

# Pairing community seismic experiments with seismic community development

Aubrey Adams (Colgate University) and Maureen Long (Yale University)

A hallmark of the GeoPRISMS Program has been its support of community seismic experiments in the Eastern North American Margin (ENAM) and Alaska & Aleutians primary sites. These projects were funded specifically as data collection efforts - the data analysis was provided through separate awards. The projects involved a large number of Principal Investigators (PIs), and were planned and executed with extensive community input. The large and comprehensive geophysical datasets collected during the GeoPRISMS community experiments were made immediately publicly available, enabling a wide range of scientific investigations by the community. These experiments have allowed for the collection of large-scale, onshore-offshore datasets, altogether more ambitious than any that could have been realistically carried out by individual researchers. These deployments were designed to enable imaging of the crust and mantle across the shoreline, over multiple scales, using both active- and passive-source imaging approaches, to address the full range of science questions that have been articulated for each GeoPRISMS primary site.

*In June 2019, seven undergraduate students, selected from a national pool of 54 applicants, participated in an AACSE short course in Kodiak, AK, led by PI Aubrey Adams (Colgate University). During the week-long experience, participants were immersed in a short but intensive course introducing topics in seismology, plate tectonics, and the tectonic history of Alaska. A fieldtrip led by Peter Haeussler (USGS) and Gary Carver (Humboldt State University) introduced students to the geology of accretionary prisms. Finally, the group joined PI Lindsay Worthington (UNM) in the recovery of 398 nodes in eastern Kodiak. Photos credit: A. Adams and J. Nakai.*



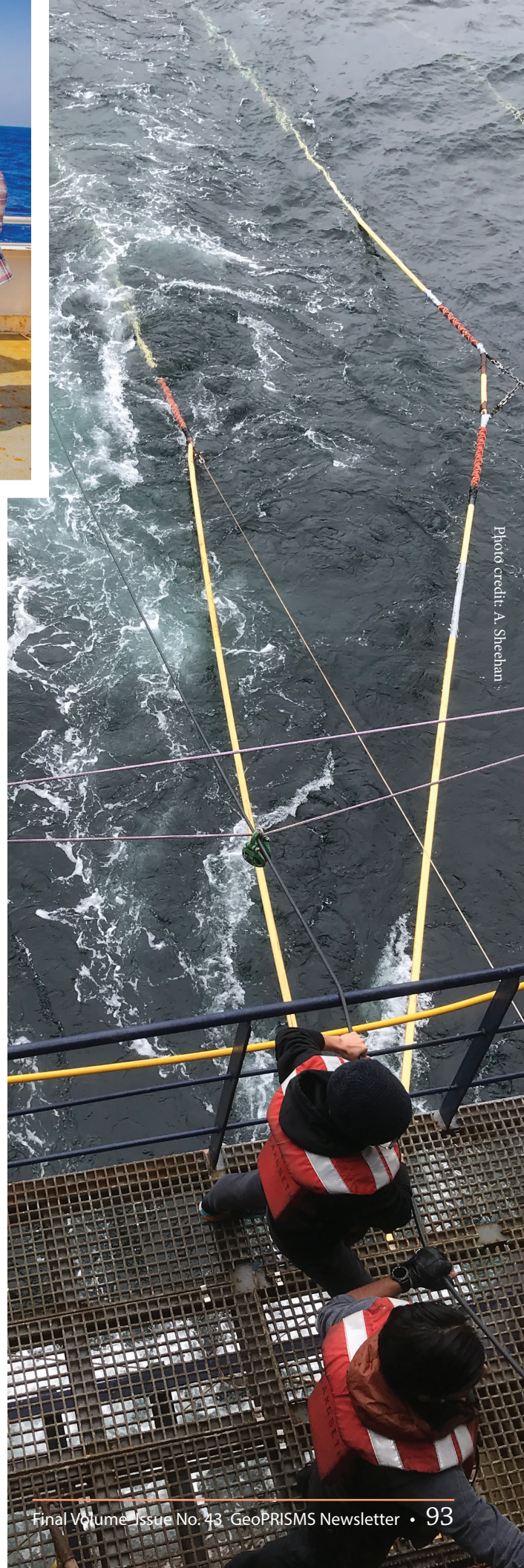




*The Science Party and Apply-to-Sail graduate students during the September 2014 OBS deployment campaign part of the ENAM Community Seismic Experiment. Photo credit: D. Dubois.*

A unique aspect of these GeoPRISMS community experiments is their substantial investments in the professional development of future earth scientists through a range of educational and experiential activities. The 2014-2015 ENAM Community Seismic Experiment (ENAM CSE) and the 2018-2019 Alaska Amphibious Community Seismic Experiment (AACSE) joined a series of community projects that have helped scientists, particularly students and early-career investigators, to gain experience with seismic data collection. These included marine seismic data acquisitions through the Apply-to-Sail program and onshore active-source data field campaigns. Additionally, each project offered experiential opportunities through hands-on workshops, targeted to different populations within the community. Such programs are critical to expanding access to seismic research - particularly in marine settings - to new communities, maximizing the utilization of data collected in community experiments, and recruiting and retaining a more diverse community of earth scientists.

The ENAM CSE solicited community participation in data collection on four cruises and two onshore field campaigns during 2014-15. Participation was open to the broad geoscience community, with an emphasis on participation by students and early-career investigators. In total, 79 scientists and students from 49 different institutions participated in an ENAM CSE fieldwork. The AACSE cruises expanded the Apply-to-Sail program by inviting applicants from all career stages to participate in five cruises between 2018 and 2019. A total of 32 accepted participants included K-12 teachers, undergraduate and graduate students, postdoctoral researchers, mid-career professionals, and both tenured and untenured faculty members. Participants in both the ENAM CSE and AACSE cruises and field campaigns contributed to all aspects of on-board and field science activities, including instrument preparation, deployment, surveying, and recovery, initial onboard and field data collection and processing, documenting dives of the ROV JASON (in the case of AACSE), and contributing to public outreach through live field blogs.



*Photo credit: A. Sheehan*



Data collected by community experiments are publically available and workshops were held for both projects to train students and new investigators with the goal to maximize the utilization of project data. Two week-long workshops focusing on ENAM CSE data processing, and aimed primarily at graduate students and early-career scientists, were held in 2015 at the University of Texas Institute for Geophysics and at the Lamont-Doherty Earth Observatory of Columbia University. Participants in the refraction workshop learned to plot Ocean Bottom Seismometer data, pick arrivals, formulate a starting model, and carry out tomographic inversions, while each participant in the reflection workshop processed one of the reflection profiles from raw shot gathers to a migrated image.

Access to seismological research is limited for many undergraduate students, especially those attending small or minority-serving institutions. In order to increase the engagement of scientists at the undergraduate level, the AACSE hosted in the summer 2019 a week-long workshop in Kodiak, AK for undergraduates from across the US, with priority given to those with limited access to

field experiences or courses in geophysics. The workshop included a presentation of the scientific goals of the AACSE, an introduction to passive-source seismic data, how to access seismic data, and an overview of earthquake location. The workshop concluded with several days of field work during which students helped to recover 398 nodal seismometers deployed across eastern Kodiak.

Community projects not only play a valuable role in addressing large-scale scientific problems, but also play a critical role in engaging the scientific community and promoting access to seismic data - and the acquisition of data - to new populations. The successful calls for community involvement in the ENAM CSE and AACSE projects have broadened participation in data collection and provided experience with data processing and analysis that is critical for future investigators. The ENAM CSE and AACSE demonstrated that this engagement may be expanded using workshops to train additional scientists in data processing to maximize data usage and to recruit and retain undergraduate students for seismic research and graduate study, promoting diversity among the next generation of scientists. ■





*Hours of watch stands, deploying and retrieving instruments, learning and applying data processing, seating in lectures focusing on the areas of study, the duties of Apply-to-Sailors are as numerous as they are varied. The learning curve might be steep but the experience is rewarding. Photos credit: A. Bécel*

