K. Hoernle<sup>4</sup>

<sup>1</sup>Oregon State University; <sup>2</sup>University of Iowa; <sup>3</sup>University of Maryland; <sup>4</sup>GEOMAR

**Description:** A workshop on coordination and discussion of science goals and marine field locales in the Kermadec Arc-Havre Trough in preparation for the New Zealand Primary Site studies.

For more information visit:

<http://www.geoprisms.org/agu-mini-workshops/kermadec-mini-workshop-agu2013.html>

# ExTerra 2013: Understanding Subduction through the Study of Exhumed Terranes

August 24-25, Florence, Italy

M. Feineman (Pennsylvania State University) & S. Penniston-Dorland (University of Maryland)

On August 24-25, 2013, geoscientists met in Florence, Italy for the ExTerra 2013 workshop prior to the Goldschmidt conference. In all, there were 33 participants from 9 countries, including 11 students, 2 post-docs, and 5 early-career faculty. Workshop participants divided into three groups based on different types of exhumed terranes: subducted slab, mantle wedge, and arc crust. The groups were tasked with refining the key scientific questions previously identified in the ExTerra White Paper (2012) and discussing future directions for ExTerra.

## What is ExTerra?

ExTerra is a group of individuals interested in studying exhumed rocks of ancient subduction zones in order to understand the processes that operate deep within subduction zones. Our ongoing mission is to explore how we can best organize research on exhumed terranes such that we might accomplish more as a group than we can as individuals working indepen-

dently. Three target areas have been identified as significant to improving our understanding active subduction processes by the study of exhumed terranes: 1) Subducted slab, including HP and UHP rocks such as blueschists, eclogites, and metapelites; 2) Mantle wedge, including serpentinites, ophiolites, and peridotites; and 3) Middle and lower arc crust, including granulites, gabbros, migmatites, gneisses, amphibolites, granulites.

## Workshop summary

### Day 1: Science Questions

The first day consisted of a full day of scientific presentations with ten keynote talks followed by an evening poster session. The talks were chosen to emphasize cutting-edge research on the processes and materials found deep within subduction zones and ultimately exhumed at the Earth's surface, and to stimulate discussion of the Big Science Questions that can be addressed using rocks from exhumed terranes. The keynote speakers and topics are listed in the table below.



Figure 1. ExTerra 2013 workshop participants.

### Day 2: Planning for the Future

The second day was focused on the future of ExTerra and included presentations on potential field institute localities and a discussion of sample and data management led by Kerstin Lehnert, Director of Integrated Earth Data Applications (IEDA). The workshop participants then separated into breakout groups by target area to refine the key scientific questions identified in the first ExTerra white paper (2012), and to discuss future directions for ExTerra, including potential field institute localities.

Table 1. List of speakers and presentations

Speaker	Institution	Talk title
<b>Subducted slab</b>		
Ethan Baxter	Boston University	The growth of garnet and the chronology of slab dehydration
Philippe Agard	UPMC (Paris VI)	Into the subduction plate interface?
Horst Marschall	WHOI	The importance of hybrid rocks for transient trace-element and volatile storage at the slab-mantle interface
<b>Mantle wedge</b>		
Peter Kelemen	LDEO - Columbia	Field observations and thoughts about carbon transfer from metasediments into the mantle wedge in oceanic subduction zones
Jaime Barnes	U.T., Austin	Geochemical signature of a serpentinized mantle wedge
Katherine Kelley	URI - GSO	Mantle wedge oxygen fugacity
Sarah Brownlee	Wayne State Univ.	Seismic signatures of a hydrated mantle wedge from antigorite crystal preferred orientation (CPO)
<b>Arc crust</b>		
Mihai Ducea	Univ. of Arizona	A review of some of the most important exhumed crustal sections and xenolith localities from the Americas
Josef Dufek	Georgia Tech	Magmatic connections: The interplay of magmatic systems with their crustal containers
Oliver Jagoutz	MIT	The formation of continental crust: the seismological perspective



## Get involved!

If you are interested in contributing to the discussion or joining the ExTerra mailing list, please contact us at:

mdf12@psu.edu or  
sarahpd@umd.edu

For more information, download the 2012 ExTerra White Paper from:

<http://www.geoprisms.org/scd/externa.html>



Figure 2. ExTerra 2013 workshop participants learn about US examples of exhumed arc crust sections from Mihai Ducea.

## Big Science Questions

Workshop participants continued to explore and refine the Big Science Questions regarding subduction zones that can be addressed through the study of exhumed high- and ultrahigh-pressure rocks and terranes. A few of the many emergent and re-emergent themes include:

- What are the timescales of fluid release and transport in the slab and mantle?
- What is the physical nature of the slab-mantle boundary?
- What is the relative importance of mechanical vs. chemical mixing across the slab interface?
- How are volatiles (including CO<sub>2</sub>, H<sub>2</sub>O, and O<sub>2</sub>) stored and transported in the mantle?
- What is the extent of mass ex-

change between arc magmas and arc crust?

- Is the erupted component at volcanic arcs representative of the stored plutonic component in the middle-to-lower arc crust?
- How different is the bulk composition of continental vs. oceanic arc crust?
- How can we best relate observables from exhumed rocks to seismic observations and geodynamic models?

## ExTerra Field Institutes

One proposed extension of ExTerra in the coming years is a series of field institutes that would gather groups of researchers (~20 participants) at a few world-class exhumed subduction localities with the purpose of exploring

some of the key scientific questions identified in the ExTerra white papers. The field institutes would focus on targeted sample collection, supported by careful sample registration and data management. Institutes might also include field techniques such as LiDAR, handheld XRF, and in situ measurement of physical properties. After an initial time period (~18 months) during which samples would be preferentially accessible to field institute participants for analysis, all samples would be made publicly available for research purposes following a model similar to that employed by the Ocean Drilling Program. Proposed sites for future field institutes include Santa Catalina Island, CA; Santa Lucia Mountains, CA; Fiordlands, New Zealand; Sierra Valle Fertil, Argentina; and Monviso, Italian Alps.

## GeoPRISMS AGU Prize for Outstanding Student Oral and Poster 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, Dec 9-13, 2013. 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.

For more information, please visit:

<http://www.geoprisms.org/agu-student-prize.html>



## GeoPRISMS Steering and Oversight Committee Highlights, Spring 2013

March 28-29, 2013, NSF Headquarters, Arlington, VA

*Edited by Anaïs Férot, GeoPRISMS Science Coordinator & Julia Morgan, GeoPRISMS Chair*

### Introduction

The Spring 2013 GeoPRISMS Steering and Oversight Committee Meeting focused on revisions to the GeoPRISMS Implementation Plan for the East African Rift System (EARS) primary site, plans for the upcoming GeoPRISMS Planning Workshop for the New Zealand Primary Site, finalization of the phased funding models for GeoPRISMS primary sites, and planning for the upcoming AGU Meeting.

### NSF Update

GeoPRISMS Funding and Planning: NSF funding is uncertain, due to the sequester; NSF budget may be reduced 3.5-5%, but some NSF programs could undergo bigger cuts than others. With the ongoing Continuing Resolution, all programs are holding back 20% of FY2012 budget. NSF hopes to have a better idea of the FY14 budget in July or August 2013, and optimistically will get back some of the budget.

The FY2013 GeoPRISMS budget is essentially spent out. The FY2014 budget will be mortgaged by about \$2M; currently there's an existing mortgage of about \$850K. The funding situation is worse than in previous years and NSF will experience lean years in the foreseeable future, which means greater scrutiny of budgets, tougher competition for funds, fewer planning workshops, and less travel, including for NSF staff. Virtual workshops and meetings are encouraged.

The Phased Funding Model for the GeoPRISMS Program has been implemented by NSF in time for the July, 1 2013 GeoPRISMS solicitation. The revised solicitation will provide advice to proponents for submitting large field data acquisition proposals (>1M\$), defining "windows of opportunity"

for such large experiments to limit the number of expensive projects funded at one time. This funding model encourages self-organization of the PIs and advance coordination through community discussions. Preparatory work, data analysis, data synthesis and thematic studies will continue to be considered for all sites each year. The windows of opportunity for large field data acquisition experiments are defined by site and can be found online. NSF personnel offered that the plan will be flexible when necessary, e.g., to take advantage of unique opportunities, and the model can be revised over time.

Now that the planning workshops are complete, GeoPRISMS can begin organizing Science workshops, critical to maintaining and engaging the broader GeoPRISMS community. Community coordination of research efforts can take place in smaller venues, e.g., at AGU. NSF can provide technical assistance organizing virtual meetings and webinars if that would be helpful.

### *Update from the EAR Division*

Wendy Harrison, the new EAR Division Director, highlighted the importance of the phased funding model in these lean budget times. Expected cuts will affect new awards, but will not be taken out of existing awards. The approach of focusing and organizing community effort is really important when budgets are tight. GeoPRISMS and the GSOC can help by making sure that the science is excellent and visible, and by reaching out to the community. Harrison emphasized her desire to continue to increase the EAR contribution to GeoPRISMS, but the ongoing budget crunch makes this

impossible to guarantee.

Harrison also provided a brief update on EarthScope, noting the increasing collaborations with GeoPRISMS. NSF addressed a mandate from the Office of Management and Budget to retain some TA stations in the Eastern and Central US as part of a permanent monitoring network. These stations will have to be replaced when the TA is deployed to Alaska. EAR and EarthScope are keen to engage a broader community of science when the TA moves to Alaska, to more fully leverage additional interest in the remote station locations. Sites will be of interest to the Arctic Program, and Atmospheric Science. Strong communication between EarthScope and GeoPRISMS will be very important.

### GeoPRISMS Planning Meetings and Outcomes

#### *EARS Implementation Plan*

The updated Implementation Plan (IP) for the East African Rift System (EARS) Primary Site has been completed, following the workshop held in New Jersey in October 2012. The draft of the IP was distributed to the community in March 2013. The IP outlines how to best address the key questions in the Science Plan in the areas identified by the community:

- The Eastern Rift is identified as the primary focus area (from Turkana to the Tanzanian Divergence), where most of research efforts funded by GeoPRISMS are expected to take place.
- "Collaborative Targets of Opportunity" recognize ongoing efforts by US and international researchers, which can be leveraged to address GeoPRISMS

science questions. Key areas include the Afar, the Western Rift, and the SW Branch.

- Potential synoptic investigations are identified across the entire rift. These are not to build a “backbone” experiment but rather to fill in gaps in current coverage (e.g., geophysical, geochemical, and climatological) and to encourage efforts to synthesize existing data.
- The EARS IP can be used as guidance for proponents to seek GeoPRISMS funding as well as other sources of funding through other programs like SEES and IES.

The IP for EARS does not include detailed descriptions of ongoing or planned projects, but the community is encouraged to contribute brief synopses of past or ongoing efforts to the GeoPRISMS website, to inform other investigators about existing data and leveraging opportunities. Synopses should provide links to project websites giving up-to-date details, and include contact information.

An important follow-up to the EARS planning workshop will be for GeoPRISMS representatives to attend a meeting in Africa to share the IP with African scientists and help develop collaborations with US scientists – maybe during the year before the window of opportunity opens for large experiments.

Substantial credit was given to the students at the workshop, who developed a rigorous and systematic methodology to identify the target area for GeoPRISMS focus that best addressed most of the questions of the science plan. The workshop-wide vote pretty much agreed with the matrix prepared by the students. The conveners of the meeting were keen to emphasize the students’ contributions to this process of site selection, demonstrating that they are an integral part of the GeoPRISMS community.

### *GeoPRISMS Planning Workshop for New Zealand Primary Site*

The GeoPRISMS Planning Workshop for the New Zealand Primary Site will be held in Wellington, New-Zealand, April 15-17, 2013, sponsored jointly by NSF GeoPRISMS, the New Zealand Ministry of Business and Employment, the Consortium for Ocean Leadership, GNS Science, and the New Zealand Earthquake Commission. Out of 220 applicants, ~150 participants from the US, Europe and Asia will attend. A key outcome will be a portfolio of potential studies, and how best GeoPRISMS can contribute. A student symposium will be organized the day before the workshop, followed by an afternoon field trip to the Wellington Fault. [A report on the New Zealand Planning Workshop is on page 5 of this issue.]

### **Other Meetings and Mini-Workshop Summaries and Plans**

#### *ExTerra @ Goldschmidt – August 2013*

GeoPRISMS will co-sponsor a mini-workshop in association with the Goldschmidt Conference, ExTerra 2013: Understanding Subduction through Studies of Exhumed Terranes, on August 24-25, in Florence, Italy. The meeting will focus on the study of subduction-related metamorphic and igneous rocks, to identify a common set of scientific targets and centralized tools to move the discipline and community forward. [A report on the ExTerra Workshop is on page 10 of this issue.]

#### *Cascadia Marine Geophysics*

About 40 scientists attended this mini-workshop, held the day before AGU att. The objectives of this meeting were to review the ongoing projects, coordinate efforts and plan future marine work in the Cascadia primary site, following the acquisition of several large-scale onshore-offshore geophysical data sets in 2012. Major projects, NSF proposal opportunities,

and short contributions “from the floor” were presented to the audience before opening the discussion among the participants.

#### *IODP in SCD Studies*

About 25 scientists attended the IODP Opportunities in GeoPRISMS Subduction Studies mini-workshop on Thursday evening. The main objective of this workshop was to stimulate scientists’ interest to write drilling proposals for the Aleutians, Cascadia and Hikurangi Margins, in a way to best address the key questions of the SCD section of the GeoPRISMS Science Plan. A series of short talks reviewed the different aspect of the SCD initiative as well as potential drilling targets. [A report of the IODP mini-workshop is available in the Spring 2013 GeoPRISMS newsletter.]

#### *Early Career Investigators Luncheon*

GeoPRISMS sponsored jointly with EarthScope, an Early Career Investigators (ECIs) Luncheon organized by the IRIS ECI working group, and attended by about 60 graduate students, postdoc fellows and early career scientists. The luncheon was designed to discuss research interests and explore potential collaborations based on shared GeoPRISMS and EarthScope focus sites and initiatives, and for ECIs to network. Breakout sessions on primary sites-related topics were led by senior scientists. [A report of the ECI Luncheon is available in the Spring 2013 issue of the GeoPRISMS newsletter.]

#### *Chikyu+10*

Susan Schwartz, serving on the Chikyu+10 steering committee, provided a brief update on this meeting, to be held in Tokyo, Japan on April 22-24, 2013. Five themes to be discussed at the meeting are of direct interest to GeoPRISMS: active faults, continent formation, and sediments secrets. Keynote talks will

be focused on the last ten years of drilling and the science objectives for the next years.

#### *Ocean Bottom Seismograph Workshop*

This workshop, to be held in Redondo Beach, CA, Oct 21-22, 2013, will focus on achievements and needs relating to OBS studies. GeoPRISMS may sponsor a mini-workshop on the OBS activities in Cascadia and the future of the amphibious array.

### **Community-Based Research Programs**

#### *COAST Survey*

Harold Tobin reported on the R/V Marcus G. Langseth cruise MGL1212 COAST (Cascadia Open-Access Seismic Transect), a 2D seismic survey carried out in July 2012 off the coast of Central Washington. The PIs were Steve Holbrook (Univ. Wyoming), Graham Kent (Univ. Nevada) and Katie Keranen (Univ. Oklahoma). A project goal was to build the science community with skills and interests in carrying out marine multi-channel seismic (MCS) field programs. The science party was selected by open application; 13 graduate students, 2 post-docs and 2 faculty were selected out of 60 applicants. About half of the participants had never been aboard a research vessel or participated in a marine seismic reflection survey. Excellent quality multichannel seismic data, as well as gravity, magnetic and multibeam bathymetry data, were acquired to characterize the potentially tsunamigenic and seismogenic plate boundary. These data were made available on the LDEO website within 2 months post-expedition, and were the subject of several AGU presentations in 2012. Proposals are being submitted to work with the data.

#### *ENAM Community Seismic Experiment*

The community proposal for an ENAM community seismic experiment was submitted in July 2012, for data

acquisition and training workshops on MCS processing and active source OBS work. There is interest in expanding the survey with industry support, but no guarantee.

#### *Cascadia Initiative*

Susan Schwartz presented an update of the Cascadia Initiative activities. Year 2 expeditions have been completed, recovering OBSs from Cascadia year 1 deployments in the northern area, and deploying in the southern area. Several proposals have been submitted to NSF to work with the year 1 data. Planning for year 3 is underway, and an open call for participation will be issued on the GeoPRISMS website for graduate students and early-career scientists. NSF has asked the CIET to submit a proposal to fund the 4th year Cascadia acquisition. Further community discussions will take place at upcoming meetings about the year 4 deployment and proposal plans.

#### *Future of the Amphibious Array*

Geoff Abers reported on the planned discussion to be held during the EarthScope National Meeting in May 2013 in Raleigh, NC, to advertise the Cascadia Initiative and discuss possible plans for the amphibious array. A one day workshop might be organized with the OBSIP Workshop to be held in California in October 2013. These forums would provide opportunities to bring the community together to discuss the first 2 years of the Cascadia Initiative, to assess data quality and any associated problems, and to discuss the future of the Amphibious Array Facility. A community workshop is still needed in ~2014 to plan the future of the amphibious array.

Alaska Community Expedition: GeoPRISMS work in Alaska and the Aleutian arc presents logistical challenges due to the remote locations and limited time window for field work, so advance coordination is

critical. PI cooperation and resource sharing can reduce the costs of field operations for all. NSF and members of the community are exploring the concept of a community expedition in the Aleutian arc, in which a ship will transit along the Aleutian arc over a two-year time span. Ship availability and timing would be announced in advance to allow members of the community to write proposals to take advantage of the ship, and to coordinate their efforts. [See page 16 of this issue to sign up for the related AGU mini-workshop.]

### **GeoPRISMS Data Portal Update**

Andrew Goodwillie provided an update of the GeoPRISMS Data Portal and recent improvements in capabilities. Users can now narrow their search by primary site, type of data, etc. An interactive map provides links with details on the data. GeoMapApp is updated every 6 months, with the addition of new data, bibliographic references, and much more. [A report on the GeoPRISMS Data Portal is on page 17 of this issue.]

### **Education & Outreach Updates**

#### *MARGINS Mini-Lesson Project*

The NSF TUES project to develop new MARGINS Mini-Lessons was funded in September 2012. The project aim is to synthesize and incorporate MARGINS research of the last decade into upper level undergraduate geoscience curricula, and to show how MARGINS science has changed our understanding of continental margins. The project launched in February with a series of webinars offering the highlights of the four initiatives. [A report on the MARGINS Mini-Lesson project is on page 19 of this issue.]

#### *AGU Student Prize*

GeoPRISMS awarded two \$500 prizes for the Outstanding Student Oral and Poster Presentations on GeoPRISMS



or MARGINS-related science at AGU Fall Meeting. The office received 35 applications for poster and 15 for oral presentations this year. Maryjo Brounce (University of Rhode Island) and Samer Naif (UC San Diego) received the oral and poster presentations respectively. Erin DiMaggio (Arizona State University), Kristina Walowski (University of Oregon), Brad Pitcher (Oregon State University) and D. Sarah Stamps (Purdue University) were rewarded for their work with an honorable mention. *[Biographies of the prize winners and honorable mentions can be found in the Spring 2013 issue.]*

#### *Distinguished Lectureship Program*

The Distinguished Lectureship Program (DLP) continues to be very popular, with 53 applications received for the 2012-2013 season, 7 from new schools. Of these, 34 institutions are scheduled to receive speakers for the 2013-2014 academic year. The GeoPRISMS Office is creating a DLP library to share with the community by collecting speakers' presentations from hosts and speakers. Several DLP speakers have visited museums for public lectures, which is strongly encouraged.

#### **Social Media**

GeoPRISMS has a Facebook page to promote GeoPRISMS activities and opportunities, and a Twitter feed. Like us on Facebook to keep up with the latest goings on with the program, including DLP activity, AGU plans, upcoming workshops, and GeoPRISMS related science.

#### **Initiative Updates & New Projects (GeoPRISMS & Related)**

New and ongoing RIE Initiative projects include:

- Matt Pritchard, James Gaherty, and Donna Shillington continue a GeoPRISMS-funded project on early-stage rifting in Northern

Malawi, after the December 2009 swarm of earthquakes. A related continental dynamics project in the area is building, a network of 6 GPS stations around the Lake Malawi to record opening rates across a couple of segments in the rift. Rob Evans and colleagues (Canales, Atekwana) collected MT data in Botswana and Zambia. Next June they will conduct seismic work in the Okavango Delta to relate the displacements to the early stage of rift propagation to the south.

- Elizabeth Johnson and Esteban Gazel have been funded to work on Cenozoic basalts in Eastern North American Margin (ENAM). Combining geochemical, spectroscopic, and petrologic observations and modeling, their study will constrain the structure and the evolution of the mantle lithosphere.

- Also relating to ENAM, but funded by EarthScope, Maureen Long and Maggie Benoit and others will carry out a passive seismic study from Virginia to Ohio, providing an integrated view of the dynamics from the mantle to the surface. The EarthScope funded SESAME project (Pls Wagner, Fischer, Forsyth, Hawman) also lies in an area of interest to GeoPRISMS.

New and ongoing SCD Initiative projects include:

- Building on a previous study, David Chadwell has been funded to install two more seafloor geodetic stations (for a total of three) along the Cascadia subduction zone, to understand megathrust slip behavior.
- Paul Johnson, Evan Solomon, and Robert Harris will work on the thermal structure of the Cascadia Subduction Zone in the Gray's Harbor area, to refine models

for the locked portion of the megathrust fault.

- Yang Shen and Haiying Gao are developing a velocity model of the Cascadia subduction zone using OBS data, and will do full-wave ambient noise tomography and receiver function analysis.

- Work on the iMUSH project to study the architecture of the magmatic system beneath Mount St Helens will begin in summer of 2014, involving Ken Creager, Heidi Houston, John Vidale, Alan Levander, Adam Schultz, Paul Bedrosian, and Geoff Abers.

- Adam Kent, Robert Duncan, and Anita Grunder are studying the explosive volcanic history of the Central Oregon Cascades to probe the changing state of the Neogene Cascade Arc.

- Doug Wiens and Dan Lizarralde completed a collaborative study of mantle serpentinization to assess the water budget through the Mariana Trench.

- Brian Jicha, and Sue Kay are carrying out on  $^{40}\text{Ar}/^{39}\text{Ar}$  and U/Pb geochronology, and geochemical and isotopic analyses, to characterize the earliest stages of the Aleutian Arc.

- Peter Kelemen is investigating plutonic rocks in the intra-oceanic Aleutian Arc.

- Peter van Keken, Bradley Hacker and Geoff Abers are funded to study dehydration in the mantle wedge correlated with Vp/Vs ratio in Cascadia and Alaska.

- Taryn Lopez is funded to conduct a geochemical study on the source, flux, migration and seismic signature of volcanic fluids of the Katmai Volcanic Cluster – Alaska.

Ongoing S2S and related projects:

- Neal Blair is studying the carbon cycle of subduction margins

(Hikurangi, South Alaska and Cascadia), to determine the nature of organic Carbon transported to the trench.

- Kyle Straub and Ben Sheets are reconstructing ancient passive margin dynamics by relating geomorphic and stratigraphic surfaces using combined laboratory and field studies.

### Partner Organization Updates

#### *Community Surface Dynamics Modeling System (CSDMS)*

GeoPRISMS has recently partnered with the CSDMS Program to co-sponsor a Geodynamics Focus Research Group (FRG), co-chaired by Phaedra Upton and Mark Behn. They are seeking community input to prepare a 5-year plan or this FRG. An AGU session on surface-geodynamic feedbacks, along with a GeoPRISMS mini-workshop, will provide opportunities for community input to define the directions of this cooperation.

#### *EarthScope*

EarthScope's US Array facility is moving to the East Coast. A variety of GeoPRISMS-related FlexArray experiments are underway. There will be discussions of interest to GeoPRISMS

at the next EarthScope National Meeting (ESNM) in May 2013, including an ENAM breakout session before the ESNM, and a pre-meeting workshop to discuss the next MT-TA footprint.

#### *IODP*

Tom Janacek provided an update about the International Ocean Discovery Program (IODP), which has been renewed, at least for the short term. Platform ship tracks are being planned in advance for more efficient scheduling. NSF ODP funding for basic research, including site surveys for future drilling, is currently only ~\$1-2 M, extremely low, due in part to the high costs of maintaining the facilities, among other reasons. The new IODP framework has changed, including:

- The three platforms (Chikyu, JOIDES Resolution, and Mission-Specific platforms) are now funded independently, and overseen by independent facility boards, which will schedule their use. Berthing exchange arrangements will continue, enabling international participation.
- The Advisory Panels still exist, and will be available for all platform providers if they care to use them. These include: proposal evaluation

panel, site characterization panel, and safety and environmental protection panel.

- A small support office will take care of proposal processing, provide logistics support for the panels and the website. The office will start to run by mid-September.
- A new international IODP Forum, chaired by Keir Becker, will provide guidance to the platform providers. The new forum will have no fiscal authority.

### GeoPRISMS Office Activities & Updates

The GeoPRISMS Office is closing out the EARS workshop, while also organizing the next planning workshop in New Zealand. Ongoing activities include website and listserv announcements, fielding applications for upcoming workshops and other events, building a presence on Facebook to inform about GeoPRISMS-related activities, and setting up webpages and application forms for upcoming activities and meetings. The Rice GeoPRISMS Office is preparing for the office transition, and helping with post-transition activities while the new GeoPRISMS Office at the University of Michigan, directed by Peter van Keken, gets up and running.

### Interested in doing field work in Alaska? Join us at the

### ***“Workshop on Field Logistics for GeoPRISMS Research in the Aleutian Arc”***

Sunday, December 8, 2013, 12:40 am – 6:00 pm  
Fillmore ABC, Grand Hyatt San Francisco (345 Stockton Street)

**Conveners:** P. Kelemen<sup>1</sup>, G. Abers<sup>1</sup>, J. Freymueller<sup>2</sup>, P. Haeussler<sup>3</sup>, W.S. Holbrook<sup>4</sup>, B. Jicha<sup>5</sup>, J. Power<sup>3</sup>, G. Yogodzinski<sup>6</sup>

<sup>1</sup>LDEO; <sup>2</sup>University of Alaska, Fairbanks; <sup>3</sup>USGS; <sup>4</sup>University of Wyoming; <sup>5</sup>Univ. Wisconsin; <sup>6</sup>Univ South Carolina

**Description:** Advance coordination of shared logistical resources for field work in the oceanic Aleutian Arc, including an assessment of available resources and community interest in use of shared facilities.

For more information visit:

**<http://www.geoprisms.org/agu-mini-workshops/aleutian-agu2013.html>**

# GeoPRISMS Data Portal Status Report: October 2013

Andrew Goodwillie and the IEDA Database Team, Lamont-Doherty Earth Observatory, Columbia University

The GeoPRISMS data portal ([www.marine-geo.org/portals/geoprisms](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 useful data resources.

Since the last newsletter report, the database group presented at the spring GeoPRISMS Steering and Oversight Committee meeting; had discussions with PIs about data products to be generated with their NSF awards; and, expanded the on-line GeoPRISMS bibliography to offer more than 700 citations, many linked to data. In GeoMapApp, EarthScope USArray station tables and EarthChem geochemistry analytical data sets were updated. And, as part of a summer series of in-depth GeoMapApp webinars recorded and placed on [YouTube](#), one webinar showcased data sets and functionality relevant to the GeoPRISMS community.

Highlighted below are some recent contributions of field program information and data sets of interest to the GeoPRISMS community.

## Cascadia

Cascadia Initiative Year 3 OBS operations saw six OBS cruises take place between spring and autumn: three for recoveries followed by three for deployments. As in previous field seasons, the OBSs included shallow-water instruments designed to withstand

fishing net trawls. Year 3 OBSs are expected to be picked up next year. Field program information and links to data for each Cascadia Initiative cruise are available via the GeoPRISMS data portal. Map-based OBS station information can be found in the GeoMapApp Focus Site menu as shown below.

There was continued focus on a bathymetric compilation for Cascadia. Version 2.5 of the Global Multi-Resolution Topography (GMRT) synthesis is used as the base map in GeoMapApp and incorporates cleaned sonar data from an additional 5 Cascadia cruises, including AT26-04, the summer 2013 Atlantis heat flux cruise run by Paul Johnson, Evan Solomon and Rob Harris.

Basic project outlines were also added to the portal for three other Cascadia projects: the summer 2012 Washington and Oregon onshore seismometer deployments of Anne Trehu and Geoff Abers in which airguns fired during R/V Langseth's offshore seismic work (cruises MGL1211 and MGL1212) were recorded; and, lead PI Ken Creager's inter-disciplinary, multi-institution iMUSH (Imaging Magma Under St. Helens) program.

## ENAM

Conjugate to the Newfoundland margin, the West Iberia-Galicia margin was the site of a large-scale 3-D seismic survey during summer 2013.

A two-ship experiment led by Dale Sawyer, Donna Shillington, Tim Reston, Cesar Ranero, Milena Marjanovic and Juli Morgan, cruise MGL1307 collected high-quality multi-channel and OBS data to study this magma-starved passive rifted margin (Fig. 2).

## GeoPRISMS Data Portal Tools and Resources

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

**Data Management Plan tool** ([www.iedadata.org/compliance](http://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** ([www.marine-geo.org/portals/geoprisms/references.php](http://www.marine-geo.org/portals/geoprisms/references.php)) With more than 700 citations, many tied to data sets, the references can be searched by primary site, paper title, author, year, and journal. The lists of publications can be exported to EndNote™. Submit your papers – just the DOI is needed – for inclusion in the bibliography!

**GeoMapApp** ([www.geomapapp.org](http://www.geomapapp.org)) is a free map-based data exploration and visualization tool. Enhancements in version 3.3.8 include an improved interface for the PetDB portal, a more robust profiling tool, updates to support the import of data sets served via OGC WMS version 2, and an updated toolbar. Version 2.5 of the multi-res-

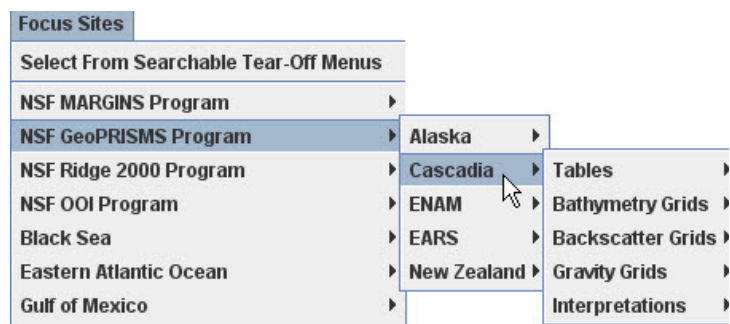


Figure 1. In GeoMapApp, GeoPRISMS Focus Site menus provide access to a range of data and instrument station information for each primary site.



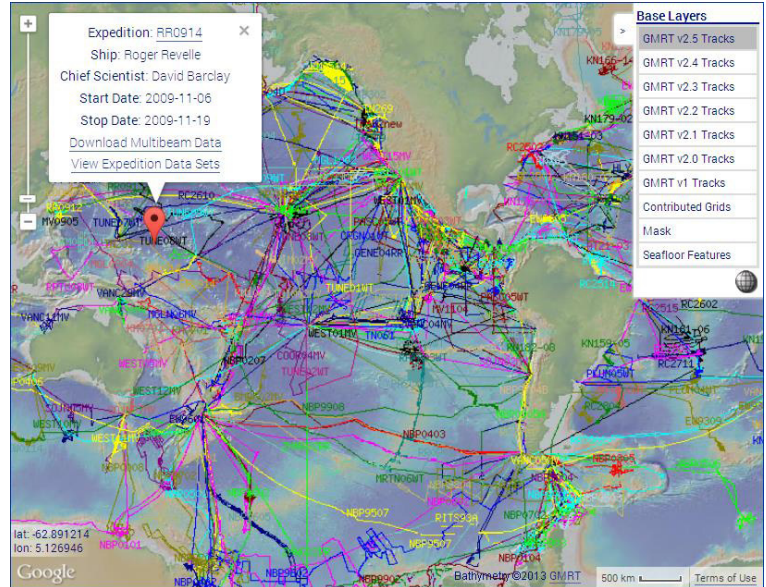
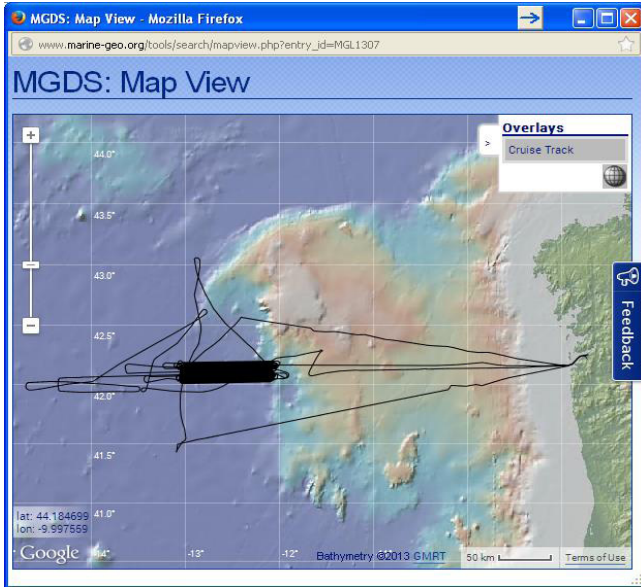


Figure 2. From this GeoPRISMS data portal image, the MGL1307 ship track off the west coast of Spain and Portugal is overlain on the GMRT bathymetry compilation. The dense block of E-W-trending tracks shows the location of the focused 3-D seismic survey. Figure 3. Multibeam sonar ship tracks used in the GMRT bathymetry compilation can be displayed for each GMRT release. When a track line is clicked, the attribution window that pops up provides links to the cruise web page and data sets, including the individual swath ping files.

olution base map contains additional swath bathymetry for Cascadia and other areas. The GMRT portal map browser now allows users to explore the growth of the GMRT bathymetry synthesis with each new release by toggling track lines for each GMRT version, as shown below.

A webinar held this past July focused on GeoPRISMS data sets and is avail-

able on the [YouTube](#) GeoMapApp channel. It shows how to generate custom maps, explore built-in data sets and import your own data.

**Contribute Data** This updated web tool (<http://www.marine-geo.org/contribute.php>) provides a simple way to submit grid files, tabular data sets, spreadsheets, and shapefiles. Once added to the GeoPRISMS database,

these data sets become available to the broader community immediately or can be placed on restricted hold.

**GeoPRISMS MediaBank** (media.marine-geo.org) Please send compelling images, including photos from your field expeditions, for inclusion in the gallery!

## GeoPRISMS Data Portal

[www.marine-geo.org/portals/geoprisms](http://www.marine-geo.org/portals/geoprisms)

Visit the GeoPRISMS data portal to find information for each primary site:

- Pre-existing data sets and field programs
- Data sets ready for download
- Links to partner programs and resources
- References database with papers tied to data

GeoPRISMS references database of relevant publications is now available:

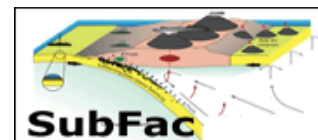
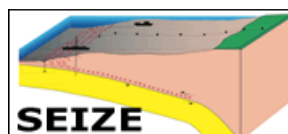
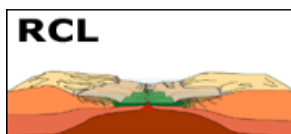
[www.marine-geo.org/portals/geoprisms/references.php](http://www.marine-geo.org/portals/geoprisms/references.php)

The GeoPRISMS data portal team is here to serve the community. To submit missing data sets, field programs or publications to the GeoPRISMS portal, contact

[info@marine-geo.org](mailto:info@marine-geo.org)

# Bringing NSF MARGINS/GeoPRISMS Continental Margins Research Into the Undergraduate Curriculum

*Julia Morgan, Outgoing GeoPRISMS Chair (Rice University), and Members of GeoPRISMS Education Advisory Committee*



The new MARGINS mini-lesson project, funded by the NSF TUES Program (Division of Undergraduate Education) in 2012, is now well underway, and we provide a brief update on the program activities, plans for the future, and opportunities for other educators to contribute to this effort. This project is designed to develop the next generation of data based mini-lessons, integrating a decade of successful MARGINS research into the upper level undergraduate geoscience curriculum. The project brings together members of the GeoPRISMS Education Advisory Committee (GEAC), prominent scientists from the MARGINS and GeoPRISMS community, as well as curriculum experts from On the Cutting Edge, a community of geoscience faculty dedicated to improving teaching and student learning (Fig. 1). This integration of leading scientists and curriculum experts will produce high quality science curricula informed by current educational research and practices.



*Figure 1. MARGINS Mini-Lesson Team Members. From left to right: Bob Stern, August Costa, Cathy Manduca, Steve Kuehl, Casey Moore, Kristin O'Connell, Dave Pearson, Jen Beck, Sarah Penniston-Dorland, Lonnie Leithold, Adam Hoffman, Kathy Surpless, Juli Morgan, Lisa Lamb, Sue Cashman, Ellen Iverson, Andy Goodliffe, Eliza Richardson, Jack Loveless, Anaïs Férot, Scott Bennett, Susi Haveman, Jeff Marshall, Chris Kincaid.*

The project launched in early Spring 2013, with a stimulating webinar series reviewing the highlights of the four MARGINS Initiatives (Box 1). The webinars, designed primarily to bring the curriculum team members up to speed on MARGINS science, were also

announced through the GeoPRISMS and SERC listservs, and attended by other members of the community, including quite a few undergraduate and graduate students. These webinars are available to the public, and provide a fantastic archive of more than a decade of exciting science.

Following this webinar series, the initiative teams participated in a virtual workshop during which the teams scoped out the mini-lessons they would develop, and outlined the assessment plans for each mini-lesson. The mini-lesson authors then, in collaboration with other team members, dove into the tasks of preparing the mini-lessons, supported by strong intra-team communications and project-wide report-outs.

## MARGINS Highlights Webinars (<http://www.geoprisms.org/mini-lessons.html>)

February 28, 2013 - REBECCA J. DORSEY (University of Oregon),  
*A Decade of Research Findings about Rupturing Continental Lithosphere (RCL)*

March 4, 2013 - LONNIE LEITHOLD (North Carolina State University),  
*A Decade of Research Findings about Source to Sink Research (S2S)*

March 5, 2013 - J. CASEY MOORE (University California, Santa Cruz),  
*A Decade of Research Findings about the Seismogenic Zone Experiment (SEIZE)*

March 13, 2013 - ROBERT J. STERN (University of Texas at Dallas),  
*A Decade of Research Findings about Subduction Factory Studies (SubFac)*



Our first in-person workshop was held September 17-19, 2013, at Carleton College, Northfield, MN, providing an important opportunity for the teams to align and refine their mini-lesson plans, and to test some ideas out on their colleagues in real-time (Figure 2). This gathering also revealed the importance of defining overarching frameworks for all of the mini-lessons under each initiative, clarifying how the proposed mini-lessons tie together. Further discussions took place about the importance and methods of incorporating student assessment as part of pedagogy, ensuring that instructors can evaluate student comprehension and progress in real time. Plans were outlined for field testing each mini-lesson within multiple course frameworks, with the expectation that mini-lesson authors and other volunteers will be able to implement these lessons in Spring 2014, and provide feedback on the successes, issues, and other lessons learned. (If you would like to help field test the mini-lessons, see box below.)

The last phase of the mini-lesson development project, following review and evaluation of the field-testing results,



Figure 3. The newly discovered geologic process of "Zebraduction", to be described in future MARGINS mini-lessons. (Graphic prepared by August Costa, GeoPRISMS Office, based on creative group interpretations.)



Figure 2. Class demonstrations at Carleton Workshop. Left: Luggage devolatilization and phase transitions. Right: Quantifying heat flux.



will entail refining the mini-lessons, and infilling with new material as necessary, based on student and instructor feedback. This effort is expected to take place during the summer of 2014, culminating in a second face-to-face workshop of the mini-lesson development teams in Fall 2014, to finalize the mini-lessons and prepare them for public dissemination. The field testing component is intended to provide quantitative assessment data to inform mini-lesson finalization.

The final mini-lesson products will consist of coordinated course materials tied to individual MARGINS initiatives that can be incorporated into multiple course frameworks, and have undergone rigorous testing and assessment. We envision broad distribution and publication of these products in geo-

science and education journals and meeting presentations. These materials will provide scientists a powerful means for communicating the interdisciplinary breadth of MARGINS science, increasing the impact of MARGINS research while creating a portable curricular resource to educate and engage geoscience students across a range of courses and institutions.

#### MARGINS TUES Project Leads

Julia Morgan, GeoPRISMS Chair  
(Rice University)

Andrew Goodliffe  
(University of Alabama)

Jeff Marshall  
(Cal Poly Pomona)

Ellen Iverson and Cathy Manduca  
(SERC, Carleton College)

Jennifer Beck  
(EvalArts Consulting)

### Can you help field-test a MARGINS Mini-Lesson?

The Project Team is seeking volunteers interested and able to field test one or more of the new MARGINS mini-lessons in undergraduate classes this coming Spring 2014. If you will be teaching a course appropriate for this material, and would like to contribute to this effort, please contact Juli Morgan ([morganj@rice.edu](mailto:morganj@rice.edu)) for more information.

More information about the MARGINS Mini-Lesson Project is at

<http://serc.carleton.edu/margins>



## GeoPRISMS Sponsored & Related Sessions at the 2013 AGU Fall meeting

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 for the GeoPRISMS community. For more information, visit the GeoPRISMS website <http://www.geoprisms.org/agu-sessions.html>. Please refer to the AGU meeting program to confirm date and time of the sessions (<http://fallmeeting.agu.org/2013/scientific-program>).

Compiled by the GeoPRISMS Office

### **EP33B, EP43A, EP44A: Exploring the interplay between solid Earth tectonics and surface processes from mountains to the sea**

*Conveners:* P. Upton, M. Behn, J. Jaeger

Wednesday Dec 11 & Thursday Dec 12

*Description:* Understanding the feedbacks between tectonics, surface processes and landscape evolution requires integrating observations and processes across a wide range of scales. The Earth's surface is a complex and dynamic system responding to tectonic and geomorphic drivers whose influence varies over several orders of magnitude. Surface processes can in turn influence fault evolution, uplift/subsidence patterns and surface heat flow that feeds back on topography that can drive geomorphic agents. This session sets out to explore current research into coupled problems of geomorphology, surface processes and geodynamics. We welcome contributions utilizing field, experimental and numerical approaches.

### **DI23B, DI24A, DI33A: Geophysical Observations and Models of Subduction**

*Conveners:* M. Jadamec, E. Syracuse, P. van Keken

Tuesday Dec 10 & Wednesday Dec 11

*Description:* This session frames subduction through the combined lens of seismology and geodynamics. For example, seismic anisotropy and 3D geodynamic modeling indicate complex subslab and mantle wedge flow. What controls the spatial extent and magnitude of this complex flow? What are the seismic constraints on the nature of the mantle wedge? What can the seismic structure of the slab and mantle wedge reveal about the release of volatiles from the slab crust and mantle? How do these aid in wedge weakening and melting, and what is the interplay with strain-rate induced weakening? We welcome contributions from all disciplines that can constrain the seismic observations and geodynamic models of subduction.

### **OS12B, OS13B: Frontier Science from Extended Continental Shelf Studies**

*Conveners:* D. Hutchinson, M. Bohan, G. Barth

Monday Dec 9

*Description:* Coastal nations have spent considerable resources exploring the limits of their extended continental shelf (ECS) beyond 200 nm. Although these studies are funded to fulfill requirements of the UN Convention on the Law of the Sea, the investments are producing new data sets in frontier areas of Earth that will

be used to understand, explore, and manage the world's seafloor and sub-seafloor for decades to come. Field work includes multibeam, seismic reflection/refraction, bottom sampling, and geophysical data. Physical oceanographic, ocean acidification, meteorological, and marine mammal observations are often acquired simultaneously. We invite papers that highlight the many scientific achievements arising from ECS explorations.

### **S11C, S12A, S21C: Understanding the Cascadia Subduction Zone: Contributions from the Cascadia Initiative and Multidisciplinary Studies**

*Conveners:* H. Gao, P. Wallace, R. Allen, E. Hooft

Monday Dec 9 & Tuesday Dec 10

*Description:* The Cascadia Initiative (CI) is an onshore/offshore seismic and geodetic experiment that takes advantage of an Amphibious Array to study topics ranging from megathrust earthquakes to volcanic arc structure to the formation, deformation and hydration of the Juan de Fuca and Gorda plates. The CI is enabling continued monitoring of seismicity, episodic slip, and non-volcanic tremor along the subduction zone; imaging of the physical properties of the megathrust zone and forearc; and studies of the Juan de Fuca and Gorda plates as they move from ridge to trench. We invite contributions that analyze data from the CI and related active source experiments to increase our understanding of the Cascadia subduction zone.

### **T11F, T12B, T13G, T14A, T21A, T21B: Continental Rifts and Rifted Margins**

*Conveners:* S. Gao, E. Atekwana, J. van Wijk, T. Rooney

Monday Dec 9 & Tuesday Dec 10

*Description:* Mechanisms of rift opening are preserved in continental rift zones, while rifted margins provide insights into the transition to seafloor spreading and post-breakup margin evolution. This session focuses on all phases and timescales of the rifting cycle; from earthquakes, eruptions, and intrusions in rifts to the structure of rifted margins. Since rift opening is seldom orthogonal, transtensional (pull apart) basins and sheared and transform margins form an integral part of the rift suite. We invite presentations that seek to investigate rifting and the transition to seafloor spreading with observations and modeling. Insights from orthogonal, oblique and sheared rift structures,

continental rifts, failed rift arms, and rifted margins are welcomed.

### **T22C, T23D: Investigating marine records of climate-tectonic interactions in active orogens: southern Alaska and other convergent margins**

*Conveners:* L. Worthington, R. Reece, K. Ridgway

Tuesday Dec 10

*Description:* We seek contributions addressing climate-tectonic interactions along convergent margins that focus on sediment transport, structural and stratigraphic evolution, and the effect of glacial advance-retreat cycles on margin architecture and development. One theme will be the effect of climate-driven surface processes on the architectural evolution of the coastal St. Elias Mountains in southern Alaska and the sedimentary record within the Gulf of Alaska, with an emphasis on results from recent ocean drilling. We encourage contributions focusing on this and other margins as the session will provide the opportunity to discuss these processes within a global context.

### **T31F, T31G, T33F, T34C, T41F. Recent IODP Investigations of Circum-Pacific Subduction Zones**

*Conveners:* M. Ikari, D. Sawyer, H. Daigle, E. Screaton, B. Dugan, G. Moore, R. Harris, A. Sakaguchi, F. Chester, E. Brodsky, J. Mori

Wednesday Dec 11 & Thursday Dec 12

*Description:* IODP expeditions over the past few years have studied subduction zone processes at multiple convergent margins in the Pacific. Recent drilling sites are producing novel results at the erosive Costa Rican margin (CRISP, X344), at the accretionary Nankai margin (NanTroSEIZE, X338), and at the Japan Trench that ruptured in the 2011 Tohoku event (JFAST, X343). We welcome submissions based on seismic, core/cuttings, observatory, logging, and experimental data that define the physical, thermal, chemical, and mechanical conditions of convergent plate boundary systems. We anticipate discussions that advance our knowledge of convergent margins and set the stage for future field programs on subduction zones.

### **T11D, T14C: The Pacific-North America Plate Boundary Through Time: Translation, Rotation, Erosion, and 4-D Strain**

*Conveners:* R. Dorsey, P. Umhoefer, S. Bennett, A. M. Barajas

Monday Dec 9

**Description:** The Pacific-North America plate boundary is a complex system of faults, mountain ranges and sedimentary basins that offer insights into processes that deform, modify, create, and consume crust at transform margins. From the Denali and San Andreas faults to the Walker Lane and Gulf of California, dextral plate motion has driven histories of translation, rotation, exhumation, and 4-D deformation through Cenozoic time to the present. We seek contributions that illuminate these processes, and relative plate-motion pathways, over a wide range of temporal and spatial scales using insights from geology, geodesy, geophysics, stratigraphy, geochronology, paleomagnetism, and related datasets.

**V13I, V14B, V21C: Tectonics and magmatism in the Alaska-Aleutian, Cascadia and Taupo-Tonga subduction systems**

**Conveners:** A. Kent, M. Coombs, E. Todd, G. Yogodzinski

Monday Dec 9 & Tuesday Dec 10

**Description:** The dynamics of plate interactions play a key role in controlling magma genesis and evolution in subduction systems. The age and thickness of the subducting plate, convergence rates, sediment loads and lithospheric stresses can all play important roles in the controlling the compositions of arc magmas and their modes of transport and evolution from source to surface. The current GeoPRISMS focus sites of Alaska-Aleutian, Cascadia and Taupo-Tonga systems encompass a range of subduction styles. We seek contributions that focus on magma genesis, transport and storage,

eruption dynamics and related Earth-surface processes in these subduction systems. Studies that link geochemical, geophysical and geologic observations or that highlight arc evolution or the role of volatiles are especially encouraged.

**Sessions of Interest to GeoPRISMS**

**DI31B, DI33B: The Detection and Migration of Melt and Volatiles in the Earth's Interior** - Dec 11

**Conveners:** C. Till, S. Hier-Majumder, N. Schmerr, T. Yoshino

**DI11A, DI21C, DI22A: Seismic Anisotropy: Predictions, Observations, and Interpretations** - Dec 9 & Dec 10

**Conveners:** P. Skemer, M. Long, L. Montési, K. Fischer

**S21A, S23C, S24A: A Decade of EarthScope advances in Research, Infrastructure and Education** - Dec 10

**Conveners:** L. Flesch, S. Stein, S. Hickman, R. Arrowsmith

**S41B, S51D, S52A: Interplay of Slow Slip, Tremor, and Earthquakes** - Dec 12 & Dec 13

**Conveners:** H. Houston, D. Shelly, K. Chao, A. Kato

**T41D, T42A, T43A: Controls on Fault Rupture Patterns** - Dec 12

**Conveners:** S. Bennett, R. Gold, R. Briggs

**T43G, T44A, T51G, T53A, T53B: Deformation Processes: Microstructure, Rheology, and the Effects of Fluids** - Dec 12 & Dec 13

**Conveners:** K. Michibayashi, H. Jung, J. Zhang, J. Warren, V. Le Roux, L. Hansen, S. Kruckenberg

**T31C, T33E: Geodynamic modeling of litho-**

**sphere deformation: Advances and challenges** - Dec 10

**Conveners:** C. Currie, C. Cooper, E. Mittelstaedt, J. Van Wijk

**T31D, T34B: Innovative approaches to constraining lithospheric deformation in space and time** - Dec 10

**Conveners:** K. Morell, A. Ault

**T41A, T44B: Integrated Studies of Slow Earthquakes** - Dec 11

**Conveners:** J. Brown, H. Colella, H. Savage, D. Schmidt

**T13C, T13D, T13E, T21G, T22E, T23I, T24C: Seismology, Active Tectonics and Geomorphology in South and East Asia** - Dec 9 & Dec 10

**Conveners:** J. Bruce Shyu, H. Van Avendonk, Z. Wang, C. Chang, J. Ashi, Y. Hsu, T. Byrne, K. McIntosh, M. Steckler, J. Patton, J. Lewis, H. Huang, W. Ouimet, K. Cook

**T031, T43C, T43D, T43E, T51I, T52B, T53F, T54B. Subduction plate boundaries from the trench to sub-arc and beyond** - Dec 12 & Dec 13

**Conveners:** L. Crispini, P. Vannucchi, Y. Kim, A. Reyes, R. Bell, M. Gutscher, K. Furlong, L. McNeill, D. Eberhart-Phillips, Y. Hu

**V33H, V34C, V41D: Physical Volcanology of Eruptions Involving Water** - Dec 11 & Dec 12

**Conveners:** R. Scudder, J. White, S. Soule, R. Carey

**V11A, V13C. Fluids in Slabs: Chemical and Physical Studies of Volatile-Bearing Minerals in Subduction Zones** - Dec 9

**Conveners:** D. Whitney, A. Vitale Brovarone, S. Mulcahy

**GeoPRISMS at AGU 2013**

**"Exploring the interplay between solid Earth tectonics and surface processes using community codes"**

Wednesday, December 11, 2013, 6:30 pm – 9:30 pm

Fillmore ABC, Grand Hyatt San Francisco (345 Stockton Street)

**Conveners:** P. Upton<sup>1</sup>, M. Behn<sup>2</sup>, J. Jaeger<sup>3</sup>

<sup>1</sup>GNS Science New Zealand; <sup>2</sup>WHOI; <sup>3</sup>Univ. Florida

**Description:** Learn about availability and performance of community modeling codes for coupling geodynamics and surface processes, and the Geodynamics Focus Research Group within CSDMS, co-sponsored by GeoPRISMS.

For more information visit:

<http://www.geoprisms.org/agu-mini-workshops/csdms-agu2013.html>

**GeoPRISMS at AGU 2013**

**"Collaborative Efforts in the East African Rift System"**

Thursday, December 12, 2013, 6:30 pm – 9:30 pm

Fillmore ABC, Grand Hyatt San Francisco (345 Stockton Street)

**Conveners Part I:** C. Ebinger<sup>1</sup>, T. Fischer<sup>2</sup>, S. Kattenhorn<sup>3</sup>

**Conveners Part II:** D.S Stamps<sup>4</sup>, W. Nelson<sup>5</sup>, R. Mouchar<sup>6</sup>, A. Nyblade<sup>7</sup>

<sup>1</sup>Univ. Rochester; <sup>2</sup>Univ. New Mexico; <sup>3</sup>Univ. Idaho; <sup>4</sup>MIT; <sup>5</sup>Univ. Houston; <sup>6</sup>Syracuse Univ.; <sup>7</sup>Penn. State Univ.

**Description:** Collaborative efforts and coordination in preparation for research in the East African Rift Primary Site: **Part I** - The Eastern Branch Focus Site. **Part II** - Synoptic Studies of the East African Rift.

For more information visit:

<http://www.geoprisms.org/agu-mini-workshops/ears-agu2013.html>

## Student Seagoing Experiences:

### The 2013 Cascadia Initiative Expedition Team's Apply to Sail Program

Compiled by Emilie Hooft (University of Oregon) for the Cascadia Initiative Expedition Team

*This is the sixth in a series of field blogs, to inform the community of real-time, exciting GeoPRISMS-related research. If you would like to contribute to this series, please contact the GeoPRISMS Office at [info@geoprisms.org](mailto:info@geoprisms.org)*

**Foreword:** During the summer of 2013 the Cascadia Initiative Expedition Team led six oceanographic expeditions to recover and redeploy ocean bottom seismometers (OBSs) across the Cascadia subduction zone and Juan de Fuca plate. The Cascadia Initiative (CI) is an onshore/offshore seismic and geodetic experiment to study questions ranging from megathrust earthquakes to volcanic arc structure to the formation, deformation and hydration of the Juan de Fuca and Gorda plates with the overarching goal of understanding the entire subduction zone system. These objectives are all components of understanding the overall subduction zone system and require an array that provides high quality data, crosses the shoreline and encompasses relevant plate boundaries. The CI is the first to utilize a new generation of OBSs that are designed to withstand trawling by fisheries, thus allowing the collection of seismic data in the shallow water that overlies much of the Cascadia megathrust.

During the summer of 2013 the Cascadia Initiative Expedition Team led six oceanographic expeditions to recover and redeploy ocean bottom seismometers (OBSs) across the Cascadia subduction zone and Juan de Fuca plate. The Cascadia Initiative (CI) is an onshore/offshore seismic and geodetic experiment to study questions ranging from megathrust earthquakes to volcanic arc structure to the formation, deformation and hydration of the Juan de Fuca and Gorda plates with the overarching goal of understanding the entire subduction zone system. These objectives are all components of understanding the overall subduction zone system and require an array that provides high quality data, crosses the shoreline and encompasses relevant

plate boundaries. The CI is the first to utilize a new generation of OBSs that are designed to withstand trawling by fisheries, thus allowing the collection of seismic data in the shallow water that overlies much of the Cascadia megathrust.

*"We all gathered on the deck as the persistent thumping of the Oceanus's V16 diesel died away and the slow lapping of waves against the stern took its place. Our GPS indicating that we were in the correct spot, the crew began operating the crane to raise the oven-sized Ocean Bottom Seismometer (OBS) over the starboard side. For a second, the florescent yellow casing on the instrument was picked up by the ship's floodlights, illuminating the*

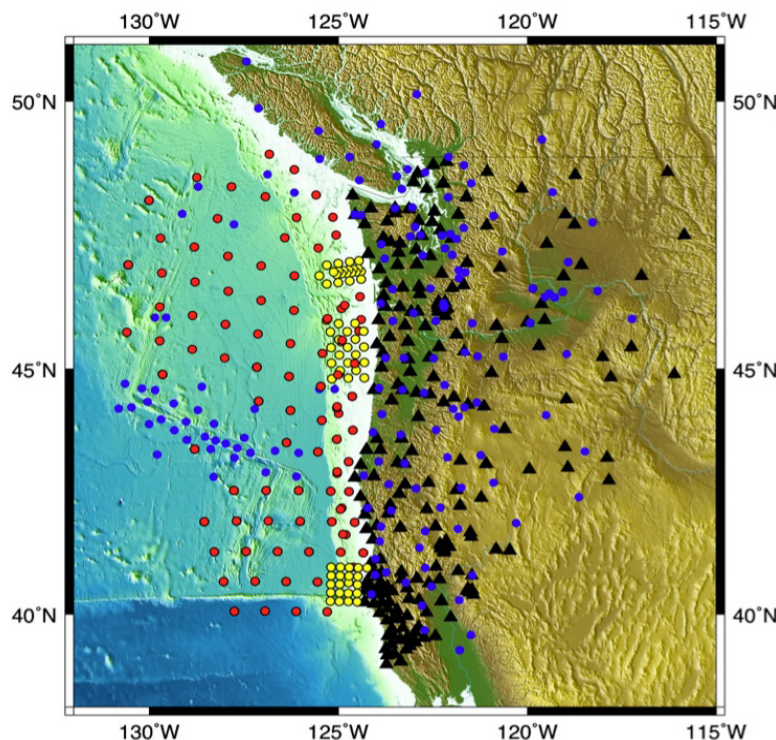


Figure 1. Cascadia Initiative experiment design: PBO GPS stations upgraded as part of the Cascadia Initiative (black triangles) and broadband seismometers (circles) expected to operate in the Cascadia Region between 2011 and 2015. The 2010 workshop report<sup>1</sup> contains a detailed discussion of the color-coded seismometer experiments and the schedule of deployments.

*instrument package against the dark, endless expanse of the Pacific Ocean. Then, just as quickly, it was released from its tether and engulfed by the swell. I leaned overboard and watched as the blinking light affixed to the top of the instrument silently faded away, eclipsed by the murky depths of the sea. Turning my back on this makeshift funeral, I imagined the OBS settling on the alien terrain of the ocean floor, perhaps on a turbidite flow. As the ship's diesel fired back to life and set course for the next drop off location, I thought about the OBS one day disengaging from its anchor and rising back up through the water column, possibly carrying with it the key to predicting crucial properties of the next submarine landslide-triggering earthquake."*





Figure 2. Robert Anthony (New Mexico Institute of Mining & Technology) counts how many SIO Abalone remain to be deployed.

- Robert Anthony, Graduate Student at New Mexico Institute of Mining and Technology.

The CI is a plate-scale experiment that provides a unique opportunity to study the structure and dynamics of an entire oceanic plate, from its birth at a spreading center to its subduction beneath a continental plate. Together with the land stations that are part of the amphibious array and other land networks, the OBSs will provide coverage at a density comparable to the Transportable Array of Earthscope from the volcanic arc out to the Pacific-Juan de Fuca spreading center segments.

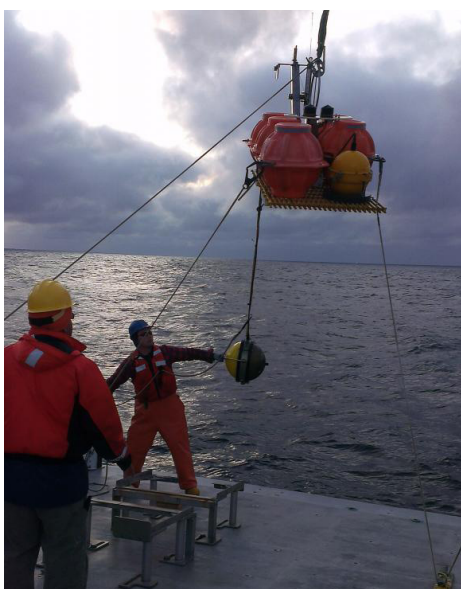


Figure 3. The WHOI team recovering an OBS.

*"I was a member of the first leg of the 2013 CIET cruises. I was extremely nervous about every aspect of the cruise, including the bunk rooms and food. The first few days were great. I learned about ocean bottom seismometer retrievals and a bit about each of the crew members. Then we started experiencing high winds and seas. I had stopped taking my seasickness medicine, so I spent most of the time in my bunk. During the last four days of the cruise, I helped with retrieving and securing the seismometers. I spent a lot of time talking with the crew from Woods Hole Oceanographic Institute. I also learned that the entire crew has a special skill to do what they do, especially with significant weather. Even though a few days were terrible for me, I will gladly join a scientific cruise again, as long as I don't forget my seasickness pills."* – Hannah Mejia, Graduate Student at California State Polytechnic University, Pomona.

The CI is a community experiment that provides open access to all data via the IRIS Data Management Center, thus ensuring that the scientific return from the investment of resources is maximized. The Cascadia Initiative Expedition Team (CIET) is a group of scientists who are leading the seagoing expeditions to deploy and recover OBSs and the team just completed its third year of data acquisition. The CIET maintains a web site for the community where information regarding CI expeditions and OBS metadata are provided.

*"Having sat through several planning meetings and teleconferences in which the community hashed out where exactly the ARRA Cascadia Initiative OBS units would be deployed, it was a real pleasure to actually participate in the CI Leg 5 deployment cruise. Prior to the cruise, OBSs were a bit of a mystery, and it was fascinating to see their various parts and pieces and well-engi-*

*neered simplicity. Some of the pieces were familiar, such as the Trillium Compact seismometer, although its casing that houses a 360-degree gimbal was new; others were completely foreign, most notably "syntatic foam" which doesn't significantly compress even at 6000 m, or 200 bar pressure. It never occurred to me that one can't use any old flotation foam, nor that fishing trawler resistance is a key design criteria of OBSs in general, and particularly offshore the Cascadia margin."* - Tim Melbourne, Professor at Central Washington University.

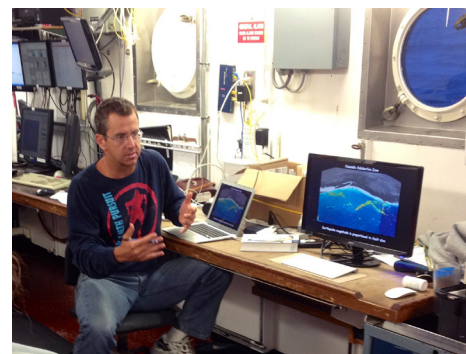


Figure 4. Tim Melbourne (Central Washington University) explains the GPS component of the Cascadia Initiative during an onboard science meeting.

The CI also includes a significant education and outreach component that is providing berths for students, postdocs and other scientists to participate in either deployment or recovery legs, thus providing the seismological community with opportunities to gain valuable experience in planning and carrying out an OBS experiment. In total, 51 applicants from the US and 4 other countries applied to sail on the 2013 cruises; 21 graduate students as well as a few undergraduate students, postdocs and young scientists from the US and Canada were chosen to join the crew.

*"My time on the R/V Atlantis showed me first hand that the geology of the sea floor is just as interesting and diverse as the geology on land. One of*

the most memorable things to me was our use of the bathymetry equipment to scan Hydrate Ridge, which is a formation composed of methane hydrate – a flammable substance that looks like ice. It is amazing to think that every time we sent the JASON ROV down to collect a seismometer, its cameras were looking at a part of the sea floor that had never been looked at before. This really drove home the idea that some things that we take for granted when working on land, such as orientation of the seismometer during installation and the ability to look carefully at the rock and sediment that it is installed on, are much more difficult to achieve when working at sea – it really does present a completely different set of challenges.” – Anton Ypma, Graduate student at Western Washington University.

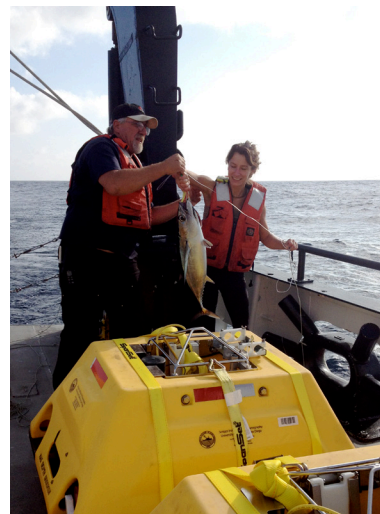


Figure 5. Left: Samantha Bruce (Adjunct Instructor at College of Charleston) holding a starfish in front of ROV Jason. Right: AB Doug Beck helps Brooklyn Gose (Undergraduate at University of Oregon) with an albacore tuna

“Sailing on the R/V Atlantis was an amazing opportunity to learn more about ocean seismology and ocean-bottom seismometers (OBS). I had little experience with in situ seismic observations and instrumentation prior to the cruise. I learned a tremendous amount about how the OBS detects movements in the Earth’s crust, the advantages of the different encasing designs (e.g. trawl resistant mounts (TRM), pop-ups & float – ups), and the recovery process for each design structure. I appreciate the folks from Lamont-Doherty Earth Observatory who answered my many questions regarding OBS’s and allowed me to get a hands-on experience helping them break down the TRM’s after recovery.” – Katie Kirk, Graduate Student at Cornell University and Woods Hole Oceanographic Institution.

“Having never done field work in seismology, what stood out most from this cruise was the incredible design and engineering that went into collecting this data. Seeing a team of scientists and engineers coordinating with the crew of a ship, I felt struck by the reality of what science in action looks like, and what can be accomplished through collaboration. I didn’t know what to expect from ship life, but to sum it up concisely: The motion of the ocean stops for no stomach. The motion of

the ocean is also soothing, and often sleep-inducing after lunch, so plan accordingly. The ship is well-stocked with books, movies, games, and characters to enjoy them with. The food is very, very good. And there is nothing quite like the crashing of waves against the hull as you watch moonlit clouds float by over a landless skyline.” – Laura Fattaruso, University of Massachusetts Amherst.

The cruises lasted from 6 to 14 days in length. OBS retrievals comprised the three first legs, of which the first two were aboard the Research Vessel Oceanus. The third retrieval leg was aboard the Research Vessel Atlantis and utilized the submersible Remotely Oper-

ated Vehicle (ROV) Jason. The ROV was used to recover 12 of the 30 seismometers for this last retrieval mission. The final three legs were OBS deployments conducted with the assistance of the Research Vessel Oceanus.

“I woke up and immediately realized that the boat was unusually still. Even though it was nearly 11 o’clock in the morning, I felt groggy. I had volunteered for the night shift and we had only been at sea for a few days so my body wasn’t fully adjusted to the new schedule. I got dressed and made my way to the top of the steps leading to the science lab. The WHOI team had their hardhats and life vests on and were darting into the lab and back out onto the deck—clearly hard at work. We were stopped because during the last deployment one of the ARRA OBSs had failed to respond when pinged almost as soon as it was released into the water.

A similar situation had happened to us the day before with the ARRA ceasing to respond about half-way through its descent. With the recent failure, there was now a major dilemma. Of the three ARRAs deployed, two were not responding. The WHOI team was busy testing the remaining OBSs by submerging them, pinging and waiting to hear a response. The chief scientists spent the day pouring over maps, sending emails and developing plans for the worst case scenario. As the day progressed, we were still no closer to understanding the problem. It was decided that the ARRA component designed to send and receive signals needed to be tested at depth. The WHOI team gutted the cage holding all the CTD equipment and attached the



ARRA parts. Each ARRA was tested and each ARRA continued to function normally. By now we had an updated itinerary that paired priority sites with the KECK OBSs that seemed more stable. The cruise continued with the stipulation that if one more ARRA failed then they would no longer be deployed. It made the next few sites extremely intense, but as the days went by without incident the anxiety began to lift. In the end, the two ARRAs that failed at the beginning of our voyage were the only two to do so and we still finished ahead of schedule. “ – Miles Bodmer, Graduate Student at University of Oregon

“It took landing in the middle of the craton in Indiana at the beginning of undergrad to make me realize that I have always wanted to live and work near the ocean. My time on the R/V Oceanus was the first opportunity to spend multiple days at sea, working on a small subset of a large scientific initiative. It seemed that every time I rolled out of bed, bleary-eyed and unaware whether it was night or day, something new was happening on deck. Fishing for tuna on hand-lines tied to the back of the boat, watching a pod of orca whales gambol around our boat or playing with a makeshift

cornhole set, there was always something new to see. The engineers were great, and I overheard them explaining each remarkable mechanism making up their OBS design with enthusiasm and pride. After a couple of days I was nipping into the galley for a midnight snack or popping up to the bridge with the feeling of being one of the crew, part of the ship, necessary. Though this ship will drop us off and its crew will depart again within the week leaving us to return to our mainland institutions, I am sure this will not be my last voyage.” - Kasey Aderhold, Graduate Student at Boston University

More descriptions and pictures of individual at-sea experiences are on the CIET Website. The 21 Apply-to-Sail participants for 2013 listed in the order of cruise participation are: Hannah Mejia, California State Polytechnic University Pomona; Sara Kowalke, University of Minnesota; Stanislav Edel, New Mexico Institute of Mining and Technology; Laura Fattarusio, University of Massachusetts Amherst; Lexine Black, California State University, Northridge; Anton Ypma, Western Washington University; Samantha Bruce, College of Charleston; Katie Kirk, Cornell University & Woods Hole Oceanographic



Figure 6. Two young orcas playing.

Institution; Christina King, University of Rhode Island; Ye Tian, University of Colorado at Boulder; Miles Bodmer, University of New Mexico; Robert Skoumal, Miami University; Kasey Aderhold, Boston University; Robert Anthony, New Mexico Institute of Mining and Technology; Shannon Phillips, University of Oregon; Tim Melbourne, Central Washington University; Brooklyn Gose, University of Oregon; Xiaowei Chen, Woods Hole Oceanographic Institution; Yajing Liu, McGill University; Harmony Colella, Miami University of Ohio; Martin Pratt, Washington University in St. Louis.

<sup>1</sup><http://www.oceanleadership.org/2010/nsf-cascadia-initiative-workshop/>

<sup>2</sup><http://cascadia.uoregon.edu>

<sup>3</sup><http://cascadia.uoregon.edu/CIET/education/apply-sail-0>

## GeoPRISMS Bibliography

Currently more than 700 citations related to GeoPRISMS Science and tied to data sets are available online.

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### **GeoPRISMS AGU Townhall Meeting and Student Forum**

December 9, 2013, 6 - 9 pm ; Franciscan Ballroom  
Westin Market Street, San Francisco, CA (50 Third Street)  
<http://www.geoprisms.org/agu-townhall.html>

## **Workshops of Interest**

### **AGU Mini-Workshop: Kermadec Arc-Havre Trough Planning**

December 8, 2013, 8 am – 12:00 pm  
Filmore ABC, Grand Hyatt San Francisco, CA (345 Stockton Street)  
<http://www.geoprisms.org/agu-mini-workshops/kermadec-mini-workshop-agu2013.html>

### **AGU Mini-Workshop: Field Logistics for GeoPRISMS Research in Aleutian Arc**

December 8, 2013, 12:40 – 6:00 pm  
Filmore ABC, Grand Hyatt San Francisco, CA (345 Stockton Street)  
<http://www.geoprisms.org/agu-mini-workshops/aleutian-agu2013.html>

### **AGU Mini-Workshop: Exploring the Interplay between Solid Earth Tectonics and Surface Processes using Community Codes**

December 11, 2013, 6:30 pm – 9:30 pm  
Filmore ABC, Grand Hyatt San Francisco, CA (345 Stockton Street)  
<http://www.geoprisms.org/agu-mini-workshops/csdms-agu2013.html>

### **AGU Mini-Workshop: Collaborative Efforts in the East African Rift**

December 12, 2013, 6:30 pm – 9:30 pm  
Filmore ABC, Grand Hyatt San Francisco, CA (345 Stockton Street)  
<http://www.geoprisms.org/agu-mini-workshops/ears-agu2013.html>

## **GeoPRISMS Office Transition**

On October 1<sup>st</sup>, 2013, the GeoPRISMS Program Office moved to  
University of Michigan in Ann Arbor, Michigan.  
GeoPRISMS website is available at [www.geoprisms.org](http://www.geoprisms.org)

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