Seismological Society of America

2022 Annual Meeting

19–23 April 2022 • Bellevue, Washington

Open-access, rapid publication, short-form papers on seismology and earthquake science

TSR papers were viewed an average of 1,270 times during year one!

Publish with us: seismosoc.org/publications/the-seismic-record

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All information in this program is current as of 3 April 2022.

Share your meeting tweets and photos: #SSA2022

Welcome to the 2022 Annual Meeting of the Seismological Society of America!

An exciting lineup of scientific presentations, workshops and plenary sessions awaits us over the next four days. This is our time to explore the latest science together and to forge new relationships with the seismologists and engineers in our global community.

Although it's been three years since we last met in person, the SSA community remains extremely tight-knit. Throughout the pandemic, our members have continued to connect with each other and to our mission: advancing earthquake science worldwide.

The Annual Meeting is a shining example of SSA teamwork in action. On behalf of the Society, I'd like to express our deepest gratitude to all who stepped forward to help shape our sessions, present a poster or lead a workshop or field trip. During many months of planning, our dedicated meeting co-chairs led the creation of this special program—a heartfelt thank you to Jackie Caplan-Auerbach and David Schmidt!

This program not only serves as your guide to the week's events, it is also a reminder of the many ways that you can stay connected to SSA until we meet again. If you haven't made your relationship official, please join SSA today. When you do, you can take advantage of SSA's complimentary training and mentoring sessions (Don't miss our summer sessions on page 88). You'll also want to take note of the upcoming submission deadlines for our journals' special issues and focus sections (details on pages 36 and 37). And prepare to craft applications for the next round of SSA Global Travel Grants (page 73) and our new Government Relations Policy Fellowship (page 15).

As you plan your schedule for the week, I encourage you to make time to peruse SSA's 2021 report which you received in your registration packet. Hot off the presses, it outlines the many ways that our community is working together to nurture our publications and outreach activities, as well as to encourage and grow diversity, equity and inclusion in our Society. If you have ideas to help us continue to make progress in the year ahead, please share them!

Thank you for joining us in Bellevue. It's time to enjoy this long-awaited reunion of the SSA community!

Peggy Hellweg
SSA President, 2022–23

SSA Land Acknowledgment Statement

The Seismological Society of America and the conference organizers welcome you to the 2022 Annual Meeting held in Bellevue, Washington, located between the Puget Sound and the Cascade Mountains.

We gather on the ancestral home of the Coast Salish people, including the Duwamish, Stillaguamish, Muckleshoot and Suquamish communities.

Please join us in acknowledging their continued stewardship of the land, and their ongoing contributions to our knowledge of its history, ecology and resources. The Annual Meeting provides a venue to bring together a broad community to share our seismological and traditional knowledge.

We invite you to contribute your voice to our shared understanding of the earth.

Jackie Caplan-Auerbach
(Western Washington University)

David Schmidt
(University of Washington)

Welcome to Bellevue

WiFi Network: Hyatt_Meeting
Password: EarthQke22

IMPORTANT MEETING DETAILS

Health and Safety

Mask Up

SSA requires all attendees to wear masks at our indoor meeting events and while traveling together on our field trip shuttle. The only exception is while actively eating and drinking where food/beverages are served. Thank you for keeping our community safe. We hope to see more smiles at our next meeting!

Not Feeling Well?

If you experience any COVID-19 symptoms, please separate yourself from others immediately and **do not attend meeting events**. Information on local medical care and COVID testing is available from the hotel's concierge.

Medical Emergencies

In the event of any **emergency situation, dial 911 for immediate assistance**.

By Entering the Meeting All Attendees Agree to:

- **Follow SSA's Code of Conduct** (see page 5)
  Related questions or concerns? Contact Executive Director Nan Broadbent at nbroadbent@seismosoc.org or visit **meetings.seismosoc.org/code-of-conduct**.
- **Be photographed or recorded on video by SSA**.
  These images, photos and/or videos will only be used in future Society communications to promote the organization and/or document its history.

Stay Connected Online

Virtual Sessions

Registration includes access to all live streamed sessions. Log in to the meeting portal at**: 2022.seismosoc.org**

Download the SSA Meeting App

Our app keeps you connected to your colleagues and the latest meeting information. Scan this QR code or search for **SSA 2022** on the App Store or Google Play. Your app log-in information is the same as the meeting portal.

Prepare and Stay Fueled

Speaker Ready Room

Presentations should be loaded/ready an hour before schedule. Upload, test and amend them in the Birch Room during open hours:

Tuesday, 2–7 PM
Wednesday, 7 AM–6 PM
Thursday, 7 AM–6 PM
Friday, 7 AM–4:30 PM

Food and Beverages

Due to COVID-19, **eating and drinking is prohibited in Tech Session Rooms**. Eques, the hotel restaurant on the second floor, is open from 6:30–10 AM on weekdays and from 7 AM–noon on Saturday. The skybridge leads to more dining options (see your registration packet for more information).

Mothers' Room

Visit the registration desk for a key to access this private lactation room.

Connect With Your Colleagues

Posters

Be sure to check out your colleagues' posters in the Evergreen Ballroom every day during morning and afternoon breaks.

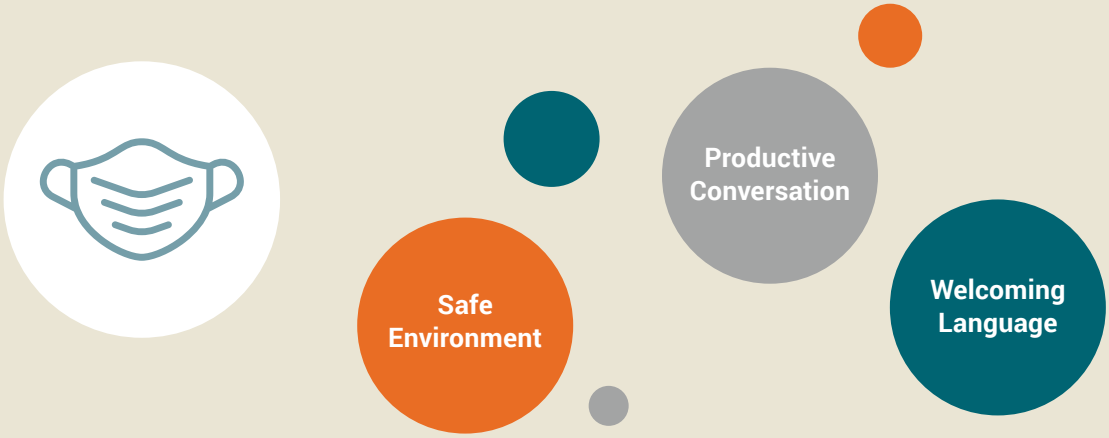
Happy Birthday, *TSR*!

Join *The Seismic Record* editorial team Thursday at 3:30 PM in Evergreen to celebrate a successful first year of information sharing. Bring your questions and comments to Editor-in-Chief Keith Koper and receive a *TSR* YETI cup while supplies last!

Need a Meeting Receipt?

SSA members can print a copy of their meeting registration receipt by logging in at **seismosoc.org** and accessing their contributions from the Members' Area. All other attendees can receive receipts by emailing their full name to receipts@seismosoc.org.

Your Health, Safety and Well-Being are SSA's #1 Priority



COVID-19 GUIDELINES

Wear Your Mask

SSA requires all attendees to wear masks at all indoor meeting events and while traveling together on our field trip shuttle. The only exception is while actively eating and drinking where food/beverages are served.

Experiencing COVID-19 Symptoms?
Please separate yourself from others immediately and **do not attend meeting events.** Information on local medical care and COVID testing is available from the hotel's concierge.

This QR Code will take you to the Centers for Disease Control and Prevention website for more COVID-related information:

THE SSA CODE OF CONDUCT

SSA is committed to fostering the exchange of scientific ideas by providing a safe, productive and welcoming environment for all SSA-sponsored meeting participants, including attendees, staff, volunteers and vendors. We value the participation of every member of the community and want all participants to have an enjoyable and fulfilling experience.

Please do your part by following the SSA Code of Conduct at all times throughout the entire Annual Meeting.

This QR Code will take you to the full policy and includes contact information for any related questions or concerns:

Meeting at a Glance

Tuesday / 19th

9 AM – Noon
Workshop: Introduction to Machine Learning
Cedar AB

1 – 4 PM
Workshop: Machine Learning II
Cedar AB

1 – 4 PM
Workshop: Publishing—How to Review and How to Be Reviewed
Regency E-G

3 – 7 PM
Registration Open
Outside the Grand Ballroom

4 – 5:30 PM
Opening Reception
Evergreen

5:30 – 6:30 PM
Keynote Plenary: The Cascadia Margin Revealed
Grand E-K

6:30 – 8 PM
Newcomers' Welcome Dinner
Regency A-G

SSA Annual Meeting Opening Reception

Reconnect with the SSA community, meet our exhibitors and enjoy food and beverages at our meeting kickoff.

Tuesday, 4–5:30 PM, *Evergreen*

Sponsored by

KINEMETRICS

Wednesday / 20th

8 – 9:15 AM
Oral Sessions

9:15 – 10 AM
Poster Break in Evergreen

10 – 11:15 AM
Oral Sessions

11:30 AM – 12:30 PM
Plenary: Science and Technology From a Makah Perspective—Incorporation of Native American Knowledge Systems
Grand E-K

12:30 – 2 PM
Lunch Break

2 – 3:15 PM
Oral Sessions

3:15 – 4:30 PM
Poster Break in Evergreen

3:30 – 4:15 PM
SIG: 50-State Update of the USGS National Seismic Hazard Models
Regency A-C

3:30 – 4:15 PM
SIG: Future of Seismic Infrastructure, Invitation for Early Collaborative Efforts Both On Land and Offshore
Regency E-G

3:30 – 4:15 PM
SIG: SOS (Save Old Seismograms)
Grand C

4:30 – 5:45 PM
Oral Sessions

6 – 7 PM
Plenary: The Future of Subduction Zone Science
Grand E-K

7 – 8 PM
SIG: Ground Motion Simulation Validation
Regency A-C

7 – 8 PM
Early-Career & Student Reception
Evergreen Ballroom

Thursday / 21st

8 – 9:15 AM
Oral Sessions

9:15 – 10 AM
Poster Break in Evergreen

10 – 11:15 AM
Oral Sessions

11:30 AM – 12:30 PM
SSA President's Address and Awards Ceremony
Grand E-K

12:30 – 2 PM
Lunch Break

2 – 3:15 PM
Oral Sessions

3:15 – 4:30 PM
Poster Break in Evergreen

3:30 – 4:15 PM
SIG: Latest Seismological and Geodetic Data and Results from Onshore-Offshore Southern Alaska
Regency A-C

3:30 – 4:15 PM
SIG: Role of Seismic Networks in Monitoring Climate Change
Regency E-G

3:30 – 4:30 PM
Meet the *TSR* editors
Evergreen

4:30 – 5:45 PM
Oral Sessions

6 – 7 PM
Plenary: Joyner Lecture
Grand E-K

7 – 8 PM
Joyner Reception
Outside Grand Ballroom

Friday / 22nd

8 – 9:15 AM
Oral Sessions

9:15 – 10 AM
Poster Break in Evergreen

10 – 11:15 AM
Oral Sessions

11:30 AM – 12:30 PM
Plenary: Frontiers in Seismology
Grand E-K

12:30 – 2 PM
Lunch Break

2 – 3:15 PM
Oral Sessions

3:15 – 4:30 PM
Poster Break in Evergreen

3:30 – 4:15 PM
SIG: Diversity, Equity and Inclusion in Seismology
Regency A-C

3:30 – 4:15 PM
SIG: Is the Southern Cascadia Region Different? Known Unknowns, Unknown Unknowns and What to Do About Them
Grand C

3:30 – 4:15 PM
SIG: Modeling of Seismic Site Amplification using AI
Regency E-G

4:30 – 5:45 PM
Oral Sessions

Saturday / 23rd

7– 10:15 AM
Field Trip: First Light Kayak Tour on Lake Washington

8 AM* – 10 PM
Field Trip: Cascadia by Canoe

8:30 AM* – 6:30 PM
Field Trip: Seattle Geology

See page 17 for more details on requested arrival times for each field trip.

SSA President's Address & Awards Ceremony

Join Us to Honor:

HENRY FIELDING REID MEDAL
WILLIAM ELLSWORTH

FRANK PRESS PUBLIC SERVICE AWARD
TIMOTHY AHERN

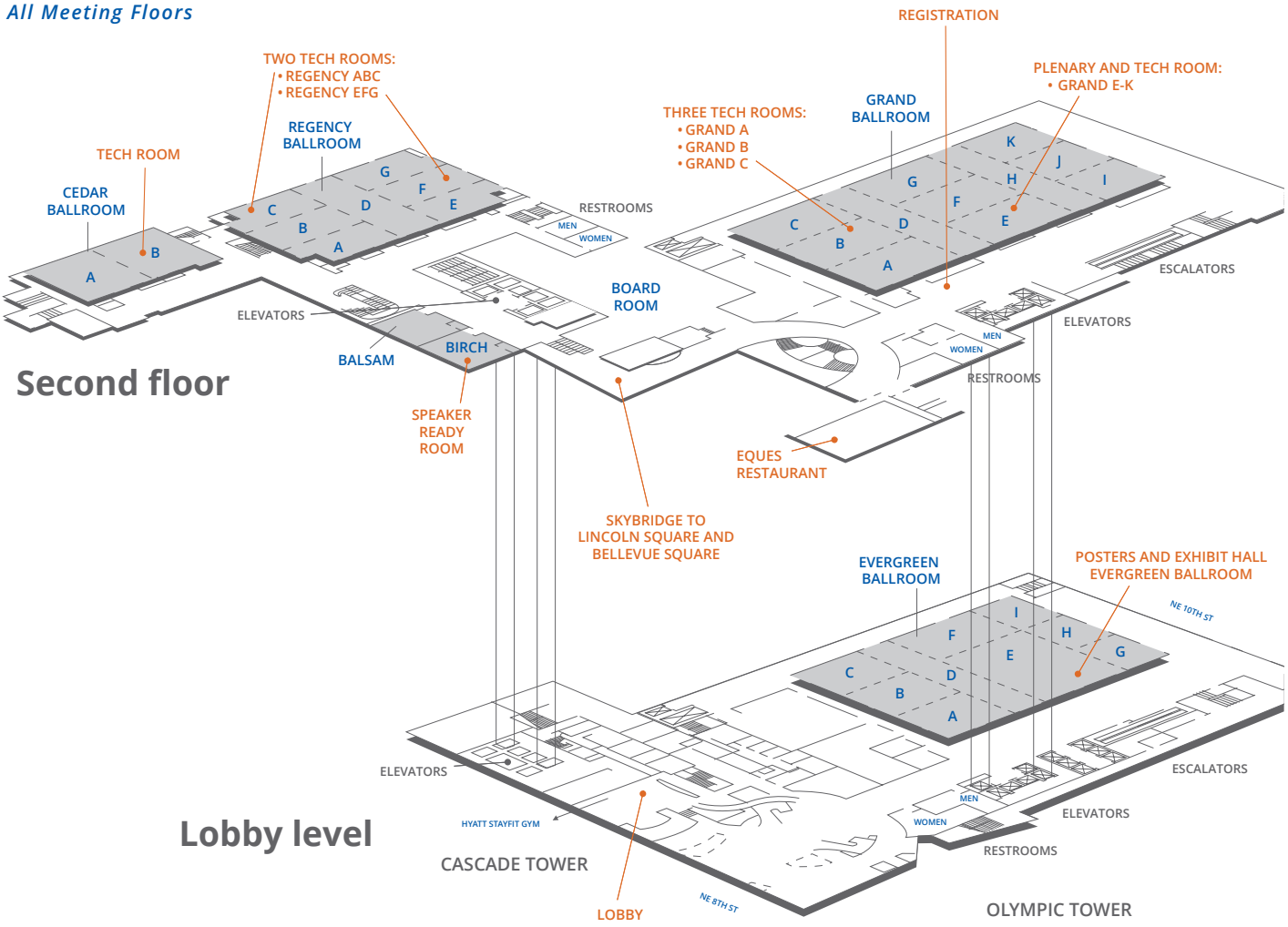
CHARLES F. RICHTER EARLY-CAREER AWARD
SEYED MOSTAFA MOUSAVI

SSA President **Peggy Hellweg** will preside over the awards ceremony and provide an update on the Society. Immediate Past President **John Townend** (2021–22) will deliver the presidential address.

Thursday, 11:30 AM–12:30 PM
Grand E-K

Hyatt Regency Bellevue

FLOOR PLAN
All Meeting Floors



Ask Before You Photograph

Per the SSA Code of Conduct, please remember to ask attendees for their permission BEFORE taking any photographs of their presentation materials.

Thank you!

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Seismological Society of America

BOOTH #17-18

KEYNOTE PLENARY

The Cascadia Margin Revealed

TUESDAY, 5:30–6:30 PM, GRAND E-K

Suzanne M. Carbotte, marine geophysicist, Lamont-Doherty Earth Observatory

Setting the stage for a dynamic meeting, Suzanne Carbotte's keynote lecture will focus on new research being conducted in Cascadia. She will shine a light on recent active source surveys of the Juan de Fuca plate and Cascadia margin and the new scientific insights that these data provide.

Carbotte uses seismic imaging techniques to study the magmatic processes of ocean crust formation at the global Mid-Ocean Ridge, the evolution of oceanic crust as it is transported across the plate interiors, and changes in the structure of oceanic crust as it begins to descend into Earth's mantle at subduction zones. Her research includes studies at the East Pacific Rise, the Axial Seamount on-axis hotspot volcano and the Cascadia Subduction Zone.

ROB DEGRAFF

PLENARY

Science and Technology from a Makah Perspective—Incorporation of Native American Knowledge Systems

WEDNESDAY, 11:30 AM – 12:30 PM, GRAND E-K

Janine Ledford, executive director of the Makah Cultural and Research Center

Janine Ledford lives in Neah Bay, Washington, on the Makah Indian Reservation. She is also the Makah Tribal Historic Preservation Officer, Chairperson for the Makah Tribe's Higher Education Committee and serves on both the Cape Flattery School District Board of Directors and the Burke Museum's Advisory Board. Under her leadership, the Makah Tribe created its Tribal Historic Preservation Office, which has been actively protecting both pre-historic Makah cultural sites and historic structures on the Makah reservation and in the vicinity. In addition, Ledford has been involved with the development and implementation of a collections management system which incorporates traditional Makah values and language.

Special Interest Groups

These gatherings are free to attend but an RSVP is required.

50-State Update of the USGS National Seismic Hazard Models Open Discussion

WEDNESDAY, 3:30 – 4:15 PM, REGENCY A-C

The National Seismic Hazard Model Project invites open discussion following the 50-State Update of the USGS National Seismic Hazard Models Technical Session.

Conveners: Sanaz Rezaeian and Allison M. Shumway (USGS)

Future of Seismic Infrastructure, Invitation for Early Collaborative Efforts Both On Land and Offshore

WEDNESDAY, 3:30 – 4:15 PM, REGENCY E-G

This is a forum to discuss longer term monitoring and science goals for future innovations and advancements for seismic and related networks. Contributions are invited from all monitoring and science communities, including global, regional, local and focused monitoring (such as geothermal or CO2 sequestration).

Conveners: Emily L. Wolin (USGS), Tim Parker (Nanometrics, Inc.), Robert Mellors (University of California, San Diego)

Ground Motion Simulation Validation (GMSV)

WEDNESDAY, 7 – 8 PM, REGENCY A-C

Simulation modelers and research engineers are invited to come together to reflect on the last decade of Ground Motion Simulation Validation (GMSV) research and development and also look ahead to establish a vision for the future of GMSV.

Conveners: Sanaz Rezaeian (USGS), Christine Goulet (University of Southern California), Jonathan Stewart (University of California, Los Angeles), Nicolas Luco (USGS)

SOS (Save Old Seismograms)

WEDNESDAY, 3:30 – 4:15 PM, GRAND C

Analog seismograms, spanning an era of more than a century, comprise a vast and largely untapped data source, one that is increasingly at risk. To unlock their potential, these records and their associated metadata must be scanned and digitized. Strategies must be developed for standards for both the waveforms and the associated metadata as well as for data sharing.

Conveners: Allison Bent (Natural Resources Canada), Peggy Hellweg (University of California, Berkeley), Lorraine Hwang (University of California, Davis)

Latest Seismological and Geodetic Data and Results from Onshore-Offshore Southern Alaska

THURSDAY, 3:30 – 4:15 PM, REGENCY A-C

This brief meeting will provide an opportunity for scientists to exchange ideas, initial findings and establish new collaborations with those who have been working with the Alaska Amphibious Community Seismic Experiment and related efforts.

Conveners: Geoff Abers (Cornell University), Donna Shillington (Northern Arizona University), Peter Haeussler (USGS, Anchorage)

Role of Seismic Networks in Monitoring Climate Change

THURSDAY, 3:30 – 4:15 PM, REGENCY E-G

Climate change is a major challenge for society. Many questions remain, including: How to enhance connections between seismologists and climate researchers? How can archived seismic data be better used for climate research and what improvements might be made to enhance use? How can current data collection be modified to increase potential use? What new technologies might be applicable?

Coveners: Rick Aster (Colorado State University), Rob Mellors (University of California, San Diego), Wenbo Wu (Caltech)

Diversity, Equity and Inclusion in Seismology

FRIDAY, 3:30 – 4:15 PM, REGENCY A-C

This gathering will provide updates on efforts undertaken to improve the diversity, equity and inclusion of seismology, geodesy and the broader geoscience community, followed by facilitated discussion. The group particularly encourages contributions/updates addressing specific issues, such as best practices for partnerships with Indigenous communities, recruitment and retention of individuals from underrepresented groups and issues related to field safety for underrepresented individuals.

Conveners: Mo Holt (University of Illinois Chicago), Kevin Kwong (University of Washington), Kasey Aderhold (Incorporated Research Institutions for Seismology)

Is the Southern Cascadia Region Different? Known Unknowns, Unknown Unknowns and What to Do About Them

FRIDAY, 3:30 – 4:15 PM, GRAND C

New geologic and geophysical data being collected by the USGS and other academic groups is shedding light on the southern Cascadia subduction zone. Join this discussion to explore the most important open questions about the region and how these projects could integrate with other ongoing and new investigations.

Conveners: Jason R. Patton (California Department of Conservation), Lori A. Dengler (Humboldt State University), Peggy Hellweg (University of California, Berkeley), Robert McPherson (Humboldt State University), Rick Wilson (California Department of Conservation)

Modeling of Seismic Site Amplification Using AI

FRIDAY, 3:30 – 4:15 PM, REGENCY E-G

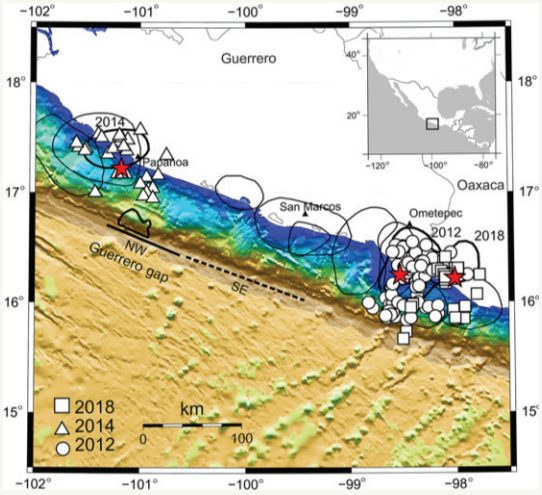
Investigations using AI in site amplification are fragmented. Different teams prepare their own datasets for training, validation and testing, and adopt different metrics to judge the performance of their models. Experts specializing in site-specific and regional amplification predictions, (near) real-time ground-motion intensity mapping and its cascading effects will be interested in discussing the path over these hurdles.

Conveners: Chuanbin Zhu (GFZ German Research Centre for Geosciences), Mohsen Zaker Esteghamati (Virginia Tech), Weiwei Zhan (Tufts University)

PLENARY

The Future of Subduction Zone Science

WEDNESDAY, 6 – 7 PM, GRAND E-K



Subduction zones host a range of seismic phenomena, including the world's largest earthquakes along the megathrust, in-slab and deep-focus earthquakes, shallow crustal events, tremor and volcanic seismicity. The structure and behavior of subduction systems provide insight into Earth's evolution and plate tectonic processes. A panel will present their vision for the future of subduction zone science and discuss the important next steps to expand our understanding of subduction processes.

Panelists: John Power (USGS), Laura Wallace (GNS Science, University of Texas, Austin), Shawn Wei (Michigan State University). Moderated by Anne Sheehan (University of Colorado, Boulder).

PLENARY

WILLIAM B. JOYNER MEMORIAL LECTURE

A Futurist's View of Earthquake Impact Estimation

THURSDAY, 6 – 7 PM, GRAND E-K

David J. Wald, USGS National Earthquake Information Center, Golden, Colorado

David. J. Wald developed and manages ShakeMap, which provides near-real-time maps of ground motion and shaking intensity following significant earthquakes, as well as the Did You Feel it? citizen-science earthquake reporting system. He leads development and operations of other systems for post-earthquake response and pre-earthquake mitigation, including ShakeCast, Ground Failure and PAGER. Editor-in-chief of EERI's premier journal *Earthquake Spectra* and an adjunct professor in the Geophysics Department at the Colorado School of Mines, Wald was the 2009 SSA Frank Press Public Service Award recipient. His Joyner Lecture offers a combined seismological/earthquake engineering view of future earthquake response and recovery, where the initial impact and secondary hazard models are rapidly supplemented with crowd-sourced and remotely sensed observations that are integrated in a holistic fashion for a more accurate view of the consequences.

Join Us to Celebrate the One-Year Anniversary of SSA's First Open-Access Journal

Meet Editor-in-Chief **Keith Koper**
and other members of the *TSR* editorial team
who are helping scientists
keep their fingers on the pulse
of seismology.

THURSDAY • 3:30–4:30 PM
EVERGREEN BALLROOM

PLENARY

Frontiers in Seismology

FRIDAY, 11:30 AM – 12:30 PM, GRAND E-K

New advances in seismological techniques and instrumentation provide opportunities to better understand earthquakes, map seismicity and refine models of the inner structure of planetary bodies. These approaches also present challenges: how to optimize instrumentation and deal with big data. This plenary will explore the science enabled by three emerging frontiers: distributed acoustic sensing technology, high performance computing and seismic instrumentation deployed to neighboring planets.

Panelists: Alice-Agnes Gabriel (University of Munich), Simon Stähler (ETH Zürich), Zhongwen Zhan (Caltech)

NEW for SSA student and early-career members!

SSA Government Relations Policy Fellowship

Learn about the policy processes that impact seismology and share your voice on Capitol Hill.

Fellows will serve on SSA'S Government Relations Committee for a year and also enjoy financial support to attend both the 2022 Geoscience Congressional Visits Day (Geo-CVD) in Washington, DC, and the 2023 SSA Annual Meeting in San Juan, Puerto Rico.

Application deadline: 15 May 2022

Learn more and apply today: tinyurl.com/SSAfellowship

Workshops

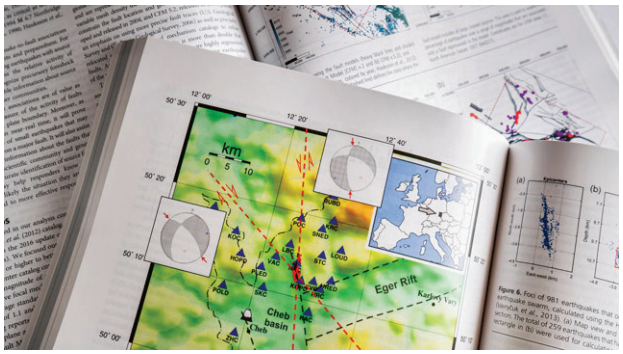
These learning opportunities were made possible by donations to the Kanamori Fund. SSA is grateful to our donors and to the volunteer instructors listed below.

Introduction to Machine Learning

9 AM – NOON, CEDAR AB

New to machine learning? The workshop will cover introductory machine learning topics and provide hands-on training on how to use them in your seismological research.

Instructors: Karianne Bergen (Brown University), Christopher W. Johnson (Los Alamos National Laboratory), Youzuo Lin (Los Alamos National Laboratory), Will Reichard-Flynn (Los Alamos National Laboratory)



Machine Learning II: Advance Your Skills

1 – 4 PM, CEDAR AB

Take your machine learning skills to the next level! This workshop will cover more advanced techniques and provide hands-on training on how to use them in your seismological research.

Instructors: Karianne Bergen (Brown University), Christopher W. Johnson (Los Alamos National Laboratory), Youzuo Lin (Los Alamos National Laboratory), Will Reichard-Flynn (Los Alamos National Laboratory)

Publishing: How to Review and How to Be Reviewed

1 – 4 PM, REGENCY E-G

Learn how to review your colleagues' scientific papers in constructive and reliable ways and how to respond effectively to reviews of your own work.

Instructors: Allison Bent (editor-in-chief, *Seismological Research Letters*), John Ebel (Boston College), P. Martin Mai (editor-in-chief, *Bulletin of the Seismological Society of America*)

Saturday Field Trips

Pre-registration is required for these exciting opportunities to explore local seismic points of interest. Participants should meet at the Northeast Evergreen Entrance, outside of the Evergreen Ballroom.

Cascadia by Canoe

8 AM*– 10 PM

*Please arrive by 7 AM for instructions

In this full-day trip with a late evening return, hardy participants will canoe the Niawiakum River, viewing muddy signs of megathrust earthquakes. Prepare to see low-tide exposures at Willapa Bay that attest to great Cascadia earthquakes with remains of subsided spruce forests and sand layers from a tsunami wave train.

Trip Leaders: Corina Allen (Washington Geological Survey), Cale Ash (Degenkolb Engineers), Brian Atwater (USGS at University of Washington), Danté DiSabatino (Washington Emergency Management Division), Diego Melgar (University of Oregon)

First Light Kayak Tour on Lake Washington

7 – 10:15 AM

Participants of all skill levels (no prior experience required) will join REI guides for a first light paddle on the tranquil waters of Lake Washington. After launching our kayaks from Enatai Beach, participants will paddle along the shoreline for views of the Issaquah Alps, the Cascade Mountains—and, on a clear day, iconic Mt. Rainier.

Participants will need to arrange their travel to and from Enatai Beach, located 2.9 miles south of the Hyatt Regency Bellevue.

Seattle Geology

8:30 AM* – 6:30 PM

*Please arrive by 7:30 AM for instructions and to enjoy breakfast

Seattle is subject to earthquakes on shallow faults within the crust of the North American plate, on extensional faults within the down-going Juan de Fuca slab, and on the Cascadia plate-boundary thrust fault. This trip introduces the geomorphology and stratigraphy within Seattle that record shallow faulting and determine site response to earthquakes on all sources. Participants should plan for an approximately two-mile walk with a 250-foot elevation gain and wear shoes that are ready to explore both sandy and cobbly beaches, rip-rap and muddy river banks.

Trip Leaders: Ralph Haugerud, (USGS), Elizabeth Barnett (Shannon & Wilson), Bill Laprade (Shannon & Wilson), Elizabeth Davis (University of Washington)

THANK YOU

They shepherded the publication of high-impact papers, guided young researchers through their first submissions and helped our journals continue to advance earthquake science worldwide—all on a volunteer basis. The Society is grateful to these editors for their outstanding contributions to our publications in 2021.

Bulletin of the Seismological Society of America

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Congratulations, Travel Grant Recipients

Each of the recipients listed below received free registration to the Annual Meeting as well as a stipend for travel expenses. SSA is grateful to our members and friends who gave generously to the Society's Kanamori Fund, General Fund and Annual Meeting Travel Grant Fund, which make these grants possible.

Student Travel Grants

Louisa Olivia Brotherson, *University of Liverpool*
Andrea Bryant, *University of Chicago*
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Ayako Tsuchiyama, *Massachusetts Institute of Technology*
Reynaldo Vite Sanchez, *Colorado School of Mines*
Xiaozhuo Wei, *University of Rhode Island*
Paulina Wozniakowska, *University of Calgary*

Early-Career Travel Grants

Zoya Farajpour, *The University of Memphis*
Angela G. Marusiak, *Caltech/JPL*
Diana Núñez, *University of Guadalajara*
Jiong Wang, *The University of Chicago*

European Seismological Commission/ SSA Travel Grant

Sreeram Reddy Kotha, *Institut des Sciences de la Terre*

International Travel Grant

Qi Ou, *University of Oxford*

Technical Sessions

The 15 January 2022 Tonga Eruption and Tsunami

The 15 January 2022 eruption of Hunga Tonga-Hunga Ha'apai in the Tonga Islands was unprecedented in modern times. It was one of the largest volcanic explosions of the instrumental era and also caused atmospheric shockwaves that circled the globe. The eruption produced a tsunami that traveled throughout the Pacific and was also observed at locations in the Atlantic Ocean and the Mediterranean Sea. We welcome papers on the eruption, the atmospheric waves, any sources and characteristics of the tsunami, remote or nearby measurements of any of the associated phenomena, as well as threat assessment and communications and impacts.

Conveners: Peggy Hellweg, University of California, Berkeley (peggy@seismo.berkeley.edu); Lori A. Dengler, Humboldt State University (lori.dengler@humboldt.edu); Emile A. Okal, Northwestern University (emile@earth. northwestern.edu); Seth Moran, U.S. Geological Survey (smoran@usgs.gov); Stuart Weinstein, PTWC (stuart.weinstein@noaa.gov); Summer Ohlendorf, NTWC (summer.ohlendorf@noaa.gov)

50-State Update of the USGS National Seismic Hazard Models

The USGS National Seismic Hazard Models (NSHMs) are a bridge between best-available earthquake science and public policy. By the end of 2023, the National Seismic Hazard Model Project (NSHMP) will publish a 50-State NSHM, focusing on updates to the conterminous U.S. (last updated in 2018) and Alaska (last updated in 2007) models. The update to the Hawaii model, published in 2021, will be included as part of the 50-State NSHM update. The NSHMP has been developing and evaluating new data and models over the past year and has held a number of public workshops to present early input models to the scientific community for feedback. Planned updates for the 50-State NSHM include better representation of epistemic uncertainties, new seismicity models, updated geologic and geodetic deformation models, improved treatment of segmentation and multi-fault ruptures, NGA-Subduction GMMs, incorporation of physics-based (3D simulation) GMMs, modified location of the CEUS and WUS attenuation boundary, basin effects and site response models. In addition, the NSHMP plans to develop a research NSHM that may include directivity, non-ergodic aleatory uncertainty in GMMs and time dependence models. In early 2022, the NSHMP will hold a multi-day public workshop to present the draft model for the 50-State NSHM update.

This session will outline the next steps in finalizing the 2023 50-State NSHM and explore the implications of the draft model. NSHMs are community consensus-based models that are constantly aiming to leverage from the latest data, models and tools available at the time to evaluate and to validate hazard assessments as we undertake an updating process. We invite abstracts on implications, sensitivities and uncertainties of new sources and GMMs that are being considered for the draft model, research model, risk assessments, building code applications and other policy uses. We also invite abstracts from end users on applications and needs of NSHMs in end user products.

Conveners: Mark D. Petersen, U.S. Geological Survey (mpetersen@usgs.gov); Edward H. Field, U.S. Geological Survey (field@usgs.gov); Morgan P. Moschetti, U.S. Geological Survey (mmoschetti@usgs.gov); Peter M. Powers, U.S. Geological Survey (pmpowers@usgs.gov); Kishor S. Jaiswal, U.S. Geological Survey (kjaiswal@usgs.gov); Sanaz Rezaeian, U.S. Geological Survey (srezaeian@usgs.gov); Allison M. Shumway, U.S. Geological Survey (ashumway@usgs.gov); Emel Seyhan, Risk Management Solutions, Inc. (emel.seyhan@rms.com)

Adjoint Waveform Tomography: Methods and Applications

Adjoint waveform tomography and full waveform inversion methods are providing new models of Earth structure. These methods use numerical 3D wave propagation to determine the sensitivity of waveform misfits to sub-surface structure and involve iterative inversion strategies that require complex workflows. As such, they are data and computationally intensive and benefit from recent developments in full waveform solvers and high-performance computer systems.

This session solicits presentations on adjoint waveform tomography and full waveform inversion, including contributions on theoretical and methodological developments as well as applications on reservoir, local, regional and global scales.

Conveners: Arthur J. Rodgers, Lawrence Livermore National Laboratory (rodgers7@llnl.gov); Qinya Liu, University of Toronto (qinya.liu@utoronto.ca); Michael Afanasiev, Mondaic Ltd. (michael.afanasiev@mondaic.com); Ryan Modrak, Los Alamos National Laboratory (rmodrak@lanl.gov)

Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science

Earthquake Early Warning (EEW) systems are able to provide a few to tens of seconds of warning for incoming strong ground motions after the rupture of a significant earthquake has initiated. For effective EEW, the rapid assessment of and alerting for an evolving earthquake is necessary, requiring action based on small increments of data. The 'brains' of EEW systems are constantly being improved in terms of speed and accuracy, through aspects such as updates to algorithms, the addition of novel data sources, the incorporation of additional earthquake physics and more. Increased processing capabilities also allows for more computational intensive measures to be considered.

This session invites submissions on any aspect of the development or improvement of an EEW system, which may include: algorithm development and performance review, improved detection/discrimination techniques, the use of data sources beyond traditional seismic stations, social and physical science perspectives on alerting logic, methods of reducing missed or false alerts or new approaches to EEW from around the world.

A portion of this session will also focus on the current state of practice of the ShakeAlert system with emphasis on network operations, the possible wider expansion of ShakeAlert and lessons learned from recent events (e.g. Lone Pine, Westmoreland, Antelope Valley). We also encourage abstracts related to the role of EEW in engineering and social science to assess the current status of ShakeAlert on the West Coast of North America and of EEW operations worldwide.

Conveners: Sarina C. Patel, University of California, Berkeley (sarina.patel@berkeley.edu); Stephen Crane, Natural Resources Canada (stephen.crane@nrcan-rncan.gc.ca); Fabia Terra, University of California, Berkeley (terra@berkeley.edu); Mouse Marie Reusch, Pacific Northwest Seismic Network (topo@uw.edu)

Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy

Field and remote sensing observations of recent ruptures at the Earth's surface highlight variable rupture geometries, surface slip distributions, zones of distributed or off-fault deformation and fault zone damage. The extent to which these complex and heterogenous patterns are consistent or variable between earthquakes is a fundamental question in earthquake science and remains largely unknown. Meanwhile, advances in numerical and analog modeling and laboratory experiments expand our ability to study strain accumulation and release and the landscape response through multiple earthquake cycles. Additionally, advances in geochronology allow us to better constrain earthquake timing and slip rates, enabling higher resolution comparisons of spatial and temporal patterns of slip within a fault zone. In this session, we encourage abstracts that investigate spatial and temporal patterns (including their causes and uncertainties) in strain accumulation and release spanning coseismic to geologic timescales to address questions such as: 1) How variable or consistent are patterns of surface slip and distributed deformation from one earthquake to the next and along ruptures?; 2) How do we infer geologic rates based on limited geodetic records?; 3) How does earthquake timing and recurrence cluster through space and time?; 4) Are observations from single events representative of earthquake and fault behavior over geologic timescales?; 5) How applicable are observations and findings across fault systems? We welcome contributions that present new observations or theories on the patterns and variability in earthquake rupture from field (paleoseismology, tectonic geomorphology), remote sensing (geodesy) or modeling (numerical or analog simulations or laboratory experiments) studies in any tectonic setting that will further our understanding of fault behavior over modern to geologic timescales.

Conveners: Nadine Reitman, U.S. Geological Survey (nreitman@usgs.gov); Chris Milliner, Caltech (milliner@caltech.edu); Xiaohua Xu, University of Texas at Austin (xiaohua.xu@austin.utexas.edu); Austin Elliott, U.S. Geological Survey (ajelliott@usgs.gov); Jessica A. T. Jobe, U.S. Geological Survey (jjobe@usgs.gov)

Advances in Geophysical Sensing

Seismological studies depend on the capability to measure ground motion resulting from the passage of seismic waves. Similarly, geodetic studies of tectonic and volcanic deformation are underpinned by measurements of changes in the shape of the Earth. Advances in observational geophysics rely on improvements in the quality of measurements and innovations that extend the types and ranges of phenomena observed. These advances both drive and are driven by development of theoretical and computational approaches to interpret observations. Recent years have seen considerable efforts to improve the quality of geophysical sensing. New techniques have been developed that complement established approaches by measuring new quantities and improving the quality and density of observations. Existing sensing techniques have been improved by reducing instrument self-noise, expanding bandwidth, improving calibrations for sensitivity and drift and developing compact and rugged instruments with lower power requirements for easier operation in the field. Dense multi-element networks in a variety of settings may use arrays of inexpensive sensors developed initially for consumer electronics purposes. There are often particular challenges to operating instruments in hostile locations such as the oceans, polar regions, volcanoes, other planets or very remote sites on Earth that have spurred technical advances. Methods of removing environmental noise from observations have been critical to improving geophysical observations, particularly within the oceans, but atmospheric and hydrological noise can also be important.

This session will provide an opportunity for scientists, engineers and instrument developers to discuss recent advances in the full range of sensors and sensing techniques for seismology, geodesy and related fields and explore potential applications of emerging sensing capabilities and future scientific needs and challenges.

Conveners: William S. D. Wilcock, University of Washington (wilcock@uw.edu); Paul Bodin, University of Washington (bodin@uw.edu); Spahr C. Webb, Columbia University (scw@ldeo.columbia.edu); Erik K. Fredrickson, University of Washington (erikfred@uw.edu); Dana A. Manalang, University of Washington (manalang@uw.edu)

Advances in Geospatial Modeling of Seismic Hazards

Geospatial modeling analyzes spatial relationships and patterns of geographic features on sociocultural and physical processes. Recent developments in geospatial modeling of seismic hazards have benefited from the rapid growth of multi-source data (e.g., seismic waveform, remote sensing images, GPS time series) and advances in modeling techniques (e.g., machine learning and deep learning). These have opened up the possibility of performing seismic hazard assessment at different phases, such as pre-earthquake planning and post-earthquake reconnaissance. In addition, the spatial distribution pattern of different types of geographic features on seismic hazards and its temporal variation provide the possibility of investigating the driving mechanism of seismic hazards. We welcome contributions of recent advances in and applications of geospatial modeling on various types of seismic hazards (e.g., shaking, landslide, liquefaction), including (but not limited to) geospatial data collection, processing and management, data mining, artificial intelligence in geospatial modeling and spatiotemporal analysis.

Conveners: Weiwei Zhan, Tufts University (weiwei.zhan@tufts.edu); Xuanmei Fan, Chengdu University of Technology (fanxuanmei@gmail.com); Laurie G. Baise, Tufts University (laurie.baise@tufts.edu); Chuanbin Zhu, GFZ Potsdam (chuanbin.zhu@gfz-potsdam.de)

Advances in Seismoacoustic Methods for Explosion Monitoring

National and global security are ongoing missions whose needs are supported significantly through seismoacoustic research and development. In particular, seismic and acoustic research relevant to the detection and description of explosions—their source properties, coupling, explosive yield, phase generation and ground and atmospheric wavefield propagation – is critically important to the ability to discern anthropogenic explosion activity and assess its importance to the monitoring effort. We invite contributions relevant to the challenging field of seismoacoustic explosion monitoring, with a special focus on smaller sources, noise mitigation strategies, machine learning and deep learning applications, cloud computing, laboratory to local to teleseismic scale analyses and observations and new approaches to models and model validation.

Conveners: Charlotte A. Rowe, Los Alamos National Laboratory (char@lanl.gov); Delaine Reiter, Applied Research Associates (dreiter@ara.com); Sean Ford, Lawrence Livermore National Laboratory (ford17@llnl.gov); Keith Koper, University of Utah (koper@seis.utah.edu); Fransiska K. Dannemann, Sandia National Laboratories (fkdanne@sandia.gov); Michelle E. Scalise, Nevada National Security Site (scalisme@nv.doe.gov)

Advances in the Use of Seismic and Acoustic Methods to Constrain Physical Processes at Volcanoes

Recent advances in instrumentation technology have enabled scientists to deploy progressively denser networks of seismo-acoustic sensors for longer periods of time at locations closer to volcanic systems than was previously possible. Recordings from these networks have enabled researchers to glean new insights into surface and sub-surface processes that produce seismo-acoustic signals at volcanoes, insights that hold promise for improved monitoring and real-time hazard assessment. Furthermore, advances in data processing and the development of new techniques enable both new discoveries in legacy datasets and the promise of new monitoring tools. We invite submissions to this session that describe novel studies at volcanic systems involving seismic and/or infrasonic instrumentation, with particular emphasis on results that would be applicable to the monitoring and understanding of Cascade Range volcanoes.

Conveners: Weston Thelen, U.S. Geological Survey (wthelen@usgs.gov); Amanda Thomas, University of Oregon (amthomas@uoregon.edu); Alicia Hotovec-Ellis, U.S. Geological Survey (ahotovec-ellis@usgs.gov); Barrett Johnson, University of Washington (bnjo@uw.edu); Seth Moran, U.S. Geological Survey (smoran@usgs.gov)

Advancing Multi-scale Evaluations of Seismic Attenuation

Understanding and quantifying seismic attenuation is key to advancing seismic hazard assessments at different spatial scales. At regional scales, the seismic quality factor Q captures path attenuation with consideration of the different wave phases (e.g., P-wave or S-wave) and attenuation mechanisms (e.g., anelasticity and/or scattering). At local scales (e.g., at a given site of interest), the empirical high-frequency spectral decay parameter kappa and its site-specific component characterize the near-surface attenuation. However, the description of seismic wave propagation is not easy especially when it comes to amplitudes. The crust and especially the shallower layers can be very variable leading to wave focusing effects or wave conversions. Furthermore, seismic source phenomena, local site amplifications or the responses of the recording instrument itself can hinder the identification of attenuation. All these reasons in connection with different measurement techniques makes it difficult to identify a unique parameter that captures seismic attenuation mechanisms at multiple scales.

This session aims to gather recent advances in physics-based or empirical modeling related to the quantification of seismic attenuation. We welcome studies focused on, but not limited to: 1) the variability and uncertainty associated with seismic attenuation measurements (e.g., the errors associated with in-situ measurements of Q, the computation bias in kappa and potential tradeoffs between kappa and source); 2) the physics-based explanation behind seismic attenuation parameters (e.g., identification of scattering versus intrinsic attenuation contributions); 3) the link among different attenuation parameters (such as kappa, Q and material damping ratio; scattering and intrinsic attenuation) at various scales and 4) challenges associated with their integration into ground motion modeling, seismic hazard assessments and site response analysis.

Conveners: Chunyang Ji, North Carolina State University (cji3@ncsu.edu); Annabel Haendel, GFZ Potsdam (ahaendel@gfz-potsdam.de); Ashly Cabas, North Carolina State University (amcabasm@ncsu.edu); Marco Pilz, GFZ Potsdam (pilz@gfz-potsdam.de); Fabrice Cotton, GFZ Potsdam (fcotton@gfz-potsdam.de)

Characteristics, Hazards and Evolution of the Gorda Region ofthe Cascadia Subduction Zone

The Gorda region of the Cascadia subduction zone (CSZ) extends from the Mendocino triple junction to Southern Oregon. It is one of the most seismically active regions of the contiguous 48 states. This region is marked by two transitions: 1) that from the strike-slip tectonics of the San Andreas transform system to the CSZ and 2) that from the seismically active deformation zone associated with the Gorda plate to the relatively intact Juan de Fuca plate.

We welcome presentations addressing the tectonics in the Southern Cascadia region, as well as discussion of the tsunami, ground shaking and fault rupture hazards from the region's seismicity. We also encourage contributions on the major uncertainties in estimating risk and how new technologies may contribute to a better understanding of the area.

Conveners: Jason R. Patton, California Geological Survey (jason.patton@humboldt.edu); Lori A. Dengler, Humboldt State University (lori.dengler@humboldt.edu); Peggy Hellweg, University of California, Berkeley (peggy@seismo.berkeley.edu); Bob McPherson, Humboldt State University (robert.mcpherson@humboldt.edu); Rick I. Wilson, California Geological Survey (rick.wilson@conservation.ca.gov)

De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances

Geothermal energy is an emerging renewable energy source and as a green and sustainable energy can make a significant contribution to the current worldwide challenge to reduce the net atmospheric emissions of greenhouse gases to zero (zero-net emissions target). Geothermal heat extracted from depth in excess of 400m is defined as deep geothermal energy. Enhanced Geothermal Systems (EGS) employ hydraulic fracturing to increase the rock permeability and favor a more efficient exploitation of deep geothermal reservoirs when local geology does not favor natural pathways for fluid circulation. Induced micro-earthquakes in EGS are not therefore undesired by-products but a necessary tool to create effective pathways for fluid migration and heat exchange. Thus, to develop EGS, adaptive, data-driven real-time monitoring and risk analysis of potential seismicity triggered by EGS operations are crucial for assessing the geothermal stimulation effects and demonstrating that safe and sustainable development of deep geothermal energy projects is possible. A current research-oriented EGS laboratory is being developed at the FORGE (Frontier Observatory for Research in Geothermal Energy) geothermal site in Utah, USA. We encourage contributions from FORGE and other EGS projects and field test sites that focus on geophysical technologies applied to geothermal energy, such as real-time monitoring and characterization of induced seismicity, distributed acoustic sensing, large-N array, active surface seismic, vertical seismic profiling, seismic imaging of faults and fracture zones, laboratory experiments and novel instrumentation. We also welcome submission of abstracts on modeling studies at all scales, seismicity forecasting models, hazard and risk analysis studies as well as presentations dealing with good-practice guidelines and risk assessment procedures that would help in reducing commercial costs and enhancing the safety of future geothermal projects.

Conveners: Federica Lanza, Swiss Seismological Service, ETH Zurich (federica.lanza@sed.ethz.ch); Kristine L. Pankow, University of Utah Seismograph Stations (kris.pankow@utah.edu); Alexandros Savvaidis, University of Texas at Austin (alexandros.savvaidis@beg.utexas.edu); Stefan Wiemer, Swiss Seismological Service, ETH Zurich (stefan.wiemer@sed.ethz.ch); Antonio Pio Rinaldi, Swiss Seismological Service, ETH Zurich (antoniopio.rinaldi@sed.ethz.ch); Nori Nakata, Lawrence Berkeley National Laboratory (nnakata@lbl.gov)

Development, Enhancement and Validation of Seismic Velocity Models

3D velocity and anelastic attenuation models are critical to generate useful ground motion estimates as well as many other applications. Community Velocity Models (CVMs) have been developed for these purposes in different regions. However, the potential for these CVMs to contribute to new advances in seismic hazard analysis depends on their accuracy, flexibility (e.g., meshing capabilities) and accessibility (e.g., software, efficiency).

We solicit submissions describing the development, enhancement and validation of seismic velocity and anelastic attenuation models. Among other topics, we are interested in: 1) uncertainty estimation of the velocity models as well as the resulting ground motion predictions; 2) studies on techniques for including variable-resolution features, surface topography, small-scale heterogeneities and (frequency-dependent) anelastic attenuation; 3) procedures for including multi-scale features such as fault damage zones, near-surface weathering layers, geotechnical information and other geophysical and geological data and 4) case studies for validating existing or new enhancements, for example through 3D waveform tomography, to CVMs.

Conveners: Kim Olsen, San Diego State University (kbolsen@mail.sdsu.edu); Evan T. Hirakawa, U.S. Geological Survey (ehirakawa@usgs.gov); Andreas Plesch, Harvard University (andreas_plesch@harvard.edu); William J. Stephenson, U.S. Geological Survey (wstephens@usgs.gov)

Distributed Deformation from Surface Fault Rupture

Distributed deformation or secondary surface fault rupture are a concern for many projects that lie within some distance of principal active faults. Attempts to model the probability of distributed ruptures and amounts of distributed deformations have considered style of faulting, fault geometry, distance from the principal fault, geologic and tectonic structural setting and whether the distributed deformations are geometrically connected to principal ruptures or dynamically triggered. Attempts to understand the causes and mechanisms of distributed fault rupture deformations have application not only to hazard assessment of engineered structures and hazard policy but also to our understanding of the shallow slip deficit, particulate vs. rock mechanics and earthquake rupture forecasting. This session invites speakers to present recent research on distributed deformations associated with surface fault rupture and participate in a broad discussion on how to understand, study and manage these deformations.

Conveners: Robb Moss, California Polytechnic State University (rmoss@calpoly.edu); Steve Thompson, Lettis Consultants Inc. (thompson@lettisci.com); Chris Milliner, Caltech (milliner@caltech.edu)

Diversity, Equity and Inclusion in Seismology

Geosciences is one of the least diverse fields and will remain so if actions are not taken to address issues of racism, sexism, homophobia and inaccessibility. In this session, we welcome participants to present on efforts undertaken to improve the diversity, equity, and inclusion of seismology, geodesy and the broader geoscience community.

We particularly encourage contributions that will include specific issues, for example: best practices for partnerships with indigenous communities, workforce development including the recruitment and retention of individuals from underrepresented groups or issues related to field safety for underrepresented individuals. Recent developments to diversify, retain and provide career development for student and early career scientists in seismology, geodesy and the broader geoscience community will be highlighted.

Conveners: Anika Knight, UNAVCO (anika.knight@unavco.org); Mo Holt, University of Illinois Chicago (mmholt@uic.edu); Kevin Kwong, University of Washington (kbkwong@uw.edu); Kasey Aderhold, Incorporated Research Institutions for Seismology (kasey@iris.edu)

Earthquake Source Processes at Various Scales: Theory and Observations

The recurrence time, ground motion and the spatiotemporal evolution of natural, anthropogenic-induced and laboratory earthquakes are strongly influenced by processes that involve the frictional and mechanical properties of the fault systems, as well as the regional and local stress field where these events nucleate. Understanding and characterizing static and dynamic earthquake source parameters is crucial for improving hazard assessment and earthquake forecasts. Similarly, understanding the various scaling relationships of these parameters and their interactions between seismic and aseismic slip modes is important for further advancing hazard estimates. This session focuses on highlighting forefront studies that aim to improve understanding of earthquake source processes and its related complexities. From theory and numerical modeling to large-scale observations at different tectonic regimes, we encourage contributions on research that explore earthquake source physics in a broad range of magnitudes and time scales.

Conveners: Esteban J. Chaves, Volcanological and Seismological Observatory of Costa Rica (esteban.j.chaves@una.ac.cr); Annemarie Baltay, U.S. Geological Survey (abaltay@usgs.gov); Valerie Sahakian, University of Oregon (vjs@uoregon.edu); William Ellsworth, Stanford University (wellsworth@stanford.edu); Taka'aki Taira, University of California, Berkeley (taira@berkeley.edu)

Earthquakes in the Urban Environment

The relentless urbanization and associated concentration of people and infrastructure in earthquake-prone environments brings increased focus on the local to site-specific assessment of seismic risk. Seismic hazard and risk in urban areas need to be addressed by considering all the elements that can affect the intensity of shaking and distribution of losses, considering close proximity to even moderate events and the multi-event degradation of structures. Seismic measurements in urban areas can be difficult due to abundant ambient noise, scattered energy from built structures and foundations and modified near-surface conditions. Array studies also can be difficult due

to limited space and access issues. In this session, we invite presentations on earthquake studies using data processing, empirical, analytical or numerical models, which integrate urban aspects into the research of seismic hazard and risk. Topics could include studies on the source parameters of shallow earthquakes, nearby induced seismicity, attenuation in the near-field, approaches to model and mitigate dynamic seismic hazards and risks, wave propagation in a complex urban environment, ground motion spatial variability, 2D versus 3D site responses and site-city or soil-structure interactions. We also encourage presentations on recent instrumental and data processing developments in urban environments (e.g., optical fiber technology, low-cost sensors, rotation, N-arrays), along with studies on dynamic urban exposure, dealing with seismic structural health monitoring, rapid loss assessment and/or early warning systems. Similarly, we hope to include recent and innovative developments on proxies for predicting the consequences of seismic ground motion and improving the spatial distribution forecasting of earthquake losses on cities.

Conveners: Fabian Bonilla, Université Gustave Eiffel (luis-fabian.bonilla-hidalgo@univ-eiffel.fr); Philippe Guéguen, ISTerre, Université Grenoble Alpes (philippe.gueguen@univ-grenoble-alpes.fr); Stefano Parolai, Istituto Nazionale de Oceanografia e de Geofisica Sperimentale (sparolai@inogs.it); Thomas Pratt, U.S. Geological Survey (tpratt@usgs.gov); Chiara Smerzini, Politecnico di Milano (chiara.smerzini@polimi.it)

The Effects of Sedimentary Basins on Earthquake Ground Motions

The manifestation of ground shaking intensities at the surface of sedimentary basins during an earthquake is a complex phenomenon that is depends on a variety of factors, which include basin structure (shape and depth), depositional history (e.g., sediment type and layering) and characteristics of the seismic event (e.g., magnitude, directivity and azimuth). Sedimentary basins also underlie many urban settings where the potential for the amplification of strong ground motions, especially at long periods, may lead to a substantially elevated risk profile for the residing population and the built environment. As the number of long-period large-scale structures increases worldwide, estimation and realistic modeling of long-period ground motions become important considerations in seismic design. However, there is still a lack of simple guidelines for the selection of strong ground motion recordings containing surface waves and for considering their complex characteristics (such as dispersion) in engineering analysis procedures.

In this session, we seek contributions that will elucidate the impact of sedimentary basins on ground motions and the associated seismic hazards. Example topics of interest/areas of study include advances in characterizing basin structure, improving Earth models at multiple scales, performing high-fidelity 3D numerical simulations to investigate basin site response, identifying basin effects on ground motions and incorporating representative features into ground motion models. We also encourage presentations related to modeling long-period surface-wave propagation within basins, rotational motions (i.e., rocking and torsion), long-duration excitation and relevant risk to long-period structures.

Conveners: Oliver S. Boyd, U.S. Geological Survey (olboyd@usgs.gov); Kristel Meza Fajardo, Bureau de Recherches Géologiques et Minières (k.mezafajardo@brgm.fr); Sean K. Ahdi, U.S. Geological Survey (sahdi@usgs.gov); Patricia Persaud, Louisiana State University (ppersaud@lsu.edu); Chukwuebuka C. Nweke, University of Southern California (chukwueb@usc.edu); Jean-François Semblat, École Nationale Supérieure de Techniques Avancées (jean-francois.semblat@ensta-paris.fr); Fernando López-Caballero, Ecole Centrale Paris, CentraleSupélec (fernando.lopez-caballero@centralesupelec.fr)

Everything Old Is New Again—Resurging Use of Analog Data

Efforts to understand Earth dynamics often depend on our ability to interpret past behaviors of complex systems. Much of this observational data was collected during the pre-digital era and is difficult to discover and access. The seismological community benefits greatly from these continuous observations that have been collected, at some locations, for over a century. When subject to analysis using modern methods, analog seismic data can reveal new insights and have the potential to enable discoveries in many fields. These include not only seismotectonics and seismic hazard, but also Earth structure, induced seismicity, ambient noise, tsunamis, landslides, volcanoes and effects associated with climate change. This data set is being rediscovered and progress continues many fronts in advancing its use.

To that end, we invite presentations from a wide range of activities that advance the preservation and discovery and illustrate the value of legacy seismic data. We seek presentations from users and maintainers of data on addressing issues concerning preservation and access as well as efforts to create standards to enhance search and discovery, improve usability and enable access. Presentations on new and successfully adapted and applied techniques demonstrating the utility of these data are strongly encouraged. Contributions may include but are not limited to, studies of seismicity, natural hazards, seismotectonics, Earth structure and climate signatures as well as studies that advance the preservation of records through scanning and vectorization and efforts towards understanding and establishing metadata standards needed to successfully use legacy data.

Conveners: Allison Bent, Natural Resources Canada (allison.bent@nrcan-rncan.gc.ca); Lorraine J. Hwang, University of California, Davis (ljhwang@ucdavis.edu); Peggy Hellweg, University of California, Berkeley (peggy@seismo.berkeley.edu); Richard D. Lewis, Defense Threat Reduction Agency (richard.d.lewis1.civ@mail.mil); Qi Ou, University of Oxford (qi.ou@earth.ox.ac.uk)

Exploring Earthquake Source Dynamics and Wave Propagation Properties in Tectonic and Lab Environments

Current, challenging research issues include complex earthquake rupturing and the impact of physical state of media on wave propagation. Therefore, this session will cover recent advancements in the understanding of dynamics in both complex tectonic and controlled lab environments. Our understanding of earthquake source physics remains restricted due to the scarcity of documented seismic rupture along complex fault systems, which makes short-term and long-term forecasting difficult. The two most crucial concepts to understand are rupturing processes and modification waves passing through heterogeneous media. Laboratory experiments exploring real tectonic scenarios might be a feasible way for understanding and comparing earthquake source physics. Using shear rock experiments as an earthquake analogue coupled with a state-of-the-art high frequency acoustic monitoring system, various researchers have demonstrated in the past that accelerations recorded in the kilohertz range on centimeter-sized samples were self-similar to those expected at the kilometric scale for a large earthquake. Recent advances in laboratory imaging of spontaneous dynamic ruptures have allowed us to visualize and quantify stress reduction at the free surface, and its impact on friction for fault-slip histories that are similar to natural thrust and normal earthquakes. Therefore, we are open to an extensive variety of seismological studies such as moment tensor analysis, seismic tomography, frictional parameters, fault dimension assessment, fault geometry, wave attenuation characteristics, etc.

Conveners: Rohtash Kumar, Banaras Hindu University (rohtash21@bhu.ac.in); Subhash C. Gupta, Indian Institute of Technology, Roorkee (s.gupta@eq.iitr.ac.in); Ranjit Das, University Catolica Del Norte (ranjit.das@ucn.cl); Prithvi Thakur, University of Michigan (prith@umich.edu)

Extraterrestrial Seismology: Seismology from Mars, the Moon and Everywhere

The InSight mission landed on Mars on 26 November 2018 and was the first to place an ultra-sensitive broadband seismometer on the surface of another planet. The mission has now reached the milestone of 1000 sols on Mars, and the Marsquake Service is frequently reporting new marsquakes. Researchers from the InSight team are making new observations and inferences regarding the structure of Mars' core, upper mantle and crust and other recent work.

Meanwhile, on the Moon, new work is happening or being planned. The Farside Seismic Suite, a NASA mission to Schrödinger Crater, was selected for flight in the mid-2020s. The Lunar Geophysical Network is in formulation for NASA's New Frontiers 5 Announcement of Opportunity and would place four geophysical stations around the Moon. Other space agencies are also interested in deploying instruments to determine the structure of the Moon. Chang'e 4 uses ground-penetrating radar to learn more about the shallow structure of the farside of the Moon. Other potential seismic targets include Venus, where researchers are beginning to consider studying venusquakes with infrasound, and icy ocean moons, where seismometers could be deployed to study icequakes and even the rocky interior.

We invite contributions on any aspect of planetary seismology. Contributions from Mars, the Moon, Venus, Mercury, icy moons, the Sun, comets, asteroids and even stars or exoplanets are all welcome. We're interested in data-driven or theoretical work, and we would also love to hear about new mission proposals, instruments and concepts.

Conveners: Ceri Nunn, Jet Propulsion Laboratory, Caltech (ceri.nunn@jpl.nasa.gov); Angela G. Marusiak, Jet Propulsion Laboratory, Caltech (angela.g.marusiak@jpl.nasa.gov); Aisha Khatib, University of Maryland (akhatib1@umd.edu)

Fault Damage Zones: What We Know and Do Not

Fault damage zones accommodate the bulk of the inelastic deformation produced during earthquakes, modify the long-term properties of the shallow crust and increase local seismic hazard through enhanced shaking. Because of their relevance to the earthquake energy balance problem, their influence on ground motions and their impact on fluid pathways near faults, damage zones have garnered the interest of a broad disciplinary range of geoscientists. Over the past two decades, increasing resolution and availability of observations, together with improvements in numerical modeling capabilities, have advanced our understanding of the spatial extent, physical (mechanical) properties and long-term evolution of damage zones. Though the understanding of fault damage zones is improving there remain many unanswered questions such as the mechanism and role of fault healing, the importance of lithology, the effect of fault maturity and the bulk damage zone rheology over time.

In this session, we welcome recent advances in the quantitative understanding of damage zones from observations, numerical models and laboratory studies. We are particularly interested in studies spanning the complete earthquake cycle, experimental studies and work bridging observations from various methods. As part of pushing our understanding of damage zones forward, we invite contributors to identify the outstanding questions in their research and potential directions that will address them, especially those requiring a collaborative, cross-disciplinary approach.

Conveners: Alba M. Rodriguez Padilla, University of California, Davis (arodriguezpadilla@ucdavis.edu); Travis Alongi, University of California, Santa Cruz (talongi@ucsc.edu); Xiaohua Xu, University of Texas at Austin (xiaohua.xu@austin.utexas.edu); Thomas Mitchell, University College London (tom.mitchell@ucl.ac.uk)

Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors

Distributed Acoustic Sensing (DAS) is rapidly becoming a popular tool for seismological research, contributing to a new understanding of earth structure and its influence on wave propagation and seismic source mechanisms. DAS is enabling Large-N array seismology in novel and unique spaces. Examples of recent deployments have explored microseismicity in enhanced geothermal systems (EGS), regional scale earthquakes, the near-field source physics of underground explosions, ocean wave propagation and acoustics, glacier surface and basal processes, near-surface structure in urban areas and mass movements including landslides and avalanches. The main advantages of DAS for seismology include, but are not limited to, dense recording, wide spatial extent of virtual sensors, time-lapse repeatability and the unique opportunity to leverage existing fiber infrastructure in the form of telecommunication cables ("dark fiber"). Researchers are rapidly expanding the range of DAS applications, techniques and analysis methods. Because DAS measurements are a single-component projection of the strain (or strain-rate) wavefield along the direction of the fiber, there is a need to develop a fundamental theoretical framework to cope with this new measurement. Methods have been proposed for relating DAS measurements to traditional seismic recordings using geophones and seismometers, however much work remains in translating and matching both the phase and amplitude information between the instruments. The high spatial resolution and broadband nature of DAS furthermore allows for new data analysis methods or the adaptation of existing Large-N methods to strain recording. Large data volumes generated with DAS are also amenable to the application of machine learning for addressing data management, processing and interpretation challenges. Additionally, DAS measurements can be paired with complementary optical based measurements (i.e. distributed temperature or strain sensing), thereby gaining unique subsurface and process understanding.

We invite contributions from research related to all aspects of fiber-optic sensing methods in seismology and geophysics, including but not limited to: advancements in optical engineering; developments in theoretical and methodological aspects of fiber-optic sensing; novel processing and data handling approaches; case studies from recent and ongoing fiber-optic sensing experiments; comparisons between non-inertial and inertial instruments and insights gained from fiber-optic sensing measurements in the context of other types of seismological/geophysical datasets.

Conveners: Verónica Rodríguez Tribaldos, Lawrence Berkeley National Laboratory (vrodrigueztribaldos@lbl.gov); Kirsten Chojnicki, Pacific Northwest National Laboratory (kirsten.chojnicki@pnnl.gov); Ariel Lellouch, Tel Aviv University (ariellel@mail.tau.ac.il); Hunter A. Knox, Pacific Northwest National Laboratory (hunter.knox@pnnl.gov); Patrick Paitz, ETH Zurich (patrick.paitz@erdw.ethz.ch); Brad Lipovsky, University of Washington (bpl7@uw.edu); Herb Wang, University of Wisconsin (hfwang@wisc.edu)

From Desktops to HPC & Cloud: Emerging Strategies in Large-scale Geophysical Data Analysis

As the availability of geophysical data continues to grow in volume and variety, many aspects of research data collection, access and processing are evolving to allow full use of large data sets. Processing large data volumes is not unique to geophysics and there exist many modern, open source languages (e.g. Python, Julia), data containers (e.g. HDF5, Zarr) and computational frameworks (e.g. Apache Spark, xarray and Dask, Ray), that can be leveraged and allow researchers to focus more on the domain-specific issues. Access to computational resources, such as HPC and cloud computing, continue to become more accessible and affordable. Specialized hardware, such as GPUs, are increasingly available in both academic and commercial computing environments and make efforts such as large scale waveform template matching possible. New computing models, like serverless architectures and Kubernetes container orchestration, expand the ways in which research can be performed. The combination of available software and computational resources increase accessibility to a new scale of inquiry, making large-scale research in seismology, infrasound, geodesy and geophysics in general more tractable than ever before. In this session, we invite researchers, data producers and data providers to share work in data-hungry applications, approaches to large data collection, storage and access and experiences with processing platforms and architectures.

Conveners: Chad Trabant, Incorporated Research Institutions for Seismology (chad.trabant@iris.edu); Jonathan K. MacCarthy, Los Alamos National Laboratory (jkmacc@lanl.gov)

Frontiers in Earthquake and Tsunami Science—Model Integration, Recent Advances, Ongoing Questions

Over the last several decades, the subduction zone science community has accumulated a wealth of geophysical and geological data on earthquakes and tsunamis. This has enabled the creation of more realistic and diverse numerical models of earthquake and tsunami hazards. However, critical questions about earthquake rupture characteristics, tsunami inundation extents, paleoseismic proxies and more remain unresolved. In this session we solicit presentations on recent advances in modeling earthquake rupture scenarios with particular focus on the use of iterative modeling across coseismic deformation and resultant tsunami inundation. Modeling studies incorporating real-time, historic or reconstructed data constraints (geophysical and/or geological) are expressly welcome.

In this session we hope to highlight advances in the field of earthquake and tsunami science and outline the steps needed to move towards more integrated models and filling important knowledge gaps. Such gaps may include limited geologic and/or geophysical data constraints, needs for improved modeling methodology, etc. We hope participants view this session as a community discussion on continued improvement of earthquake and tsunami science.

Conveners: Andrea D. Hawkes, University of North Carolina Wilmington (hawkesa@uncw.edu); Diego Melgar, University of Oregon (dmelgarm@uoregon.edu); Lydia M. Staisch, U.S. Geological Survey (lstaisch@usgs.gov); SeanPaul La Selle, U.S. Geological Survey (slaselle@usgs.gov); Jason S. Padgett, University of Rhode Island (jason_padgett@uri.edu)

Frontiers in Marine Seismology

Understanding of geohazards and Earth structure continues to be advanced with the development and use of marine technologies and new analysis techniques. Whether investigating the formation and evolution of structures in ocean basins, refining the controls on and potential impact of megathrust earthquake slip behavior along subduction zones or tracking the seismicity along oceanic transform faults, mid-ocean ridges, seafloor or island volcanoes and undersea landslides, marine geophysical observations will be key to answering the science questions prioritized by the community in reports like "A Vision for NSF Earth Sciences 2020-2030: Earth in Time" (National Academies of Sciences, Engineering and Medicine, 2020).

This session encourages abstract submissions related to all aspects of marine seismology, particularly in the collection and use of observations through ocean bottom seismographs to record natural and controlled sources. Presentations are also encouraged on related marine geophysical topics such as marine electromagnetic instrumentation and imaging, seafloor geodesy, moored and unmoored hydroacoustic sensors and use of underwater fiber optics, as well as on integration of offshore and onshore technologies and techniques.

Conveners: Charlotte A. Rowe, Los Alamos National Laboratory (char@lanl.gov); Andrew Gase, University of Texas at Austin (agase@utexas.edu); Joshua Russell, Brown University (joshua_russell@brown.edu); Jianhua Gong, Scripps Institution of Oceanography (j4gong@ucsd.edu); Hannah Mark, Woods Hole Oceanographic Institution (hmark@whoi.edu); Guilherme de Melo, San Diego State University, Scripps Institution of Oceanography (gsampaiodemelo@ucsd.edu); Kasey Aderhold, Incorporated Research Institutions for Seismology (kasey@iris.edu)

Imaging, Monitoring and Induced Seismicity: Applications to Energy and Storage

The character and evolution of both natural and induced fracture networks in the deep subsurface remains critical for utilization in both energy (e.g., EGS) and storage (e.g., CO2 or nuclear waste) applications. Additionally, the interactions between induced fractures and the natural structural heterogeneities (i.e., those that govern subsurface flow) remain enigmatic at most meaningful scales. Recent advancements have afforded the research community the opportunity to develop high resolution characterization and monitoring techniques using seismic methods at intermediate to full scale field applications. Additionally, model advancements have allowed for detailed studies of these interactions, although many critical parameters remain poorly constrained. In deep crystalline settings the rock fabric, complex structure, and sometimes severe seismic anisotropy often create challenging characterization environments. In terms of monitoring, energy and storage applications are frequently 4D problems, where the character of the reservoir evolves throughout the active injections (e.g., stress evolution). In these long-term operational scenarios, it is paramount that seismic imaging and characterization approaches be developed and streamlined to provide useful and timely information to operators. Finally, new observations regarding induced seismicity are illuminating complexities beyond stress reduction via increased pore pressures (e.g., thermo-poro-elastic stressing). Improved understanding of these processes bears significantly on seismic hazard assessments. Given the unique challenges to deep subsurface seismic investigations, we invite submissions detailing methods, observations, and modeling studies related to seismic imaging, monitoring and induced seismicity in fractured crystalline rocks and other relevant geologic media applied to energy production or waste storage.

Conveners: D. Parker Sprinkle, University of Washington (dpsprink@uw.edu); Hunter A. Knox, Pacific Northwest National Lab (hunter.knox@pnnl.gov)

Improving Strong-motion Data, Products and Services: From Waveform Quality to Open Dissemination

Engineering seismology and earthquake engineering require high-quality and easily accessible earthquake waveform data and associated station and event metadata. Providers of event-based waveform data (often referred to as 'strong-motion data' for simplicity) and services worldwide are continuously improving the portfolio of available services in order to meet the expectations of a broad range of users, that includes both scientists and engineering practitioners. Users and funding agencies expect the data, products and services to be open and FAIR (Findable, Accessible, Interoperable, Reusable). While web interfaces remain the preferred way to discover available data, access is increasingly via web services that allow integration in automated processing workflows and enhanced interaction with large datasets. The traditional boundary between weak and strong ground motion records has become blurred, as on-scale weak motion data is proving to be useful in many applications where strong motions would have only been used in the past. In this context, ensuring a high quality of event-based waveform data and metadata is a need and at the same time a challenge. In this session we welcome contributions from the communities of strong-motion/event-based data providers at both a local/national level and an international level to promote knowledge transfer and expert discussion on the strategies to improve earthquake waveform data, metadata and the associated products and services. Topics include: station and waveform quality, station and event metadata curation and integration, new processing algorithms and needs, new data types, formats and open dissemination strategies.

Conveners: Carlo Cauzzi, ORFEUS, SED, ETH Zurich (carlo.cauzzi@sed.ethz.ch); Hamid Haddadi, CGS-CSMIP & COSMOS (hamid.haddadi@conservation.ca.gov); Eric Thompson, U.S. Geological Survey (emthompson@usgs.gov); Giovanni Lanzano, Istituto Nazionale di Geofisica e Vulcanologia (giovanni.lanzano@ingv.it); Lisa Schleicher, U.S. Geological Survey (lschleicher@usgs.gov); Olga-Joan Ktenidou, GEIN-NOA (olga.ktenidou@noa.gr); Jamison Steidl, University of California, Santa Barbara (steidl@ucsb.edu)

Insights from Earthquakes in and Around Alaska in the 20 Years Since the Denali Fault Earthquake

This year will mark 20 years since the 3 November 2002 M7.9 Denali Fault Earthquake. The last two decades have seen a number of intriguing and important earthquakes across Alaska, as well as an explosion in the amount of seismic and geodetic instrumentation and data to study them. Notable Alaska earthquakes over the last two decades include the largest earthquake in the United States since 1965 (2021 M8.2 Chignik), the largest intraslab earthquake in the United States (2014 M7.9 Little Sitkin earthquake in the western Aleutians), an earthquake that at least partially filled the enigmatic Shumagin seismic gap (2020 M7.8 Simeonof), the complex Gulf of Alaska earthquake in 2018 and two damaging events in Cook Inlet (2016 Iniskin and 2018 Anchorage). Additional large earthquakes have occurred nearby in the North Pacific region, including the 2012 M7.8 Haida Gwaii earthquake offshore Canada and the 2017 M7.8 earthquake north of the Komandorsky Islands. Meanwhile, observational capabilities have grown dramatically due to the EarthScope program, significant components of which have been incorporated into long-term network capabilities, the continuing enhancement of InSAR measurements and the growth in the number of near-field strong motion recordings.

This session welcomes presentations on all aspects of earthquakes in Alaska and the north Pacific, including western Canada and the Russian Far East. We welcome geological, geodetic and seismological studies, modeling efforts, hazard assessments and integrative studies that address earthquakes in this region and their hazard, seismotectonics and mechanics of fault systems.

Conveners: Jeffrey T. Freymueller, Michigan State University (freymuel@msu.edu); Julie Elliott, Michigan State University (julieelliott.ak@gmail.com); Ronni Grapenthin, University of Alaska (rgrapenthin@alaska.edu); Peter J. Haeussler, U.S. Geological Survey (pheuslr@usgs.gov); Lucinda Leonard, University of Victoria (lleonard@uvic.ca); Natalia Ruppert, University of Alaska Fairbanks (naruppert@alaska.edu); Andrew Schaeffer, Geological Survey of Canada (andrew.schaeffer@canada.ca); Derek Schutt, Colorado State University (derek.schutt@colostate.edu); Rob Witter, U.S. Geological Survey (rwitter@usgs.gov)

Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring

Applying Machine-learning (ML) applications to seismic processing problems is increasingly becoming standard for local and near regional networks. However, sparser global and continental scale regional networks present additional challenges that require further development for such methods to be effective. These challenges include the detection and identification of additional phase types (such as local, regional and teleseismic P and S arrivals). Overlap among all arrival types and network sparsity often prevent the direct application of many local and dense network approaches (e.g. those that rely on moveout patterns). Another difference is the broader use of seismic arrays at some networks, such as the International Monitoring System, which provide processing challenges as well as more input features for ML algorithms than are available at most smaller networks. We invite presentations on methods that can enhance the performance of steps commonly taken in both retrospective and near-real-time network processing, such as signal detection, phase identification, event detection/association, event location, event validation, magnitude estimation, event type classification and repeat event tracking, with a focus on methods that reduce analyst workloads, especially during large aftershock sequences. We also invite presentations that combine multiple steps or reimagine processing into novel pipelines enabled by data science methods and/or high performance computing capabilities. The goal of this session is to highlight recent work that improves large scale, sparse network processing and to motivate discussion of new research directions that can address these challenges.

Conveners: G. Eli Baker, Air Force Research Laboratory (g.eli.baker@gmail.com); John Patton, National Earthquake Information Center, U.S. Geological Survey (jpatton@usgs.gov); Josh Dickey, Air Force Technical Applications Center (joshuadickey@gmail.com); Ian McBrearty, Stanford University (imcbrear@stanford.edu); Jesse Williams, Global Technology Inc. (jwilliams@globaltechinc.com)

Modeling, Collecting and Communicating Post-earthquake Hazard and Impact Information

Effective and timely post-earthquake response and recovery require a continuous flow of accurate, updated assessments to key decision-makers from a variety of disparate sources. Users know that each source has its own limitations and uncertainties, though there are always challenges in quantifying and communicating them. In the case of the 2021 M7.2 Haiti earthquake, compounding the difficulty in assessing the immediate shaking damage were reports of widespread landslides that added uncertainty as to the cause of remotely assessed physical changes. Further changes resulted from tropical storm rainfall and flooding that began soon after the event. This earthquake emphasized the benefits and importance of modeled hazard and loss estimates, remotely sensed observations and information gathered locally and assessed remotely. Field assessments by numerous international teams were limited due to Haiti's governmental limitations, security concerns and other on-the-ground challenges.

In this session, we solicit studies of all means of contributing to post-event situational awareness for decision-makers, responders and aid agencies, be it from physical or empirical modeling, ground-truth or remotely sensed data collection, or combinations of thereof. We are also intent on gathering experience or evidence of best practices in communicating actionable information and their uncertainties for the 2021 Haiti and other events. Analyses that consider the complexity of response and recovery from simultaneous, cascading and multi-hazard events are particularly welcome.

Conveners: David J. Wald, U.S. Geological Survey (wald@usgs.gov); Heidi Stenner, Geohazards International (stenner@geohaz.org); Eric Fielding, NASA Jet Propulsion Laboratory (eric.j.fielding@jpl.nasa.gov); Haeyoung Noh, Stanford University (noh@stanford.edu); Susu Xu, SUNY Stonybrook (susu.xu@stonybrook.edu); Kate E. Allstadt, U.S. Geological Survey (kallstadt@usgs.gov)

Multi-scale Dynamics of Complex Earthquake Faulting and Seismic Wave Propagation

The complexity of earthquake rupture and the parameters that control such behavior is an active area of investigation that includes many challenging research topics. This session will highlight recent advances in rupture dynamics on complex fault systems and their comparison with different types of available observations. We are interested in a wide range of investigations related to numerical, experimental and observational fault rupture studies that examine the effects of fault geometry, fault roughness, frictional parameters, topography, creeping mechanisms, stress asperities, off-fault material properties and plasticity, bi-material interfaces and wedge structures along subduction zones. We also encourage contributions on research that explores links between earthquake source physics, tsunami generation/propagation and ground motion variability.

Conveners: Kenny Ryan, Air Force Research Laboratory (0k.ryan0@gmail.com); Roby Douilly, University of California, Riverside (roby.douilly@ucr.edu); Christodoulos Kyriakopoulos, University of Memphis (ckyrkpls@memphis.edu); Eric L. Geist, U.S. Geological Survey (egeist@usgs.gov); Ruth Harris, U.S. Geological Survey (harris@usgs.gov); David D. Oglesby, University of California, Riverside (david.oglesby@ucr.edu)

Network Seismology: Recent Developments, Challenges and Lessons Learned

Seismic monitoring is not only an essential component of earthquake response but also forms the backbone of a substantial amount of research into seismic hazards, the earthquake process and seismotectonics. As such, it is important to continue to develop monitoring networks' abilities to accurately and rapidly catalog earthquakes to ensure networks best serve the public, government and academic communities. Due to the operational environment of seismic monitoring, seismic networks encounter many unique challenges not seen by the research community. In this session, we highlight the unique observations and challenges of monitoring agencies and look to developments that may improve networks' ability to fulfill their missions. Seismic operation centers play a crucial role in collecting seismic data, generating earthquake products and including catalogs, warnings and maps of ground shaking. The purpose of the session is to foster collaboration between network operators, inform the wider seismological community of the interesting and challenging problems within network seismology and look to the future on how to improve monitoring capabilities. This session is not only an opportunity for monitoring agencies to highlight new developments in their capabilities, but we also encourage submissions describing new techniques that would benefit network operations for detecting, locating and characterizing earthquakes, particularly in a near real-time environment.

Conveners: William L. Yeck, U.S. Geological Survey (wyeck@usgs.gov); Kris L. Pankow, University of Utah (pankowseis2@gmail.com); Renate Hartog, University of Washington (jrhartog@uw.edu)

New Developments in Physics- and Statistics-based Earthquake Forecasting

The increasing availability of geophysical datasets, including high-resolution earthquake catalogs, fault information and interseismic strain data, has enabled the creation of statistics- and physics-based seismicity models that underpin probabilistic seismic hazard analyses. Recently, data acquisition has further improved from machine learning (ML) techniques, which paves the way for potentially more informative earthquake forecasts. Earthquake forecasting models express a wide range of hypotheses regarding the occurrence of earthquakes, which can be tested within the framework of the Collaboratory for the Study of Earthquake Predictability (CSEP). We welcome contributions that help uncover the main advantages and limitations of statistical and physics-based seismicity models, identify informative forecasting methods and improve our understanding of the earthquake generation process. Submissions may include forecasting models based on ML-derived catalogs, new hypotheses explaining what controls earthquake potential or evaluations of the predictive skills of earthquake-rate forecasts.

Conveners: Jose Bayona, University of Bristol (jose.bayona@bristol.ac.uk); William H. Savran, Southern California Earthquake Center (wsavran@usc.edu); Leila Mizrahi, ETH Zurich (leila.mizrahi@sed.ethz.ch)

Numerical Modeling in Seismology: Developments and Applications

We invite both methodological contributions and useful applications. Progress in seismology is unthinkable without continuous development of numerical-modeling methods. Recent methodological development includes faithful rheological and geometrical complexity of the Earth, important seismological phenomena, time-space discretization, optimizations of computational algorithms and computer codes, optional balance between accuracy and efficiency. Recent methodological progress in numerical modeling in seismic exploration poses a useful challenge for numerical modeling in earthquake seismology.

New observations and data make applications of numerical modeling very important for understanding rupture dynamics, seismic wave propagation, earthquake ground motion including non-linear behavior, seismic noise and earthquake hazard. We especially welcome applications to compelling observational issues in seismology.

Conveners: Peter Moczo, Comenius University Bratislava (moczo@fmph.uniba.sk); Alice-Agnes Gabriel, Ludwig-Maximilians-University of Munich (gabriel@geophysik.uni-muenchen.de); Wei Zhang, Southern University of Science and Technology Shenzhen (zhangwei@sustech.edu.cn); Emmanuel Chaljub, Université Grenoble Alpes (emmanuel.chaljub@univ-grenoble-alpes.fr); Jozef Kristek, Comenius University Bratislava (kristek@fmph.uniba.sk); Martin Galis, Comenius University Bratislava (martin.galis@uniba.sk); Arben Pitarka, Lawrence Livermore National Laboratory (pitarka1@llnl.gov)

Observations and Modeling of the 2021 Haiti Earthquake

The August 14, 2021 Mw7.2 Nippes, Haiti earthquake ruptured along the Enriquillo-Plantain Garden Fault Zone (EPGFZ), about 100 km west of the devastating 2010 Mw7.0 Leogane, Haiti earthquake. The EPGFZ is part of a system of strike slip and thrust faults that comprise the transpressive boundary between the North American and Caribbean plate. In this session, we plan to highlight observations and models of this rupture sequence, informing the ongoing debate on how this complex fault system partitions strain as it transitions from subduction to strike-slip regimes. In bringing together the latest observations and models of the 2021 earthquake, we hope to forge new perspectives on ongoing seismic hazards in the region.

We welcome all abstract submissions related to observations and models of the 2021 earthquake. This includes rupture imaging, relocated aftershock sequences, field observations, surface rupture observations, ground failure observations, landslide observations, rupture modeling and hazard modeling. Submissions with retrospective analyses of the 2010 earthquake that shed light on the broader context of the earthquake sequence are also welcome.

Conveners: H. Zoe Yin, University of California, San Diego (hyin@ucsd.edu); Alice-Agnes Gabriel, Ludwig Maximilian University of Munich (alice.gabriel@web.de); Roby Douilly, University of California, Riverside (robyd@ucr.edu)

Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?

Probabilistic seismic hazard assessments (PSHA) are widely used in building codes and other standards and guidelines in determination of seismic loads for seismic resistant design. Many types of input go into PSHA, such as an earthquake catalogues (requiring a robust assessment of earthquake magnitudes, locations, depths, etc.), active fault information (geometry, sense of motion on the fault, recurrence and slip rate estimates, etc.) and prediction of strong ground motion through ground motion models (GMMs), which can be empirical. GMMs require large amounts of recorded strong motion or analytical data and simulations that may have varying degrees of sophistication. In addition, PSHA is increasingly conducted for multiple ground conditions rather than being pegged to a "reference" site condition characterized in terms of Vs30. In this session we discuss how to rethink and improve some of these inputs, keeping in mind the end goal of determining seismic loads for engineering design. To that end, we welcome contributions related to topics including but not limited to: improvements in moment magnitude calculations and magnitude conversions; earthquake relocations; how to improve upon declustering earthquake catalogues for PSHA purposes; how to incorporate our current knowledge in active faults into PSHA, particularly in places where that knowledge is sparse; whether we can move beyond "active" and "stable" crustal GMMs to adequately capture the variation in attenuation characteristics for shallow crustal earthquakes; objective vs. subjective decision making in selecting GMMs and how simulations can help resolve some important issues around ground motion characterization in PSHA.

Conveners: Tuna Onur, Onur Seemann Consulting, Inc. (tuna@onurseemann.com); Rengin Gok, Lawrence Livermore National Laboratory (gok1@llnl.gov); Kristin Morell, University of California, Santa Barbara (kmorell@geol.ucsb.edu); Arben Pitarka, Lawrence Livermore National Laboratory (pitarka1@llnl.gov); Mark Petersen, U.S. Geological Survey (mpetersen@usgs.gov)

Searching for Fault Creep Over a Range of Timescales

Creep is well-expressed on fast slipping faults in developed areas (ex: the Hayward fault, California). In the absence of fault creep, geoscientists often assume that all fault slip over historic and geologic time scale is accommodated seismically. However, this assumption is not currently testable as the broader earthquake hazard community does not have well-developed methods for distinguishing seismic from aseismic transient displacement in the geologic record. The impacts of this assumption on hazard assessment are likely profound. How much does interseismic creep contribute to periodic, quasi-periodic, random or clustered earthquake recurrence? What is the impact on the spatio-temporal distribution of microseismicity, geologic slip rate calculations and earthquake rupture forecasting?

This session seeks to understand geologic, geodetic, seismologic, numerical and physical modeling insights into including the following: 1) What are observations of creep in the geodetic, paleoseismic and geologic record?; 2) When does shallow aseismic occur during the seismic cycle?; 3) Does lithology impact the distribution and preservation of creep?; 4) Do fault zone mechanical and physical properties control creeping versus seismic behavior?; 5) What do creeping faults teach us about seismogenic faults? and 6) What is missed in hazard by misidentifying aseismic as coseismic slip? We invite contributions that aim to answer these or other questions for creeping faults.

Conveners: Alexandra E. Hatem, U.S. Geological Survey (ahatem@usgs.gov); Veronica Prush, McGill University (vbprush@ucdavis.edu); Christie Rowe, McGill University (christie.rowe@mcgill.ca); Chelsea Scott, Arizona State University (cpscott1@asu.edu)

Seismo-geodetic Approaches for Seismic and Tectonic Processes

Geodetic tools have become routine in studies of tectonic plate motions, ground deformation, dynamic seismic observations, earthquake early warning and short-/long-term seismic hazard projections. Geodesy complements seismic observations by increasing the spatial resolution of seismic source models, spatially and temporally characterizing tectonic deformation and providing additional constraints on seismic processes. Advances to geodetic data processing and its incorporation in evolving seismological methods contribute to faster and more reliable seismic and disaster-mitigation applications.

This session welcomes contributions in the field of seismo-geodesy. We invite abstracts relating to any geodetic tool (e.g., GNSS, InSAR, strain, etc.) demonstrating new applications, improvements or analyses of tectonic deformation, specific earthquakes or sequences or other seismic processes with geodetic observations. We encourage submissions that illustrate the complementary nature of geodetic methods to their seismological counterparts, providing a comprehensive picture of a given seismic or tectonic process.

Conveners: Revathy M. Parameswaran, University of Alaska Fairbanks (rmparameswaran@alaska.edu); Dara E. Goldberg, U.S. Geological Survey (degoldberg@usgs.gov)

Shakes in Lakes: Frontiers in Lacustrine Paleoseismology

Lacustrine paleoseismology studies show that lakes can provide superior records of earthquake shaking for hazard analysis and understanding earthquake behavior. Earthquake-induced strong ground motions can result in the mobilization and redeposition of sediments in lakes. Thus, records of earthquake shaking can extend thousands of years with near annual resolution and be sensitive to earthquakes with Modified Mercalli Intensities as low as IV½. These advantages can provide a much more complete record of earthquake shaking than traditional paleoseismic records from trenches or coastal marshes, although single-lake records are generally agnostic of the seismic source.

Uniquely, lakes can record earthquake shaking from seismic sources that cannot be directly examined, such as intraslab or intraplate events. And multi-lake records in some regions show high potential for resolving source faults.

We invite presentations on all aspects of the emerging field of lacustrine paleoseismology and potential uses of these records. We encourage presentations on the following topics: tectonic settings and types of lake environments, the discrimination between earthquake and climatically induced turbidites, the links between deposit characteristics and shaking parameters (MMI, duration, PGA), the evaluation of seismic sources and the novel ways of including these data in hazard evaluation.

Conveners: Peter J. Haeussler, U.S. Geological Survey (pheuslr@usgs.gov); Maarten Van Daele, Ghent University (maarten.vandaele@ugent.be); Jamie Howarth, Victoria University of Wellington (jamie.howarth@vuw.ac.nz)

Site Response Characterization in Seismic Hazard Analysis

Ergodic ground motion models (GMMs) represent site response (SR) as a function of explanatory variables, such as V S30 (time-averaged shear wave velocity in the top 30 m). Such SR models make the ergodic assumption that any sites with the same values of explanatory variables will have the same SR. However, it is well known that the SR at a given site (non-ergodic site response, NESR) can significantly differ from that estimated by the ergodic SR model. Moreover, when applied to scenarios for which the empirical observations are sparse (e.g. V S30 > 1500 m/s), ergodic SR estimates from the GMMs could be systematically biased. To perform site response characterization (SRC) for a site of interest, 1D ground response analyses (GRA) are often performed, requiring SR input parameters such as a V S profile to derive a model-based NESR (M-NESR). An alternative approach uses ground motion recordings at the site of interest to perform SRC and derive an empirical NESR (E-NESR), without the need to perform GRA or make assumptions on GRA model and input parameters.

This session solicits a broad range of approaches used for SRC. Topics of interest include active-/passive geophysical surveys (e.g., linear/2D, single-/multi-station surface-based array methods, down-/cross-hole methods, seismic interferometry, etc.) to develop M-NESR, studies using site-specific recordings to derive E-NESR, the use of machine learning in SRC and studies comparing results from different techniques and their associated epistemic uncertainties. Of special interest are studies performing SRC outside the applicable range of ergodic GMMs (e.g. V S30 > 1500 m/s); studies on improving current practice in SRC, e.g., the search of optimal SR proxy (beyond V S30 or site dominant frequency); 2D/3D site effects; SR uncertainty and variability; soil nonlinearity; the effect of topography and fractured rocks on ground motion amplification and attenuation and integration of site effects into seismic hazard analysis.

Conveners: Behzad Hassani, BC Hydro (behzad.hassani@bchydro.com); Marco Pilz, GFZ Potsdam (pilz@gfz-potsdam.de); Sean K. Ahdi, U.S. Geological Survey (sahdi@usgs.gov); Gail M. Atkinson, Western University (gmatkinson@aol.com); Anna Kaiser, GNS Science (a.kaiser@gns.cri.nz); Marta Pischiutta, Istituto Nazionale di Geofisica e Vulcanologia (marta.pischiutta@ingv.it); Jonathan P. Stewart, University of California Los Angeles (jstewart@seas.ucla.edu); Chuanbin Zhu, GFZ Potsdam (chuanbin@gfz-potsdam.de)

Structure and Seismogenesis of Subducting Slabs

Sinking slabs provide the major force that drives Earth's interior dynamics and plate tectonics. They also carry volatiles such as water and CO2 into the deep mantle and impact the geochemical evolution of the Earth. Deep earthquakes (depth > 70 km) are absent in the mantle except in subducting slabs, mantle wedges, or regions of continental convergence. They can be further categorized as intermediate-depth earthquakes (70-350 km depth) and deep-focus earthquakes (350-700 km). Their causes and mechanisms remain a major scientific puzzle.

In this session, we invite contributions that characterize the structure and properties of subducting slabs, as well as new findings about deep earthquakes. We welcome observational, theoretical and numerical modeling results, as well as those from laboratory and field studies. New ideas and/or unusual observations, supported by numerical modeling, on how to study slabs and deep earthquakes are also welcome. Relevant techniques may include, but are not limited to seismic imaging, waveform inversion, seismic anisotropy, moment tensors, precise location of deep earthquakes and their statistical behaviors. Broader scientific issues to be addressed may include constraints on deep seismogenesis, slab structure and stress in subducting slabs, as well as interactions between these topics.

Conveners: Yingcai Zheng, University of Houston (yzheng12@uh.edu); Neala Creasy, Colorado School of Mines (nmcreasy@mines.edu); Heidi Houston, University of Southern California (houstonh@usc.edu); Zhigang Peng, Georgia Tech (zpeng@gatech.edu); German A. Prieto, Universidad Nacional de Colombia (gaprietogo@unal.edu.co)

Tectonics and Seismicity of Intraplate Regions

Far from active plate boundaries, in stable continental interiors of central and eastern North America, northern Europe, Australia, parts of Asia, as well as in some offshore regions, tectonic deformation and seismicity are poorly known. New understandings of intraplate tectonic activity and associated seismicity are being achieved through a variety of approaches. Some take advantage of recent local, regional or national-scale geophysical experiments, using various technologies to monitor or image both onshore and offshore regions. Detailed studies of individual recent earthquakes or sequences and new methods of identifying smaller earthquakes from existing data have provided insights into subsurface faulting. Moreover, advances are being made in measuring historical slip on faults and estimating recurrence intervals. Our understanding has also increased from investigations of geodetic, geomorphologic and elevation changes and through improved measurements of local stresses. Complementing these approaches are studies that

focus on ground motion attenuation and local site responses in continental interior regions, highlighting the impact intraplate earthquakes can have on seismic hazard assessments.

This session seeks diverse contributions related to intraplate earthquakes with goals of describing seismicity, identifying and characterizing active faults and/or deformation in stable continental interiors or offshore regions, deciphering long-term earthquake histories, assessing potential ground motion impacts, constraining models of kinematics and geodynamic properties and understanding the mechanisms that cause enigmatic intraplate earthquakes.

Conveners: Anjana K. Shah, U.S. Geological Survey (ashah@usgs.gov); Francesca Di Luccio, Istituto Nazionale di Geofisica e Vulcanologia, ROMA1 (francesca.diluccio@ingv.it); Will Levandowski, TetraTech (bouldergeophysics@gmail.com); Mimmo Palano, Istituto Nazionale di Geofisica e Vulcanologia, OE (mimmo.palano@ingv.it); Laura Scognamiglio, Istituto Nazionale di Geofisica e Vulcanologia, ONT (laura.scognamiglio@ingv.it)

Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources

Although earthquakes are well known sources of seismic and acoustic energy, there are many others that produce such signals, which can occasionally perplex scientists: explosions, underground cavity collapses, landslides, volcanic activity and human activities (planned and accidental), to name just a few. This session focuses on improvements in methods to detect these types of sources and identify what causes them amid the background of the Earth's seismicity. We seek studies that can better characterize these sources in terms of their location, size and physics with a goal of better explaining what happened to produce such signals. Many techniques have been used over the years to accomplish this task including: seismic/acoustic energy partitioning; moment tensor characterization through waveform modeling; P/S, low/high frequency, Rayleigh/Love and other types of seismic amplitude ratios; as well as many types of magnitude ratios such as m_b:M_s and M_L:M_c. The successful methods vary greatly with source to receiver distance and frequency content in ways that are not completely understood. More recently waveform correlation methods have had great success in identifying repeated sources and can be used to drive down detection levels for such events. Most recently, when appropriate training data are available, machine learning and methods are being explored for these purposes. In this session we seek studies on all types of non-earthquake seismic acoustic sources and the methods used to find and describe them.

Conveners: William R. Walter, Lawrence Livermore National Laboratory (walter5@llnl.gov); Catherine M. Snelson, Los Alamos National Laboratory (snelsonc@lanl.gov); Robert E. Abbott, Sandia National Laboratories (reabbot@sandia.gov)

Using Data and Experience to Improve Geohazards Communication

Effective communication of potential and unfolding geohazards and the science that underpins our understanding of these hazards is critical for delivering accurate information to various stakeholders, including religious, community and government leaders, scientists, emergency responders and managers, and the interested and at-risk public. While good communication techniques are paramount in any science communication, geohazards communication requires special considerations and different groups, organizations and universities may play different (but key) roles in the communication process.

This session aims to 1) explore research-based evidence and case studies of communicating about geohazards through various types of media and to different communities, 2) share lessons learned and best practices for communicating geohazards in the public sphere and 3) facilitate community-wide discussion about how we can more accurately, effectively and responsibly communicate geohazards science to a broad audience using various media and communications partnerships.

Conveners: Wendy Bohon, Incorporated Research Institutions for Seismology (wendy.bohon@iris.edu); Scott Johnson, UNAVCO (scott.johnson@unavco.org); Lisa Wald, U.S. Geological Survey (lisa@usgs.gov)

What Controls the Style of Fault Slip in Subduction Zones?

The heterogeneous structure of the plate boundary fault zone has a first-order impact on the style of fault slip that occurs at the subduction interface, both within the megathrust and neighboring regions of the seismogenic zone where slow earthquakes occur. For example, subducting seamounts appear to control the segmentation of the megathrust; at a smaller scale, tremor-generating seismic asperities are spatially stationary across multiple slow slip events that each have their own unique rupture evolution. Other controls on structure such as lithology, elevated pore fluid pressures and changing stress states can also play a role in determining faulting style. The outstanding question we would like to address is: what is the impact of subducting plate interface structure on the broad spectrum of faulting that is observed?

We seek abstracts that shed light on the impact of such fault structure (including but not limited to heterogeneity, lithology, pore fluid pressure and stress state) on the mode of fault slip. We welcome abstracts focused on individual aspects of structure and faulting dynamics, including but not limited to geophysical imaging, earthquake source, and numerical modeling studies, whose connections will be explored within the greater context of the session. Our hope is that this session will build off of, and contribute to, the momentum surrounding the community-driven Subduction Zones in 4 Dimensions (SZ4D) initiative.

Conveners: Qingyu Wang, Massachusetts Institute of Technology (qingyuwa@mit.edu); Alice-Agnes Gabriel, Ludwig Maximilian University of Munich (alice.gabriel@web.de); Keisuke Yoshida, Tohoku University (keisuke.yoshida.d7@tohoku.ac.jp); William B. Frank, Massachusetts Institute of Technology (wfrank@mit.edu)

BSSA CALL FOR PAPERS

The ***Bulletin of the Seismological Society of America (BSSA)*** is soliciting manuscripts for a special section on Caribbean Tectonics, Seismicity and Earthquake Hazards. Accepted articles will be published online soon after acceptance and collectively in print in an issue coinciding with SSA's Annual Meeting in San Juan, Puerto Rico, in April 2023.

Deadline for Submission: 1 June 2022

Possible topics for manuscripts include, but are not limited to: studies of regional and local seismicity; paleoseismic studies of active faults; analyses of crustal deformation; characterization of ground motions and site effects as applied to important infrastructure; engineering seismic studies of major facilities; geodynamic and kinematic modeling, interpretations of volcano seismicity, and presentation of new results facilitated by improved observational networks. We also encourage manuscripts focusing on disaster reconnaissance and societal impacts of earthquakes or other hazards, as well as papers on science communication, participatory/citizen science, and risk mitigation.

KATE ALLSTADT / USGS

Guest Editors:

Eric Calais, Ecole Normale Supérieure, France (eric.calais@ens.fr)

Silvia Chacón-Barrantes, SINAMOT Universidad Nacional, Costa Rica (silviach@una.ac.cr)

Roby Douilly, University of California, Riverside, USA (roby.douilly@ucr.edu)

O'Leary Gonzalez, Centro Nacional de Investigaciones Sismológicas de Cuba (oleary@cenais.cu)

Xyoli Pérez-Campos, Universidad Nacional Autónoma de México (xyoli@igeofisica.unam.mx)

Richard Robertson, The UWI Seismic Research Centre, West Indies (Richard.Robertson@sta.uwi.edu)

Elizabeth Vanacore, University of Puerto Rico Mayagüez (elizabeth.vanacore@upr.edu)

Authors must follow *BSSA* author guidelines (**seismosoc.org/publications/bssa-submission-guidelines/**) and submit papers through its online submission system (**edmgr.com/bssa**) under the category **Caribbean Special Section**.

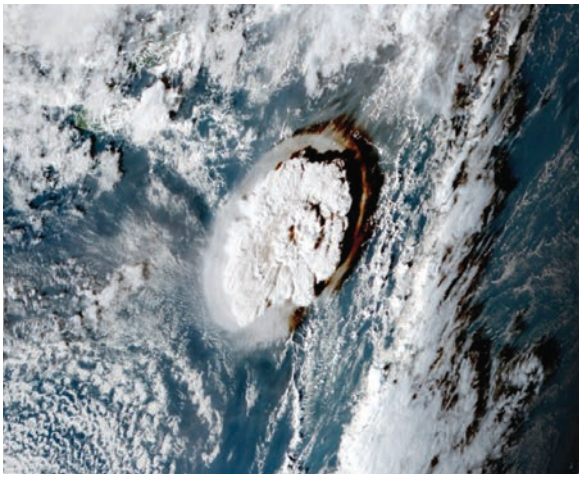
Questions about scientific issues? Contact the guest editors or *BSSA* Editor-in-Chief **Martin Mai** at **bssaeditor@seismosoc.org**. Submission-related questions? Contact **Emily Hammond**, *BSSA* manuscript coordinator, at **bssamss@seismosoc.org**.

SRL CALL FOR PAPERS

Seismological Research Letters (SRL) is soliciting papers for a focus section on the 15 January 2022 Hunga Tonga-Hunga Ha'apai eruption and tsunami. Accepted articles will be published online soon after acceptance and collectively in print in the March 2023 issue.

Deadline for Submission: 1 August 2022

The focus section invites papers on any topic associated with the Hunga Tonga-Hunga Ha'apai Eruption and Tsunami, including but not limited to the eruption, its size and timeline; associated atmospheric, oceanic and solid Earth phenomena and their effects; sources, characteristics and effects of the tsunami both locally and throughout the oceans; remote or nearby measurements of any phenomena associated with the eruption by any single or combination of terrestrial, oceanic, atmospheric or space-based instrumentation; as well as the assessment of eruption- and tsunami-caused hazards, their communication, impacts and implemented response activities as well as the effectiveness of the response and proposals for improving response plans.



CSU/CIRA AND JAXA/JMA

Guest Editors:

Stephen Arrowsmith, Southern Methodist University (sarrowsmith@mail.smu.edu)

Hugo Delgado-Granados, Universidad Nacional Autónoma de México (hdg@igeofisica.unam.mx)

James Gridley, National Tsunami Warning Center (james.gridely@noaa.gov)

Peggy Hellweg, University of California, Berkeley (hellweg@berkeley.edu)

Ronan Le Bras, Comprehensive Nuclear-Test-Ban Treaty Organization (ronan.lebras@ctbto.org)

Steven Sherburn, GNS Science (S.Sherburn@gns.cri.nz)

Authors must follow *SRL* author guidelines at **seismosoc.org/publications/srl-authorsinfo/** and submit papers through its online submission system (**edmgr.com/srl**) under the category **Hunga Tonga-Hunga Ha'apai Eruption**.

Questions about scientific issues? Contact the guest editors or *SRL* Editor-in-Chief **Allison Bent** at **srleditor@seismosoc.org**. Submission-related questions should be addressed to the *SRL* Editorial Office at **srl@seismosoc.org**.

ORAL SESSIONS WEDNESDAY, 20 APRIL

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*	*Cedar*	*Regency A–C*	*Regency E–G*
8–9:15 AM	Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources	De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances	Advancing Multi-scale Evaluations of Seismic Attenuation	50-State Update of the USGS National Seismic Hazard Models	Tectonics and Seismicity of Intraplate Regions	Numerical Modeling in Seismology: Developments and Applications	Advances in Geophysical Sensing
9:15–10 AM	Poster Break						
10–11:15 AM	Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources *(continued)*	De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances *(continued)*	Advancing Multi-scale Evaluations of Seismic Attenuation *(continued)*		Tectonics and Seismicity of Intraplate Regions *(continued)*	Numerical Modeling in Seismology: Developments and Application	50-State Update of the USGS National Seismic Hazard Models
11:30 AM–12:30 PM	Plenary: Science and Technology from a Makah Perspective—Incorporation of Native American Knowledge Systems						
12:30–2 PM	Lunch Break						
2–3:15 PM	Fault Damage Zones: What We Know and Do Not	Using Data and Experience to Improve Geohazards Communication	Advances in Geospatial Modeling of Seismic Hazards	What Controls the Style of Fault Slip in Subduction Zones?	The Effects of Sedimentary Basins on Earthquake Ground Motions	Tectonics and Seismicity of Intraplate Regions	50-State Update of the USGS National Seismic Hazard Models
3:15–4:30 PM	Poster Break						
4:30–5:45 PM	Fault Damage Zones: What We Know and Do Not *(continued)*	Improving Strong-motion Data, Products and Services: From Waveform Quality to Open Dissemination	Imaging, Monitoring and Induced Seismicity: Applications to Energy and Storage		The Effects of Sedimentary Basins on Earthquake Ground Motions *(continued)*	Modeling, Collecting and Communicating Post-earthquake Hazard and Impact Information	What Controls the Style of Fault Slip in Subduction Zones?
6–7 PM	*Plenary:* The Future of Subduction Zone Science						
7–8 PM	Early-Career & Student Reception						

ORAL SESSIONS THURSDAY, 21 APRIL

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*	*Cedar*	*Regency A–C*	*Regency E–G*
8–9:15 AM	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?	Characteristics, Hazards and Evolution of the Gorda Region of the Cascadia Subduction Zone	The 15 January 2022 Tonga Eruption and Tsunami	Earthquake Source Processes at Various Scales: Theory and Observations	Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science	The Effects of Sedimentary Basins on Earthquake Ground Motions	Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring
9:15–10 AM	Poster Break						
10–11:15 AM	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal? *(continued)*	Characteristics, Hazards and Evolution of the Gorda Region of the Cascadia Subduction Zone *(continued)*	Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors		Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science *(continued)*	Earthquake Source Processes at Various Scales: Theory and Observations *(continued)*	Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring *(continued)*
11:30 AM–12:30 PM	SSA President's Address and Awards Ceremony						
12:30–2 PM	Lunch Break						
2–3:15 PM	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?		Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science *(continued)*	The 15 January 2022 Tonga Eruption and Tsunami	Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors	Shakes in Lakes: Frontiers in Lacustrine Paleoseismology	Seismo-geodetic Approaches for Seismic and Tectonic Processes
3:15–4:30 PM	Poster Break						
4:30–5:45 PM	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal? *(continued)*		Development, Enhancement and Validation of Seismic Velocity Models		The 15 January 2022 Tonga Eruption and Tsunami *(continued)*	Extraterrestrial Seismology: Seismology from Mars, the Moon and Everywhere	Insights from Earthquakes in and Around Alaska in the 20 Years Since the Denali Fault Earthquake
6–7 PM	*Plenary:* The Future of Subduction Zone Science						
7–8 PM	Joyner Reception						

ORAL SESSIONS FRIDAY, 22 APRIL

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*	*Cedar*	*Regency A–C*	*Regency E–G*
8–9:15 AM	Earthquakes in the Urban Environment	New Developments in Physics- and Statistics-based Earthquake Forecasting	Frontiers in Earthquake and Tsunami Science—Model Integration, Recent Advances, Ongoing Questions	Earthquake Source Processes at Various Scales: Theory and Observations	Advances in Seismoacoustic Methods for Explosion Monitoring	Distributed Deformation from Surface Fault Rupture	Site Response Character-ization in Seismic Hazard Analysis
9:15–10 AM	Poster Break						
10–11:15 AM	Earthquakes in the Urban Environment *(continued)*	New Developments in Physics- and Statistics-based Earthquake Forecasting *(continued)*	Structure and Seismogenesis of Subducting Slabs		Advances in Seismoacoustic Methods for Explosion Monitoring *(continued)*	Earthquake Source Processes at Various Scales: Theory and Observations	Site Response Character-ization in Seismic Hazard Analysis *(continued)*
11:30 AM–12:30 PM	*Plenary*: Frontiers in Seismology						
12:30–2 PM	Lunch Break						
2–3:15 PM	Network Seismology: Recent Developments Challenges and Lessons Learned *(continued)*	Adjoint Waveform Tomography: Methods and Applications	Multi-scale Dynamics of Complex Earthquake Faulting and Seismic Wave Propagation	Structure and Seismogenesis of Subducting Slabs	Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy	Advances in Seismoacoustic Methods for Explosion Monitoring *(continued)*	Site Response Character-ization in Seismic Hazard Analysis *(continued)*
3:15–4:30 PM	Poster Break						
4:30–5:45 PM		Adjoint Waveform Tomography: Methods and Applications *(continued)*		Advances in the Use of Seismic and Acoustic Methods to Constrain Physical Processes at Volcanoes	Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy *(continued)*	Network Seismology: Recent Developments, Challenges and Lessons Learned *(continued)*	Frontiers in Marine Seismology

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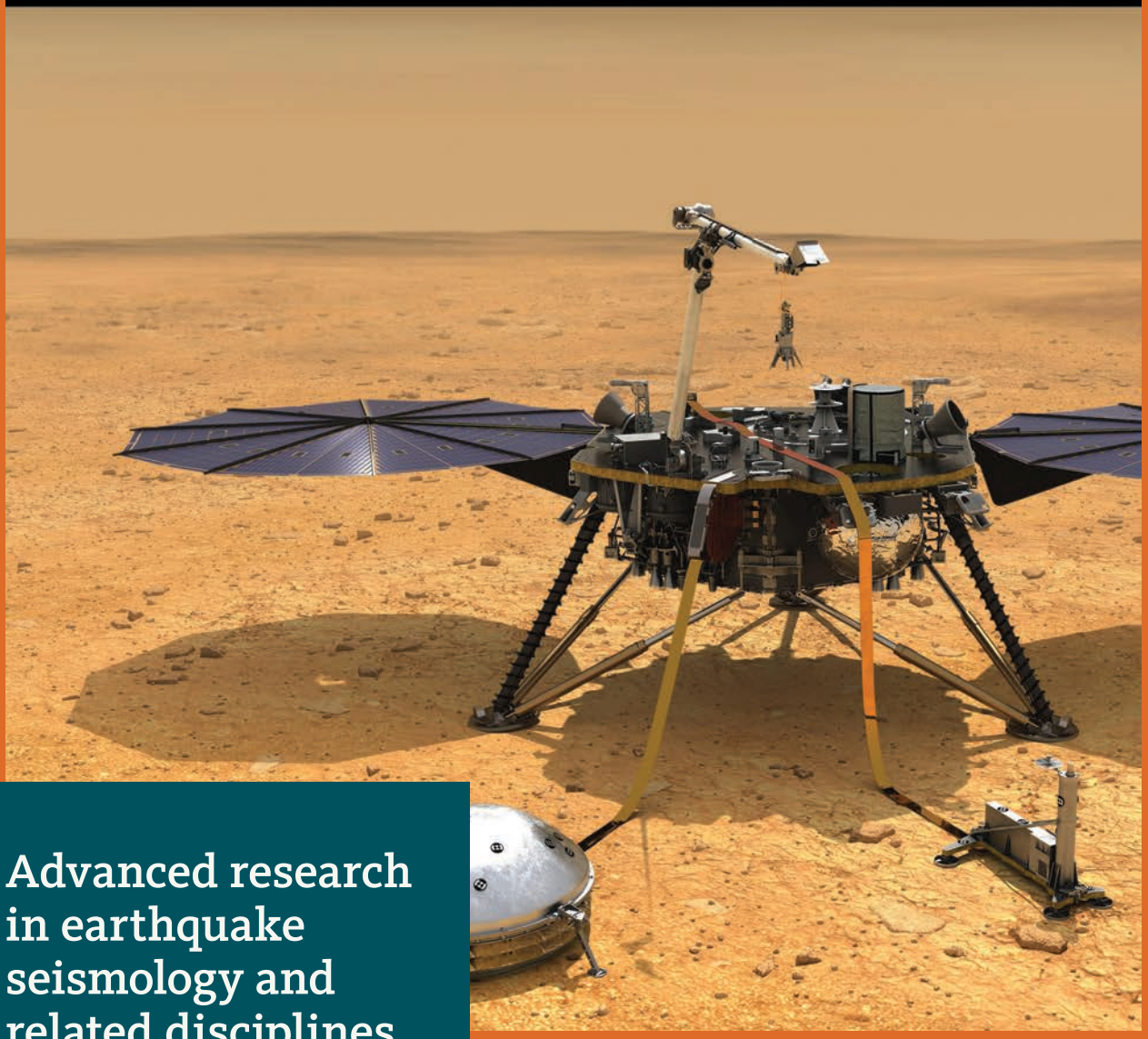
BSSA

Bulletin of the Seismological Society of America

Special Section
Martian Seismology and the InSight Mission to Mars



Advanced research in earthquake seismology and related disciplines

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Poster Sessions

Wednesday, 20 April

EVERGREEN BALLROOM

- 50-State Update of the USGS National Seismic Hazard Models
- Adjoint Waveform Tomography: Methods and Applications
- Advances in Geophysical Sensing
- Advances in Geospatial Modeling of Seismic Hazards
- Advancing Multi-scale Evaluations of Seismic Attenuation
- De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances
- Diversity, Equity and Inclusion in Seismology
- The Effects of Sedimentary Basins on Earthquake Ground Motions
- Exploring Earthquake Source Dynamics and Wave Propagation Properties in Tectonic and Lab Environments
- From Desktops to HPC & Cloud: Emerging Strategies in Large-scale Geophysical Data Analysis
- Imaging, Monitoring and Induced Seismicity: Applications to Energy and Storage
- Improving Strong-motion Data, Products and Services: From Waveform Quality to Open Dissemination
- Modeling, Collecting and Communicating Post-earthquake Hazard and Impact Information
- Numerical Modeling in Seismology: Developments and Applications
- Observations and Modeling of the 2021 Haiti Earthquake
- Searching for Fault Creep Over a Range of Timescales
- Tectonics and Seismicity of Intraplate Regions
- Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources
- Using Data and Experience to Improve Geohazards Communication
- What Controls the Style of Fault Slip in Subduction Zones?

Thursday, 21 April

EVERGREEN BALLROOM

- The 15 January 2022 Tonga Eruption and Tsunami
- Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science
- Characteristics, Hazards and Evolution of the Gorda Region of the Cascadia Subduction Zone
- Development, Enhancement and Validation of Seismic Velocity Models
- Earthquake Source Processes at Various Scales: Theory and Observations
- Everything Old Is New Again—Resurging Use of Analog Data
- Extraterrestrial Seismology: Seismology from Mars, the Moon and Everywhere
- Fault Damage Zones: What We Know and Do Not
- Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors
- Insights from Earthquakes in and Around Alaska in the 20 Years Since the Denali Fault Earthquake
- Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring
- Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?
- Seismo-geodetic Approaches for Seismic and Tectonic Processes
- Shakes in Lakes: Frontiers in Lacustrine Paleoseismology

Poster Sessions

Friday, 22 April

EVERGREEN BALLROOM

- Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy
- Advances in Seismoacoustic Methods for Explosion Monitoring
- Advances in the Use of Seismic and Acoustic Methods to Constrain Physical Processes at Volcanoes
- Distributed Deformation from Surface Fault Rupture
- Earthquakes in the Urban Environment
- Frontiers in Earthquake and Tsunami Science—Model Integration, Recent Advances, Ongoing Questions
- Frontiers in Marine Seismology
- Multi-scale Dynamics of Complex Earthquake Faulting and Seismic Wave Propagation
- New Developments in Physics- and Statistics-based Earthquake Forecasting
- Network Seismology: Recent Developments, Challenges and Lessons Learned
- Structure and Seismogenesis of Subducting Slabs
- Site Response Characterization in Seismic Hazard Analysis

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Technical Program

Wednesday, 20 April 2022—Oral Sessions

Presenting author is indicated in bold.

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources	**De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances**	**Advancing Multi-scale Evaluations of Seismic Attenuation**	**50-State Update of the USGS National Seismic Hazard Models**
8 AM	STUDENT: Oceanic Microseisms in Alaska. **John, S.**, West, M. E.	Managing Induced Seismicity in Near-real Time: A Case History from Finland. Malin, P. E. A., **Passmore, K.**, Kwiatek, G., Dresen, G., Chendorain, M., *et al.*	INVITED: Some Remarks on Seismic Attenuation in Shallow Geological Layers. **Parolai, S.**	INVITED: 2023 US 50-State National Seismic Hazard Model. **Petersen, M. D.**, Shumway, A. M., Powers, P. M., Field, E. H., Moschetti, M. P., *et al.*
8:15 AM	STUDENT: Analysis of Sustained and Extensive Tidally Triggered Seismicity on the Ross Ice Shelf. **Eckert, E. E.**	Rupture Behaviour of Geothermal Fluid-induced Microseismicity from Combining Directivity and Focal Mechanisms in Helsinki, Finland. **Holmgren, J. M.**, Kwiatek, G., Werner, M. J.	INVITED: The Good, the Bad and the Ugly: Investigating Bias in High-frequency Attenuation Using Noise Modeling. **Ktenidou, O.**, Pikoulis, E.	The 2023 Update of the Alaska National Seismic Hazard Model. **Powers, P. M.**, Altekruse, J. M., Clayton, B. S., Shumway, A. M., Girot, D. L.
8:30 AM	Insights From Trapped Seismic Waves in Antarctic Firn Columns: Flow Related Anisotropy, Temporal Monitoring and Rayleigh Wave Behaviors. **Chaput, J.**, Aster, R., Karplus, M., Nakata, N., Gerstoft, P., *et al.*	Seismic Analysis of Reservoir Conditions for Inducing Seismicity at the San Emidio Geothermal Field, Nevada, USA. **Guo, H.**, Thurber, C., Heath, B., Cardiff, M., Lord, N., *et al.*	Time-dependencies of κ. **Haendel, A.**, Cotton, F., Pilz, M.	Sensitivity Testing the 2023 Update of the National Seismic Hazard Model. **Altekruse, J. M.**, Powers, P. M., Clayton, B. S., Shumway, A. M., Girot, D. L.
8:45 AM	Identifying Stable Body-wave Sources for Correlation-based Seismic Velocity Monitoring. **Sheng, Y.**, Mordret, A., Brenguier, F., Boué, P., Vernon, F., *et al.*	Reducing Risk in Geothermal Projects Through Improved Understanding and Characterization of Stimulated Fracture Heterogeneity. **Doe, T.**, Kneafsey, T., Huang, L., Rodríguez Tribaldos, V., Johnson, T., *et al.*	STUDENT: The Variation of Kappa With Induced Shear Strain and the Accuracy of High Frequency Components of Site Response Analyses. **Normand, M.**, Rathje, E. M.	Earthquake Scenario Development in the 2023 USGS National Seismic Hazard Model Update. **Chase, R. E.**, Jaiswal, K. S., Petersen, M. D.
9 AM	Characterizing Emergent and Impulsive Non-tectonic Signals in Seismic Waveforms. **Johnson, C.**	INVITED: STUDENT: Statistical Bounds on How Induced Seismicity Stops. **Schultz, R.**, Ellsworth, W. L., Beroza, G. C.	What Does Kappa Mean in Nonlinear Site Response Analyses? **Ji, C.**, Cabas, A., Bonilla, L., Gelis, C., Gann, C.	An Argument for Time-dependent National Seismic Hazard Maps. **Wong, I. G.**, Thomas, P.
9:15–10 AM	Poster Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Tectonics and Seismicity of Intraplate Regions	**Numerical Modeling in Seismology: Developments and Applications**	**Advances in Geophysical Sensing**
8 AM	INVITED: Where Does the Intraplate Tectonic Activity Originate From? Examples From the Adriatic Plate. **Stipčević, J.,** Herak, M., Sečanj, M., Tomljenović, B., Dasović, I., Latečki, H.	A Discontinuous Galerkin Method for Sequences of Earthquakes and Aseismic Slip on Multiple Faults Using Unstructured Curvilinear Grids. **Gabriel, A.**, Uphoff, C., May, D.	Multiplexing Optical Sensors for Expanded Geodetic and Seismic Coverage of the Seafloor. **Zumberge, M.**
8:15 AM	STUDENT: From the 2009 L'aquila Earthquake to the 2016 Amatrice-Visso-Norcia Sequence: 8 Years of Seismicity in Central Italy. **Cabrera, L.**, Poli, P.	The Finite-difference Modeling of Seismic Waves in Media With Poroelastic/Elastic Interfaces. Gregor, D., **Moczo, P.**, Kristek, J., Mesgouez, A., Lefeuve-Mesgouez, G., *et al.*	INVITED: STUDENT: Understanding and Exploiting Ocean Wave Signals in DAS Data. **Williams, E. F.**, Zhan, Z.
8:30 AM	STUDENT: What Is Driving the Different Types of Seismicity Related to the Alto-Tiberina Fault in Italy? Insights From a High-resolution Seismic Catalog. **Essing, D.**, Poli, P.	STUDENT: 3D Simulation of Seismic Response of the Long Valley Embankment Dam, California. **Yeh, T.**, Olsen, K. B.	Digital Quartz Crystal Seismic and Oceanic Sensors. **Venkateswara, K.**, Paros, J., Bodin, P., Tobin, H., Wilcock, W. S. D.
8:45 AM	Intraplate Earthquakes Near Lisbon, Portugal and the 1755 Conundrum. **Fonseca, J. F. D.**	An Improvement of Corner-frequency Modeling for Stochastic Finite-fault Ground Motion Simulation. **Tang, Y.**	STUDENT: Demonstrating a Kalman Filter Fusion of Acceleration, GNSS and Rotational Sensors Using a Flexible Foot Bridge. **Rossi, Y.**, Hohensinn, R., Tatsis, K., Clinton, J. F., Chatzi, E., *et al.*
9 AM	A Conceptual Seismological Model for the Norwegian Rifted Margin Drawn from the Perspective Hyperextension. **Redfield, T. F.**, Osmundsen, P. T.	How Does Spatial Variability of Soil Properties Affect Seismic Response of Slopes? **Mohammadi, K.**, Medina, R. J. R., Sánchez-Sesma, F. J.	Observations of Natural and Induced Seismic Events Using Slim Borehole Adapted SiA Sensors. **Blumle, F.**, Avenson, B., Passmore, K., Hofstetter, A., Boese, C., Malin, P. E. A., **Zimakov, L. G.**
9:15–10 AM	Poster Break		

Wednesday, 20 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources	**De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances**	**Advancing Multi-scale Evaluations of Seismic Attenuation**	
10 AM	A Semi-empirical Method for Producing Broadband Synthetic Seismograms for Large, Rapid Landslide Scenarios. **Allstadt, K. E.**, George, D.	Local Seismic Monitoring of a Stimulation at the Utah Frontier Observatory for Research in Geothermal Energy Site. **Pankow, K. L.**, Rutledge, J., Dyer, B., Burlacu, R., Bradshaw, P., *et al.*	Observation and Model of Scattering Attenuation of 500 +- 200 Hz Induced Seismic Emissions. **Malin, P. E. A.**, Leary, P. C.	
10:15 AM	Seismo-acoustic Characteristics of the Cooling Tower of a Research Nuclear Reactor. **Chai, C.**, Maceira, M., Marcillo, O.	Seismic Monitoring Around a Potential Deep Geothermal Site in Upstate New York: CorNET. **Abers, G. A.**, Katz, Z. S., Pritchard, M. E., Fulton, P., Gustafson, O., *et al.*	Geometric Spreading and Apparent Anelastic Attenuation of Response Spectral Accelerations. **Graizer, V.**	
10:30 AM	STUDENT: Kinematic Source Inversion of Acoustic-seismic Signals of a Meteoroid Explosion Recorded on a Large-N Seismic Network and Fibre Optic Cables. **Isken, M. P.**, Dahm, T., Rodriguez, I. V., Lamb, O. D., Heimann, S., *et al.*	The DEEP Project: Establishing a Full-scale Real-time Test Bench for Seismic Monitoring and Forecasting at the Utah FORGE EGS Site. **Lanza, F.**, Wiemer, S., The DEEP Team	STUDENT: Uppermost Mantle Pn-wave Attenuation in the Anatolian Plateau and Surrounding Regions. **Zhu, W.**, Zhao, L., Xie, X., Yao, Z.	
10:45 AM	On the Seismic Equivalence of Chemical and Nuclear Explosions: Insights for the Source Physics Experiment. Vitali, E., **Ford, S. R.**	STUDENT: Induced Micro-seismicity Monitoring in Urban Context Using Seismic Arrays. **Fiori, R.**, Vergne, J., Schmittbuhl, J., Dimitri, Z., Lambotte, S.	STUDENT: Tasman Line in Eastern Australia Constrained by Regional Lg-wave Q Tomography. **You, B.**, Zhao, L., Li, H., Xie, X., Yang, G., *et al.*	
11 AM	Discriminating Explosions From Earthquakes and Collapses With Seismic and Acoustic Waves. **Walter, W. R.**, Pyle, M., Ford, S. R., Pitarka, A., Kong, Q., *et al.*	The Importance of Induced Seismicity Monitoring to De-risk Geothermal EGS Projects. **Savvaidis, A.**, Taff, C., O'Sullivan, V., Shirley, M.	STUDENT: Lateral Variations of Crustal Lg-wave Attenuation in and Around the Scandinavian Peninsula. **Liu, Z.**, Zhao, L., Xie, X., Yao, Z.	
11:30 AM–12:30 PM	*Plenary:* Science and Technology from a Makah Perspective—Incorporation of Native American Knowledge Systems			
12:30–2 PM	Lunch Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Tectonics and Seismicity of Intraplate Regions	**Numerical Modeling in Seismology: Developments and Applications**	**50-State Update of the USGS National Seismic Hazard Models**
10 AM	INVITED: Detecting Surficial Evidence of Low-rate Deformation in the Central and Eastern United States. **Jobe, J. A. T.**, Briggs, R. W., Gold, R.	STUDENT: Qualitative and Quantitative Validation of Local Site Response and Spatial Attenuation From Numerically Simulated Ground Motions. **Saxena, S.**, Motamed, R., Ryan, K. L.	INVITED: Overview of Earthquake Rupture Forecasts for the 2023 USGS NSHM Update. **Field, E. H.**
10:15 AM	Complex Fault Segmentation in the New Madrid Seismic Zone Inferred From Seismicity Clustering. **Langston, C. A.**, Powell, C. A.	STUDENT: Can Higher-order Finite-difference Operators Be Applied Across a Material Interface? Moczo, P., **Valovcan, J.**, Kristek, J., Gregor, D.	Lower Seismogenic Depth Model of the Western US Based on Seismicity. **Zeng, Y.**, Petersen, M. D.
10:30 AM	Using Swarms of Small Earthquakes to Look for Seismically Active Structures in Northeastern North America. **Ebel, J. E.**	Numerical Modeling of Earthquake Ground Motion in Georgia Basin Resulting Amplification and Elongation of Events Duration, Greater Vancouver Area, British Columbia. **Oveisy, A.**, Ventura, C.	Early Results From Deformation Models of the Western US for the 2023 Update to the US National Seismic Hazard Model. **Pollitz, F. F.**, Evans, E. L., Field, E. H., Hatem, A. E., Hearn, E. H., *et al.*
10:45 AM	Preliminary Analysis of Seismic Data Recorded by a Temporary Deployment Around the Source Zone of the 1886 M 7 South Carolina Earthquake. **Peng, Z.**, Jaume, S., Daniels, C., Zhai, Q.	Simulation of Underground Chemical Explosions in Soft Alluvium, Hard Granite, Brittle Tuff and Salt Formations Using Anisotropic Hydrodynamic Generated Source Coupled to Linear Anisotropic Wave Propagation. **Ezzedine, S. M.**, Vorobiev, O., Pitarka, A., Antoun, T., Walter, W. R.	Proposed Updates to the UCERF3 Fault System Inversion Approach for Use in the 2023 Western US ERF. **Milner, K. R.**, Field, E. H.
11 AM	Buried Basement Faults Posing Potential Seismic Risk in South Carolina: Insights From High-resolution Aeromagnetic Data. **Shah, A. K.**, Pratt, T. L., Horton, Jr., J.	Seismic Response of Metamaterials Using the Indirect Boundary Element Method for SH Waves in 1D and 2D. **Piña-Flores, J.**, Perton, M., Goh, H., Kallivokas, L. F., Sánchez-Sesma, F. J.	Paleoseismological Perspectives on Megathrust Locking, Rupture and Tsunami Hazard in Alaska. **Witter, R. C.**, Briggs, R. W., Dura, T., Engelhart, S. E., Nelson, A., *et al.*
11:30 AM–12:30 PM	*Plenary:* Science and Technology from a Makah Perspective—Incorporation of Native American Knowledge Systems		
12:30–2 PM	Lunch Break		

Wednesday, 20 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Fault Damage Zones: What We Know and Do Not	**Using Data and Experience to Improve Geohazards Communication**	**Advances in Geospatial Modeling of Seismic Hazards**	**What Controls the Style of Fault Slip in Subduction Zones?**
2 PM	INVITED: Seismic Imaging of the Mw 7.1 Ridgecrest Earthquake Rupture Zone and Garlock Fault From Data Recorded by Dense Linear Arrays. **Qiu, H.**, Chi, B., Ben-Zion, Y.	Earthquake Science Communication in Stable Continental Regions. **Pascale, A.**	Nowcasting Earthquakes with Machine Learning: The Role of Strain Hardening in the Earthquake Cycle with Implications for Slow and Silent Slip Events and Current Earthquake Hazard. **Rundle, J. B.**, Yazbeck, J., Donnellan, A., Fox, G., Grant Ludwig, L., *et al.*	Insights Into the Occurrence and Characteristics of Near-trench of Slow Slip Events at the Hikurangi Subduction Zone From Some Recent Seafloor Geodetic Experiments and IODP Observatories. **Wallace, L. M.**, Ito, Y., Saffer, D., Davis, E., Palmer, N., *et al.*
2:15 PM	Tomography of the Ridgecrest Fault Region Using Aftershocks as a Network of Virtual Seismometers. **Matzel, E.**	Impact of the National Seismological Service (Mexico) Outreach Activities. **Pérez-Campos, X.**, Cardenas Monroy, C., Vela Rosas, M. A., Sosa Jiménez, M. A., Ruiz, I., *et al.*	STUDENT: Development of Geospatial Liquefaction Probability Models for M5.4 Pohang Earthquake, South Korea. **Seo, H.**, Kim, H., Kim, B.	INVITED: STUDENT: Can Stochastic Modeling Capture Slip Distributions for M9 Events? **Small, D. T.**, Melgar, D., Lin, J.
2:30 PM	STUDENT: Ambient Noise Tomography of the Ridgecrest Fault Damage Zones: What We Know and Do Not. **Zhou, Z.**, Gerstoft, P., Bianco, M. J., Olsen, K. B.	A Decade of Creating Data Visualizations for Online Video Content: The Pacific Tsunami Warning Center's Earthquake and Tsunami Animations. **Becker, N. C.**, Wang, D., Geschwind, L. R., Fryer, G. J., Preller, C. C., *et al.*	Determination of Coseismic Landslide Hazard Using Physics-based Ground-motion Simulation: Application for the 2021 Haiti Earthquake. **Castro-Cruz, D.**, Aquib, T., Lombardo, L., Tanyas, H., Mai, P.	What Makes Low-frequency Earthquakes Low Frequency: Cluster-based Constraints on the Attenuation Structure of the Nankai Plate Interface, Japan. **Wang, Q.**, Frank, W. B., Abercrombie, R. E.
2:45 PM	STUDENT: Using Active Source Seismology to Image a Strike-slip Fault Damage Zone as a Function of Depth, Distance and Geology. **Alongi, T.**, Brodsky, E. E., Kluesner, J., Brothers, D. S.	Communicating ShakeAlert® with an Online, Educational Animation: Project Overview and Preliminary Evaluation Results. **Crayne, J.**, Herran, C., Sumy, D. F.	A Geospatial Model for Site Response Complexity. **Zhan, W.**, Baise, L. G., Kaklamanos, J.	STUDENT: CASIE21 Seismic Reflection Images Reveal Potentially Active Splay Faulting at Dynamic Backstop in Cascadia Accretionary Wedge. **Lucas, M. C.**, Tobin, H., Carbotte, S. M., Han, S., Boston, B.
3 PM	STUDENT: Fault Damage Zone Effects on Near-field Ground Motions in a Multi-scale Dynamic Rupture Model of the 2019 Ridgecrest Sequence. **Schliwa, N.**, Gabriel, A., Taufiqurrahman, T.	Assessment of the General Public's Understanding of Rapidly Produced Earthquake Information Products Shakemap and Pager. **Brudzinski, M. R.**, Karjack, S., Shipley, T.	STUDENT: A US National Vs30 Model and Map Driven by Remote Sensing and Machine Learning. Maurer, B. W., **Geyin, M.**	Unsteady, Uniform Rupture Growth Revealed by Tectonic Tremors in Cascadia. **Wech, A.**, Gomberg, J.
3:15 PM–4:30 PM	Poster Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	The Effects of Sedimentary Basins on Earthquake Ground Motions	**Tectonics and Seismicity of Intraplate Regions**	**50-State Update of the USGS National Seismic Hazard Models**
2 PM	INVITED: Impacts of Seattle Basin on Performance of RC Core-wall Buildings During M9 Cascadia Subduction Zone Earthquakes. **Eberhard, M. O.**, Marafi, N. A., Berman, J. W., Wirth, E. A., Frankel, A. D.	Seismicity of Elysium Planitia, Mars. **Stähler, S. C.**, Mittelholz, A. M., Perrin, C., Jacobs, A., Kawamura, T., *et al.*	INVITED: Updates to the Ground-motion Characterization for the 2023 US National Seismic Hazard Model. **Moschetti, M. P.**, Aagaard, B. T., Ahdi, S. K., Boyd, O. S., Petersen, M. D., *et al.*
2:15 PM	STUDENT: Evaluation of Source and Basin-induced Surface Waves on Seismic Performance of Non Linear Structures. **Soto, V.**, Lopez-Caballero, F.	Seismic Imaging of the Ups and Downs of the North American Midcontinent. **Yang, X.**, Liu, L., Stevens Goddard, A.	Assessment of Western US Basin Response and Implementation in the 2023 Update of the US National Seismic Hazard Model. **Ahdi, S. K.**, Moschetti, M. P., Aagaard, B. T., Boyd, O. S., Frankel, A. D., *et al.*
2:30 PM	Monitoring the Compaction Underneath Mexico City Using Ambient Noise. **Ermert, L. A.**, Denolle, M. A., Solano Rojas, D., Cabral Cano, E., Chaussard, E., *et al.*	STUDENT: Seismic Observations of Complex Mantle Transition Zone Structure Beneath Eastern North America. **Burky, A. L.**, Irving, J. C. E., Simons, F. J.	Probabilistic Seismic Hazard Analysis in Seattle Using Non-ergodic GMMs Based on 3D Simulation Results for Cascadia Interface Earthquakes. **Sung, C.**, Abrahamson, N.
2:45 PM	STUDENT: Analysis of Rayleigh Waves in the Sedimentary Basin of Bogotá, Colombia. **Daza, J. M.**, Soto, V., Riaño, A., Lopez-Caballero, F., Reyes, J. C.	Aftershock Sequences in Central/Eastern North America Last Years—Decades at Most—Not a Few Weeks, Not Millennia: Results From 149 Modern Mainshocks mw3.65–5.84. **Levandowski, W.**	STUDENT: A Ground-motion Prediction Model for Induced Earthquakes for Central and Eastern United States. **Farajpour, Z.**, Pezeshk, S.
3 PM	Ground Motion Time Histories for Subduction Zone Earthquakes Using Artificial Intelligence. **Florez, M. A.**, Ross, Z. E., Asimaki, D.	Refinements to the Bayesian Approach for the Calculation of Maximum Earthquake Magnitude (Mmax) in Stable Continental Regions. **Toro, G. R.**	Exploring Potential Implications to Engineering and Risk Applications From Including Epistemic Uncertainties in Hazard for the USGS 2023 NSHM. **Kwong, N. S.**, Jaiswal, K. S.
3:15 PM–4:30 PM	Poster Break		

Wednesday, 20 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Fault Damage Zones: What We Know and Do Not	**Improving Strong-motion Data, Products and Services: From Waveform Quality to Open Dissemination**	**Imaging, Monitoring and Induced Seismicity: Applications to Energy and Storage**	
4:30 PM	INVITED: Acceleration and Coalescence of Damage Zone Seismicity Leading Up to Large Earthquakes. **Cattania, C.**	Web Interfaces and Web Services for Open Coordinated Strong-motion Data Dissemination in Europe. **Lanzano, G.**, Cauzzi, C., Bienkowski, J., Bindi, D., Cakti, E., *et al.*	Multiplet Analysis for Identification of Fractures in Areas of Fluid Migration: A Comparative Study of Seismicity Clusters From the Geysers Geothermal Field, California and Song Tranh 2 Water Reservoir, Vietnam. **Staszek, M.**, Rudziński, L., Kwiatek, G., Lizurek, G., Orlecka-Sikora, B.	
4:45 PM	Fault Roughness and Frictional Stability Control Seismic Energy Partitioning Between Fore, Main and Aftershocks During Laboratory Stick-slip. **Goebel, T. H. W.**, Dresen, G.	Identifying Strong-motion Instrument Metadata Inconsistencies Before and After Earthquakes. **Schleicher, L. S.**, Steidl, J. H., Brody, J., Blair, L., De Cristofaro, J. L., *et al.*	Supervised and Unsupervised Machine Learning Applications for Induced Seismic Data Analysis at Illinois Basin Decatur Project Site. **Yoon, H.**, Lizama, D., Willis, R.	
5 PM	A Geodetic Constraint on Seismic Velocity Changes in Fault Damage Zones. **Xu, X.**, Liu, D., Lavier, L., Sandwell, D. T.	Improving the Development Pipelines for USGS Earthquake Hazards Program Real-time and Scenario Products. **Aagaard, B. T.**, Wald, D. J., Thompson, E. M., Hearne, M., Schleicher, L. S.	INVITED: Coupling Induced Seismicity to Permeability Using Spatial Correlation Analysis of EGS Data. **Malin, P. E. A.**, Leary, P. C.	
5:15 PM	Fault Friction Derived from Fault Bend Influence on Coseismic Slip During the 2019 Ridgecrest Earthquake. **Milliner, C. W. D.**, Aati, S., Avouac, J.	STUDENT: Systematic Quality Control of National Strong Motion Project Structure Instrumentation Using Teleseismic Data. **Heilpern, K. A.**, Schleicher, L. S., Steidl, J. H., Gee, L. S.	INVITED: It's in the Eye of the Beholder: Previously Discarded Seismic Noise May Tell Us Just as Much About Anthropogenic Fluid Injection as Detected Earthquakes. **Salvage, R. O.**, Eaton, D. W.	
5:30 PM	STUDENT: 738,000 Years of Off-fault Damage at the Volcanic Tablelands. **Rodriguez Padilla, A. M.**, Oskin, M. E.	STUDENT: Uncertainty Quantification Over Spectral Estimation of Ground Motion Processes Subject to Missing Data Using Variational Bayesian Inference. **Chen, Y.**, Patelli, E., Edwards, B., Beer, M.	Activation of Optimally and Unfavorably Oriented Faults Within the Oklahoma LASSO Nodal Array. **Pennington, C. N.**, Skoumal, R. J., Rubinstein, J. L.	
6 PM– 7 PM	*Plenary:* The Future of Subduction Zone Science			
7 PM– 8 PM	Early-Career & Student Reception			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	The Effects of Sedimentary Basins on Earthquake Ground Motions	**Modeling, Collecting and Communicating Post-earthquake Hazard and Impact Information**	**What Controls the Style of Fault Slip in Subduction Zones?**
4:30 PM	STUDENT: Sediment-basement Structure of the Northern Los Angeles Basins. **Villa, V.**, Li, Y., Ghose, R., Clayton, R. W., Persaud, P.	Enhanced Rapid Earthquake Ground Failure and Impact Estimates With Remotely Sensed and Ground Truth Constraints. **Wald, D. J.**, Xu, S., Noh, H., Dimasaka, J. T., Jaiswal, K. S., *et al.*	Empirical Low-frequency Earthquakes Synthesized From Tectonic Tremor Records. **Ide, S.**
4:45 PM	STUDENT: Shear Wave Velocity Model for the San Gabriel and San Bernardino Basins From Dense-array Ambient Noise Correlation. **Li, Y.**, Villa, V., Ghose, R., Clayton, R. W., Persaud, P.	Local-international Collaboration Following the 2021 Haiti Earthquake for Rapid Building Damage Data Collection and Public Awareness Messaging. Rodgers, J., Kijewski-Correa, T., Presuma, L., McBride, S. K., Devilme, G., Mentor-William, G., Lochhead, M., Canales, E., Mbabazi, A., **Stenner, H.**, *et al.*	Widespread Very Low Frequency Earthquakes (VLFEs) Offshore Cascadia. **Ghosh, A.**, Chaudhuri, K.
5 PM	Effects of the Los Angeles Basin on Ground Motion Studied Using Lab Experiments on a 3D-printed Model. **Wang, J.**, Park, S.	NASA Urgent Response Products for the 2021 Mw 7.2 Earthquake in Haiti. **Fielding, E. J.**, Jung, J., Amatya, P., Huang, M., Bato, M., **Handwerger, A.**, Emberson, R.	Analysis of Eight-year-long Low-frequency Earthquake Catalog for Southern Cascadia. **Creager, K.**, Ducellier, A.
5:15 PM	INVITED: Broadband Ground Motion Simulations with Sediment Nonlinearity: A Case Study at Garner Valley, California. **Seylabi, E.**	Best Practices for Collecting and Using Post-earthquake Damage Data: Lessons from Haiti and Other Past Events. **Loos, S.**, Lallemant, D., Wald, D. J.	Emergence of Repeating Earthquakes Along the Mexican Subduction. **Dominguez, L. A.**, Taira, T., Cruz-Atienza, V. M., Iglesias, A., Legrand, D., *et al.*
5:30 PM	Verification and Validation of the Broadband Cybershake Platform Using Observations. **Callaghan, S. A.**, Goulet, C. A., Silva, F., Maechling, P. J., Graves, R. W., *et al.*	STUDENT: Improving the USGS Pager System's Reported Fatality Updating Framework. **Engler, D. T.**, Jaiswal, K. S., Wald, D. J.	Time-domain Source Parameter Estimation of Mw3-7 Earthquakes in Japan. **Yoshida, K.**, Kanamori, H.
6 PM– 7 PM	*Plenary:* The Future of Subduction Zone Science		
7 PM– 8 PM	Early-Career & Student Reception		

Poster Sessions

EVERGREEN BALLROOM

Numerical Modeling in Seismology: Developments and Applications

1. Student: Investigation of Lithospheric Structure in NE India Based on Love Wave Data. **Chanu, N.**, Kumar, N., Mukhopadhyay, S.
2. Student: Efficient Quasi-dynamic Simulations of Earthquakes and Aseismic Slip Including Off-fault Viscoelastic Deformation Using Hierarchical Matrices. **Wick, J. M.**, Lambert, V.
3. Student: A New Approach to Estimate a Mixed Model-based Ground-motion Model Using a Computational Optimization Algorithm. **Akhani Senejani, M.**, Pezeshk, S.
4. Simulation of Mw 7 2016 Kumamoto Earthquake Mainshock Using Dynamic Rupture Modeling. **Sun, J.**, Pitarka, A., Kawase, H., Nagashima, F., Ito, E.
5. An Efficient ADER-DG Scheme for Simulation of Seismic Waves in Poroelastic Media. Wolf, S., **Galis, M.**, Uphoff, C., Gabriel, A., Moczo, P., *et al.*

Adjoint Waveform Tomography: Methods and Applications

6. Student: Seismic Wavefield Simulations of 3D Anisotropy in a Mantle Wedge Setting. **Gupta, A.**, Tape, C., Abers, G. A.
7. Finite-frequency Kernels for Pg Phases. **Nelson, P.**, Modrak, R., Phillips, W., Begnaud, M.
8. Student: Full 3D Fréchet Kernels for Low-frequency Slowness Perturbations Measured Across Seismic Arrays. **Vazquez, L.**, Jordan, T. H.
9. Student: Scattered Wave Imaging of Lithospheric Discontinuities: Eliminating Moho Reverberations With Radon Filters. **Carr, S. A. B.**, Olugboji, T.
10. Student: The Effect of Mantle Corrections on SmKS Measurements. **Vite Sanchez, R.**, Bozdag, E., Frost, D. A., Creasy, N.
11. Student: Observations of Inner Core Shear Waves With AlpArray. **Ling, A.**, Stähler, S. C., Kim, D., Giardini, D.

Advancing Multi-scale Evaluations of Seismic Attenuation

12. Spatial Variability of the Spectral Decay Parameter Kappa and Near-source Attenuation in Central Italy. **Castro, R. R.**, Colavitti, L., Vidales-Basurto, C. A., Pacor, F., Sgobba, S., *et al.*
13. Including Radiation Pattern Effects in Ground-motion Models for Taiwan. **Huang, J.**, **Sung, C.**, Chao, S., Abrahamson, N.
14. Computing Path Effects of a Large Magnitude Event From Path Effects of Many Small Magnitude Events on the Same Rupture Plane. Meng, X., **Goulet, C. A.**
15. The Eastward Expansion of the Eastern Tibetan Plateau Inferred From Stress Drops of the 2021 Ms 6.4 Yangbi Earthquake in Yunnan and the Ms 7.4 Maduo Earthquake in Qinghai, China. **He, X.**, Zhao, L., Xie, X., Zhang, L., Yao, Z.
16. Student: Pn-wave Attenuation Structure of the Uppermost Mantle Beneath the Japan Sea. **Yang, G.**, Zhao, L. WITHDRAWN
17. Student: Spatiotemporal Variation of Stress Drop for the 2019 ML 6.0 Changning Earthquake and Its Aftershock Sequence in the southern Sichuan Basin, China. **Shen, L.**, Zhao, L., Xie, X., He, X., Wang, W., *et al.* WITHDRAWN
18. Examining Temporal Variations in Coda Q Attenuation Before and After Some Significant Canadian Earthquakes: The 2017 Resolute Earthquake (Mw 6.1) in Nunavut, Canada. Farahbod, A., **Cassidy, J. F.**

Advances in Geospatial Modeling of Seismic Hazards

19. OpenAmp: A Global Seismic Site Amplification Database. **Zhu, C.**, Loviknes, K., Kotha, S., Bora, S., Cotton, F.
20. Geospatial Mapping of Seismic Hazards: An Example of Site Amplification Mapping in the New Madrid Seismic Zone of Central United States. **Wang, Z.**, Carpenter, S., Zhu, Y.
21. Exploring the Potential for SAR Phase to Capture Soil Moisture Variability to Improve Earthquake-triggered Ground Failure. **Burgi, P. M.**, Thompson, E. M., Allstadt, K. E., Lohman, R. B., Collins, B.
22. NSF SAGE-facility Begins Procurement of Rapid Response Instrumentation. **Sweet, J. R.**, Anderson, K., Meltzer, A., Woodward, B.
23. Student: Evaluating Machine Learning Methods Applied To Physics-based Ground Motion Modeling via Proper Orthogonal Decomposition. **Rekoske, J. M.**, Gabriel, A., May, D.
24. Student: Geology and Geomorphology Based f0 Model of New England. **Pontrelli, M. A.**, Baise, L. G., Ebel, J. E., Mabee, S. B., Zhan, W.
25. Ground-motion Modeling Using Machine Learning Techniques and Geospatial Proxies. **Zhan, W.**, Baise, L. G., Kaklamanos, J.
26. Student: Global Geospatial Liquefaction Model Updates Using Advanced Machine Learning Algorithms. **Asadi, A.**, Baise, L. G., Chatterjee, S., Chansky, A. A.
27. Student: Updated Global Geospatial Liquefaction Model Using Logistic Regression. **Akhlaghi, A. M.**, Chansky, A. A., Baise, L. G., Moaveni, B.

Tectonics and Seismicity of Intraplate Regions

28. Student: The Seismicity of West Africa: Construction of a Focal Mechanism Catalog with a Sparse Dataset. **Legre, J. B.**
29. Active Tectonics of the Central Adriatic Region: New Insights from the Recent March 2021 Seismic Sequence (Mw5.2). **Di Luccio, F.**, Marchetti, A., Dannowski, A., Dasović, I., Gasperini, *et al.*
30. Mapping the m5.8 Mineral Earthquake Aftershock Sequence and the Virginia Seismic Zone. Aden, F., **Frank, W. B.**, Abercrombie, R. E.
31. High-resolution Receiver Function Analysis of the Pecos, Texas Region. **Veitch, M. A.**, **Karplus, M.**, Chaput, J.
32. Student: Joint Inversion of HVSR and Surface Wave Group Velocity Dispersion to Characterize Shallow Sediments at the Monahans Dune Field, West Texas. **Spears, B.**, Pulliam, J. R.
33. Delineating the Crustal Seismic Attenuation Boundary Between the Central/Eastern and Western United States. **Levandowski, W.**, McNamara, D. E.
34. The 2021 Milford, UT Earthquake Swarm. **Whidden, K. M.**, Mesimeri, M., Pankow, K. L.
35. Student: A Comparison of Three Modern Aftershocks Sequences Across Southern Idaho: Characterizing the Seismogenic Zone Surrounding the Snake River Plain. **Wilbur, S. F.**

Modeling, Collecting and Communicating Post-earthquake Hazard and Impact Information

41. Towards Developing and Implementing an International Macroseismic Scale (IMS) for Earthquake Engineering, Earthquake Science and Rapid Damage Assessment. **Wald, D. J.**, Goded, T., Hortacsu, A., Spence, R., de Rubeis, V., *et al.*
42. Student: Updating Liquefaction Probability Given Liquefaction Potential Index in a Bayesian Framework. **Engler, D. T.**, Thompson, E. M., Geyin, M., Maurer, B. W., Jaiswal, K. S., *et al.*
43. Advancing Real-time Tsunami Warning and Response: From Characterizing the Hazard Using GNSS to Estimating Loss Models. **Kwong, K.**, Crowell, B. W., Melgar, D., Eguchi, R., Esquivias, G., *et al.*
44. Student: A Feature-based Liquefaction Image Dataset for Assessing Liquefaction Extent and Impact. **Sanon, C.**, Baise, L. G., Asadi, A., Koch, M., Aimaiti, Y., *et al.*

Using Data and Experience to Improve Geohazards Communication

45. Student: GeoGateway for Higher Level Analysis and Visualization of Data. **Mirkhanian, M. A.**, **Grant Ludwig, L.**, Donnellan, A., Pierce, M., Wang, J., *et al.*

Diversity, Equity and Inclusion in Seismology

46. A Summary of Existing Resources and Roadmap for the Hazards Equity Working Group of the American Geophysical Union's Natural Hazards Section. **Hobbs, T. E.**, Sumy, D. F., Tepp, G., Flanagan, M. P., Kakoty, P., *et al.*
47. Working To Ensure a More Diverse, Equitable, Inclusive and Accessible Workplace: DEIA Actions Within the US Geological Survey's Alaska Region. **Moran, S. C.**, Devaris, A. M., Deligne, N. I., Ellis, A. P., Flinders, A. F., *et al.*

From Desktops to HPC & Cloud: Emerging Strategies in Large-scale Geophysical Data Analysis

48. Student: Efficient Access and Manipulation of Big Seismic Data from Disparate Sources. Dugda, M., **Kassa, A. B.**, Pouchard, L., **Dires, E.**, McDaniel, L.
49. Implementing Cloud-optimized Geophysical Data Containers. **Berglund, H. T.**
50. HDF5eis: A Solution for Storing and Accessing Big, Multidimensional Data From Environmental Sensors. **White, M. C. A.**, Nakata, N.

Improving Strong-motion Data, Products and Services: From Waveform Quality to Open Dissemination

51. Student: A Python-based Toolset for Identifying Strong-motion Earthquake Database Gaps. **Shao, H.**, Brody, J., Schleicher, L. S., Gee, L. S., Steidl, J. H.
52. Ground Motion Packet (GMP): A GeoJSON Specification for Ground Motion Metrics. Yu, E., Hagos, L., Steidl, J. H., **Thompson, E. M.**, Worden, C. B.
53. Systematic Comparisons of Broad-band Velocity and Acceleration Earthquake Records as a Quality Assessment Tool for European Open Strong-motion Data. **Cauzzi, C.**, Bindi, D., Cambaz, D., Carrilho, F., Custódio, S., *et al.*
54. Güralp Data Centre Software for Easy Mass Data Acquisition and Station Metadata Monitoring. **Lindsey, J. C.**, Reis, W., Watkiss, N., Hill, P., Cilia, M.
55. A DesignSafe Ground Motion Database. **Ji, C.**, Cabas, A., Kottke, A., Pilz, M., Macedo, J., *et al.*

Advances in Geophysical Sensing

56. Inference of the Relative Strain Energy Density of Compressional and Shear Waves Using Seismic Gradiometer. **Poppeliers, C.**, Berg, E. M., Young, B.
57. Evaluating the A-0-A Method for In-situ Calibration of Seafloor Pressure Gauges at Axial Seamount. **Wilcock, W. S. D.**, Manalang, D. A., Fredrickson, E., Sasagawa, G. S., Zumberge, M., *et al.*
58. Infrasound Direction-of-arrival Determination Using a Balloon-borne Aeroseismometer. **Bowman, D. C.**, Rouse, J. W., Sinclair, A. M., Silber, E. A., Krishnamoorthy, S.
59. The Next Generation Compact Broadband Seismometer: Güralp Certis. **Lindsey, J. C.**, Reis, W., Watkiss, N., Hill, P., Cilia, M.
60. Improved Resolution Across the Global Seismographic Network: A New Era in Low-frequency Seismology. **Ringler, A. T.**, **Anthony, R. E.**, Davis, P., Ebeling, C., Hafner, K., *et al.*
61. STUDENT: Results From a Novel Self-calibrating Tiltmeter at Axial Seamount. **Fredrickson, E.**, Wilcock, W. S. D., Harrington, M. J., Cram, G. S., Tilley, J.
62. Seismic Data Acquisition for Portable Deployments—A New and Transformative Approach. Easton, D., Perlin, M., Pigeon, S., Parker, T., Pelyk, N., **Bainbridge, G.**
63. Next Generation Regional Arrays for Strong and Weak Motion Using Cascadia 120 Slim Posthole. **Bainbridge, G.**, Parker, T., Wuthrich, D., Pelyk, N.
64. Recent Improvements in Very Broadband Seismometer Self-noise Performance Embodied in the New Trillium 360 GSN Instruments. **Bainbridge, G.**, Townsend, B., Upadhyaya, S., Pelyk, N.
65. Digital Low-noise Optical Seismic Sensor. **Avenson, B.**
66. STUDENT: In-situ Measurement of Modal Rotations at a Freestanding Rock Tower. **Dzubay, A.**, Moore, J. R., Finnegan, R., Bessette-Kirton, E. K., Geimer, P. R., *et al.*
67. Towards Installing a Very Broadband Seismometer 2.4 Km Below the Surface at South Pole, Antarctica. **Anthony, R. E.**, DuVernois, M., Ringler, A. T., Cherwinka, J., Jones, D. K., *et al.*

Things That Go Bump: Identifying and Characterizing Non-Earthquake Seismo-Acoustic Sources

68. STUDENT: A Major Update to the Exotic Seismic Events Catalog: A Compilation of Seismogenic Mass Movements. Collins, E., **Allstadt, K. E.**, Groult, C., Hibert, C., Malet, J., *et al.*
69. Detecting Landslides in the Barry Arm Region Using Long-period Signals. **Karasozen, E.**, West, M. E.
70. STUDENT: Spatio-temporal Variation of Ambient Noise in the Sikkim Himalaya. **Uthaman, M.**, Singh, C., Singh, A., Jana, N., Dubey, A. K., *et al.*
71. STUDENT: Variations in Ambient Seismic Noise of the California Central Coast. **Shabtian, H. S.**, Eilon, Z.
72. STUDENT: Variability and Precision of Acoustic-to-seismic Coupling from Explosions Recoded Across Albuquerque Seismological Laboratory. **Watzak, J. M.**, Anthony, R. E., Ringler, A. T., Wilson, D. C.
73. Arrival Time Based Seismoacoustic Source Location Using a Bayesian Framework. **Koch, C.**, Dannemann Dugick, F. K., Berg, E. M., Blom, P.
74. STUDENT: Refining First-arrival Traveltime Picks of Active Seismic Data for Improving Structure Characterization at Rock Valley, Nevada. **Li, D.**, Huang, L., Chen, T., Gao, K., Snelson, C., *et al.*
75. Regional Moment Tensor Inversion of the Western United States Using a Three-dimensional Earth Model. **Chiang, A.**, Rodgers, A., Krischer, L., Afanasiev, M., Boehm, C., *et al.*

De-risking Deep Geothermal Projects: Geophysical Monitoring and Forecast Modeling Advances

76. STUDENT: Using the 2009 Basel Enhanced Geothermal Systems Project as a Proxy for Predicting Reservoir Development at Utah Forge. **Bradshaw, P.**, Dyer, B., Bethmann, F., Dzubay, A., Petersen, G., *et al.*
77. Similar Event Clusters and Microseismic Event Relocation at the Utah Forge Site. **Ratre, P.**, Chen, X.
78. Using Machine Learning for Characterizing Induced Microseismics at the Forge Geothermal Site. Shi, P., **Lanza, F.**, Grigoli, F., Wiemer, S.
79. Building a Probabilistic Seismic Hazard and Risk Model for EGS Stimulations. **Grigoratos, I.**, Papadopoulos, A. N., Ciardo, F., Rinaldi, A. P., Lanza, F., *et al.*
80. Compact Broadband Instrumentation for Geothermal Field Monitoring. **Lindsey, J. C.**, Reis, W., Watkiss, N., Hill, P., Cilia, M.
81. STUDENT: Insights Into Hydraulic Fracturing Processes From Waveform-similarity Analyses of Acoustic Emissions Induced in Mine-scale Experiments. **Niemz, P.**, Petersen, G., Cesca, S., Dahm, T., Zang, A.
82. Ambient Noise-based Monitoring of Seismic Wave Velocity Modulations at the Carbfix Reinjection Site, SW-Iceland. **Qiu, H.**, Nakata, N., Pec, M., Sánchez-Pastor, P., Obermann, A.

Imaging, Monitoring and Induced Seismicity: Applications to Energy and Storage

83. Exploring the Role of Wastewater Disposal in Causing Recent Increases in Seismicity in Central and Northern Kansas. **Fasola, S. L.**, Barlow, N. M., Brudzinski, M. R.
84. Detecting Fluid Movement in Seismogenic Faults Using Earthquake Attributes in Oklahoma. **Ogwari, P. O.**, Walter, J., Woelfel, I., Thiel, A., Ferrer, F.
85. Diverse Fault Architectures and Stress States Evolutions of Induced Earthquake Sequences Revealed by High-resolution Focal Mechanism Solutions. Qin, Y., **Chen, X.**, Chen, T., Abercrombie, R. E.
86. STUDENT: A Strategy for Choosing Red-light Thresholds to Manage Hydraulic Fracturing Induced Seismicity in North America. **Schultz, R.**, Beroza, G. C., Ellsworth, W. L.
87. Fault Activation by Induced Aseismic Slip: Scaling Behaviour and New Observations. **Eaton, D. W.**, Eyre, T., Wang, C., Ma, Y., **Salvage, R. O.**
88. Improving the Catalog of Induced Seismicity in Southeastern New Mexico. **Litherland, M.**, Huang, G.

Observations and Modeling of the 2021 Haiti Earthquake

89. Landslides Triggered by the 14 August 2021, Magnitude 7.2 Nippes, Haiti, Earthquake. **Martinez, S. N.**, **Allstadt, K. E.**, Slaughter, S. L., Schmitt, R., Collins, E., *et al.*
90. Limitations of a Teleseismic-only Dataset for 2021 mw7.2 Nippes, Haiti, Finite Fault Modeling: Improved Modeling Capability for Joint Teleseismic and Regional Inversion. **Goldberg, D. E.**, Koch, P., Melgar, D., Riquelme, S., Yeck, W. L., *et al.*
91. Slip in the 14 August Haiti Earthquake Derived From InSAR and Pixel Offsets. **Maurer, J.**, Dutta, R., Vajedian, S., Lee, Y.

Searching for Fault Creep Over a Range of Timescales

92. STUDENT: Are Creep Events Big? Estimations of the Along-strike Rupture Extent of Creep Events Along the Central San Andreas Fault. **Gittins, D. B.**, Hawthorne, J. C.
93. Investigation of Fault Creep Variability Along the Southern San Andreas Fault. **Liu, Z.**, Luo, Y., Lundgren, P.
94. Interseismic and Postseismic Creep Detected From Five Years of Sentinel-1 InSAR Data Over Northeastern Tibetan Plateau. **Ou, Q.**, Daout, S., Parsons, B., Wright, T.
95. Seismic and Aseismic Fault Slip During the Inter-seismic Period: Observations From the Marmara Region of the North Anatolian Fault. **Martinez-Garzon, P.**, Becker, D., Durand, V., Kwiatek, G., Bohnhoff, M., *et al.*
96. STUDENT: Assessing Thermal and Hydrologic Conditions of Fault Creep in the Salton Trough From the Exhumed Sedimentary Section of the Fish Creek-Vallecito Basin. **Young, E. K.**, Oskin, M. E., Stockli, D. F., Chatterjee, R.
97. The Search for Dynamically Triggered Changes in Plate Interface Coupling and Implications for Fault Coupling Models. **Bartlow, N. M.**
98. A Comprehensive Catalog of Repeating Earthquakes for Northern California: Implications for Fault Creep, Slip Rates, Slip Partitioning and Transient Stress. **Waldhauser, F.**, Schaff, D. P.

Exploring Earthquake Source Dynamics and Wave Propagation Properties in Tectonic and Lab Environments

99. INVITED: Temporal Variation of Qc and Its Implications in Medium Characterization. Arora, S. C., sharma, M. L., Jain, S., Sen, A., Jindal, A., *et al.* WITHDRAWN
100. STUDENT: Probabilistic Constraints on the Southern Californian Seismic Energy Budget From Heat Flow Across the San Andreas Fault. **Ziebarth, M. J.**, Anderson, J. G., von Specht, S., Heidbach, O., Cotton, F.
101. STUDENT: Ground Motion Prediction Models for Pennsylvania From Industrial Seismic Sources. **Deane, C.**, Ammon, C. J., **Kintner, J.**
102. STUDENT: Characteristics of Pulse Duration and Amplitude of P-wave Seismograms. **Heo, Y.**, Lee, J., Kim, B.
103. Fully-automated Processing of Single- and Multi-peak Microtremor HVSR Measurements Using Machine Learning. **Vantassel, J. P.**
104. STUDENT: Mapping Active Faulting in Post-mining Induced Seismicity by Network-based Waveform Similarity Analyses and Moment Tensor Inversions. **Niemz, P.**, Namjesnik, D., Cesca, S., Kinscher, J., Contrucci, I., *et al.*
105. STUDENT: Radiation-pattern Effects in Bay Area Ground-motion Models. **Liou, I. Y.**, Abrahamson, N.

What Controls the Style of Fault Slip in Subduction Zones?

106. STUDENT: Slow Slip Dynamics Reproduced by Symptomatic Low-frequency Earthquake Activity. **Mouchon, C.**, Frank, W. B., Radiguet, M., Poli, P., Cotte, N.
107. Nature of the Volcanic Upper Crust of the Hikurangi Plateau: Implications for Megathrust Structure and Hydrogeology. **Gase, A. C.**, Bangs, N., Han, S., Kodaira, S., Arai, R., *et al.*
108. STUDENT: Tectonic Tremor Localization Using Bayesian Inversion. **Bombardier, M.**, Cassidy, J. F., Dosso, S. E., Kao, H.
109. STUDENT: Triggering Dynamics of Tremor-like Events During Laboratory Hydrofracturing. **Yuan, C.**, Cochard, T., Ulberg, C., Denolle, M. A., Creager, K., *et al.*

50-State Update of the USGS National Seismic Hazard Models

110. Update on the Implementation of Seismic Directivity Models Into the USGS National Seismic Hazard Model. **Withers, K. B.**, **Moschetti, M. P.**, Thompson, E. M., Frankel, A. D., Wirth, E. A., *et al.*
111. Investigating the Effects of Declustering Choices on Probabilistic Seismic Hazard Assessments. **Llenos, A.**, Michael, A. J.
112. Hybrid Empirical Ground-motion Models With Simulation-based Site Amplification Factors for the Island of Hawaii. **Pezeshk, S.,** Haji-Soltani, A.
113. Student: Determination of Seismological Parameters in Central and Eastern North America. Pezeshk, S., **Assadollahi, C.**, Zandieh, A.
114. Revised Earthquake Geology Inputs for the Central and Eastern United States and Southeast Canada for the 2023 National Seismic Hazard Model Update. **Jobe, J. A. T.**, Hatem, A. E., Gold, R., DuRoss, C. B., Reitman, N., *et al.*
115. Western US Geologic Deformation Model for Use in the US National Seismic Hazard Model 2023. **Hatem, A. E.**, Briggs, R. W., Gold, R., Reitman, N., Jobe, J. A. T., *et al.*
116. A New Alaska-Aleutian Subduction Zone Rupture Model for Use in the National Seismic Hazard Model. **Briggs, R. W.**, Witter, R. C., Ross, S., Freymueller, J. T., Thio, H.
117. The Potential Impact of Listric Faults on the National Seismic Hazard Maps. **Wong, I. G.**, Thomas, P., Pechmann, J. C.
118. Student: Investigation and Re-calculation of TL: The Long-period Transition Parameter. **Assadollahi, C.**, Pezeshk, S., Camp, C. V., Campbell, K. W.
119. Student: Model Selection and Epistemic Uncertainty Quantification of the Ground Motion Models for Induced Seismicity in Central East North America. **Farajpour, Z.**, Kowsari, M., Pezeshk, S.
120. Updating the USGS CEUS–WUS Attenuation Boundary—A Hazard Sensitivity Study. **Shumway, A. M.**, Petersen, M. D., Levandowski, W., McNamara, D. E., Frankel, A. D., *et al.*

The Effects of Sedimentary Basins on Earthquake Ground Motions

121. Preliminary Shear-wave Velocity Site Characterization at Strong Motion Stations in Anchorage, Alaska, Using a Flexible Multimethod Approach. **Stephenson, W. J.**, Leeds, A., Ahdi, S. K., Dutta, U., Lindberg, N. S., *et al.*
122. Student: Examination of Synthetic Reno-area Basin Amplification From Small Earthquakes to 3 Hz Frequency. **Lewright, L. M.**, Louie, J. N., Assor, C. E., Graham, J. R., Prathap, A.
123. Student: Model Surface Wave Dispersion Analysis Across a Basin Boundary. **Graham, J. R.**, Louie, J. N., Assor, C. E.
124. The San Gabriel and San Bernardino Basin Project: New 3D Velocity and Structural Models in the Los Angeles Region for Improved Ground Motion Estimates. **Clayton, R. W.**, Persaud, P., Villa, V., Li, Y., Ghose, R.
125. Student: Comparative Analysis of Body- and Surface-wave Amplification in the Seattle Basin. **Jaski, E.**, Moschetti, M. P., Tsai, V. C., Bowden, D. C.
126. Student: Challenges Facing Discovery of Largest Lake in World History Geotechnical Investigation. Najafian, A., Jarahi, H., **Bayraktutan, M.**
127. Sediments Thickness Correction in GK17 Ground Motion Modeling. **Graizer, V.**
128. Sediment Thickness and Ground Motion Site Amplification Along the United States Atlantic and Gulf Coastal Plains. **Boyd, O. S.**, Churchwell, D. H., Moschetti, M. P., Thompson, E. M., Pratt, T. L., *et al.*
129. Joint Velocity Inversion of Active-source Phase Velocity Dispersion and Ambient-vibration H/V Spectral Ratios in the Atlantic Coastal Plain Sediments, Eastern US. **Pratt, T. L.**, Parolai, S., Poggi, V., Dreossi, I.
130. Student: Paleo Mega Lake of Rey Sediments and Its Effect on Earthquake Acceleration Case Study Tehran City. **Jarahi, H.**, Moghimi, S., Tan, O., Saygılı, Ö., Karagöz, Ö.
131. Student: Revision of Iranian Seismic Design Code for Tehran Region Based on "Paleo Mega Lake of Rey" Theory. **Jarahi, H.**, Moghimi, S., Tan, O., Saygılı, Ö., Karagöz, Ö.


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50 YEARS OF EXCELLENCE

Thursday, 21 April 2022—Oral Sessions

Presenting author is indicated in bold.

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?	**Characteristics, Hazards and Evolution of the Gorda Region of the Cascadia Subduction Zone**	**The 15 January 2022 Tonga Eruption and Tsunami**	**Earthquake Source Processes at Various Scales: Theory and Observations**
8 AM	INVITED: Seismic Source Characterization for Probabilistic and Scenario Seismic Hazard Analysis Beneath the Complex Tectonic Setting. **Miyake, H.**, Morikawa, N.	The Role of Geosciences in Informing the Seismic Risk Management of the Pacific Gas and Electric Humboldt Bay Power Plant, Humboldt County, California. **Nishenko, S.**, Page, W. D., **Bachhuber, J.**	USGS Seismic Monitoring of the 2022 Hunga Tonga-Hunga Ha'apai Volcano Eruption. **Earle, P.**, Kintner, J., Yeck, W. L., Pursley, J., Bellini, J. J., *et al.*	The SCEC/USGS Community Stress Drop Validation Study Using the 2019 Ridgecrest Earthquake Sequence Data. **Baltay, A.**, Abercrombie, R. E., Taira, T.
8:15 AM	Catalog Harmonization Using Reliable Mws. **Gok, R.**, Onur, T., Barno, J., Walter, W. R.	Interseismic Fault Loading in California's North Coast Constrained by Geodetic Data. **Materna, K.**, Murray, J. R., Pollitz, F. F., Patton, J. R.	Seismological Characterization of Dynamic Parameters of the Hunga Tonga Explosion From Teleseismic Waves. **Poli, P.**, Shapiro, N. N. S.	Spectral Scaling Comparison and Validation Between Coda and GIT Spectra for Central Italy and Ridgecrest, CA (3.3<Mw<7.1). **Mayeda, K.**, Roman-Nieves, J. I., Bindi, D., Morasca, P., Walter, W. R., *et al.*
8:30 AM	Coda Envelope Moment Magnitudes and the Re-evaluation of Magnitude Conversion Relations for Seismic Hazard Assessment in Southeastern Canada. **Bent, A. L.**, Mayeda, K., Roman-Nieves, J. I., Shelly, D. R., Barno, J.	Characterizing Active Cross-shore Faults Along the Continental Shelf in Southern Cascadia. **Watt, J.**, Hill, J., Nieminski, N., Kluesner, J., Brothers, D. S., *et al.*	Seismic Characterization of the 2022 Hunga Tonga-Hunga Ha'apai Volcanic Eruption. **Thurin, J.**, Tape, C.	Stress Estimations of Moderate Earthquakes During the Ridgecrest Earthquake Sequence. **Ji, C.**, Assor, C. E., Bailey, B., Archuleta, R. J.
8:45 AM	A Systematic Examination of the Effects on the Seismic Hazard of Non-uniqueness in Declustering an Earthquake Catalog. **Anderson, J. G.**, Zaliapin, I.	INVITED: Plate Torture: The Gorda Deformation Zone. **Goldfinger, C.**	The Global Seismographic Network Reveals Atmospherically Coupled Normal Modes Excited by the 2022 Tonga Eruption. **Anthony, R. E.**, Ringler, A. T., Aster, R. C., Taira, T., Shiro, B., *et al.*	Characterization of Earthquake Swarms and Ruptures to Reveal Driving Mechanisms. **Abercrombie, R. E.**, Chen, X., Qin, Y.
9 AM	Linear Combination of GMMs Using Optimized Weights Based on Record-free Covariance. **Kwak, D.**, Ahn, J.	Sources of North Coast Seismicity Revisited: Tectonics, Moment Tensors and Finite Fault Models for the Gorda - Southern Cascadia Region. **Hellweg, M.**, Dengler, L., Lomax, A., McPhereson, R. C., Dreger, D. S.	Early Episodic Eruption Characteristics of the January 2022 Hunga Tonga-Hunga Ha'apai Volcanic Activities. **Zheng, Y.**, Hu, H., Spera, F., Scruggs, M., Mandli, K., *et al.*	Earthquake Arrest and Stress Overshoot Affect Observed Scaling of Breakdown Energy and Source-time Functions. **McLaskey, G.**, Ke, C., Kammer, D. S.

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science	**The Effects of Sedimentary Basins on Earthquake Ground Motions**	**Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring**
8 AM	STUDENT: A First Look at Earthquake Early Warning in Alaska. **Fozkos, A.**, West, M. E., Gardine, M.	Blind Prediction of 3D Seismic Site Response in Near Field Extended Fault Scenarios: Application to the Nuclear Site of Cadarache, France. **Castro-Cruz, D.**, Gatti, F., Lopez-Caballero, F., Hollender, F., El Habber, E., *et al.*	INVITED: Deep-learning Seismology: Too Far, Too Close. **Mousavi, S.**
8:15 AM	Rollout of the Metro Vancouver Network-based Earthquake Early Warning System. **Zaicenco, A. G.**, Weir-Jones, I., Kassam, A.	From Trough to Basin, Regional Ground Motions and Local Amplifications in Israel—Insights From Numerical Modeling. **Tsesarsky, M.**, Glehman, J.	Post Hoc Visual Interpretation of Convolutional Neural Network Model for Earthquake Detection Using Feature Maps, Optimal Solutions and Relevance Values. Majstorovic, J., Giffard, S., **Poli, P.**
8:30 AM	Towards Public Earthquake Early Warning Across Central America. **Massin, F.**, Clinton, J. F., Boese, M., Strauch, W., Marroquín Parada, G. M., *et al.*	S-wave Site Amplification Factors of KiK-net Borehole Stations Obtained by Generalized Spectral Inversion. **Kawase, H.**, Nakano, K., Ito, E., Nagashima, F., Sun, J.	A Collaborative Research and Development Program to Advance the Use of Machine Intelligence in Nuclear Explosion Monitoring. **Reiter, D.**, Napoli, V.
8:45 AM	From Real-time Earthquake Monitoring to Earthquake Early Warning in Switzerland. **Massin, F.**, Clinton, J. F., Boese, M.	Surface Waves in Mexico City From the Pacific Coast Subduction Earthquakes. Baena-Rivera, M., Sánchez-Sesma, F. J., **Pérez-Rocha, L. E.**, Hernández-Meza, C., Cuellar-Martínez, A., *et al.*	INVITED: Machine Learning Applications and Developments at the US Geological Survey's National Earthquake Information Center for Improved Regional-to-global Scale Monitoring. **Yeck, W. L.**, Cole, H. M., Benz, H. M., Patton, J. M., Kragness, D. S., *et al.*
9 AM	CrowdQuake+: Noise-robust and AI-empowered Earthquake Early Warning Using Low-cost MEMS Sensors. **Kwon, Y.**, Khan, I., Lee, J., Shin, J., Ahn, J.	Seismo-VLAB: A Finite Element Simulation Platform for Basin-scale 3D Site Response Analyses. **Asimaki, D.**, Kusanovic, D. M., Ayoubi, P., Mohammadi, K.	Estimation of Hypocentral Parameters Based on Graph Neural Networks. **Matos Chuquiuri, A. O.**, Moya Huallpa, L. A., Gonzales, C., Mas, E., Koshimura, S., *et al.*

Thursday, 21 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
9:15–10 AM	Poster Break			
	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?	**Characteristics, Hazards and Evolution of the Gorda Region of the Cascadia Subduction Zone**	**Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors**	
10 AM	INVITED: Ground Motion Models: Which Way Henceforth? **Atkinson, G. M.**	The 1992 Cape Mendocino Earthquake: A Turning Point in US Tsunami Hazard Mitigation. **Dengler, L.**, Patton, J. R., Wilson, R. I., Hellweg, M., Nicolini, T., *et al.*	An Examination of DAS as a Possible Earthquake Early Warning Tool. **Mellors, R. J.**, Kilb, D., Ajo-Franklin, J., Imperial Valley Dark Fiber Team	
10:15 AM	Ground Motion Simulations in Azerbaijan: Application to PSHA. **Pitarka, A.**, Onur, T., Gok, R.	STUDENT: Block Models of the Southern Cascadia Forearc Based on Geodetic Data. **Nuyen, C.**, Schmidt, D.	Seismicity Monitoring Using Sub-array Processing of Large-aperture DAS Arrays. **Karrenbach, M.**, Cole, S., Yartsev, V., Hooper, R.	
10:30 AM	PSHA Consistently Overpredicts Historically Observed Shaking Data. **Salditch, L.**, Stein, S., Gallahue, M., Neeley, J., Hough, S., *et al.*	Application of High-precision, NLL-SSST-coherence Earthquake Location to Untangle the 3D Seismo-tectonics of the Mendocino Triple-junction, Northern California. Lomax, A., **McPherson, R. C.**, **Patton, J. R.**, Hellweg, M., Dengler, L., *et al.*	Seismic Monitoring Using Dark Fiber and Distributed Acoustic Sensing (DAS) in the Imperial Valley, California. **Templeton, D.**, Morency, C., Matzel, E., Ajo-Franklin, J.	
10:45 AM	New Approach for Modeling 3D Path Effects From Cybershake Simulations in Non-ergodic Ground-motion Models. **Abrahamson, N.**, Sung, C., Lacour, M.	A Linked Sequence of Earthquakes That Initiates at the Northern San Andreas Fault. **McPherson, R. C.**, Patton, J. R., Lomax, A.	Back-projection Imaging of the 2021 Antelope Valley m6.0 Earthquake Using Distributed Acoustic Sensing. **Li, J.**, Zhan, Z., Biondi, E., Williams, E. F.	
11 AM	Non-ergodic PSHA Using Fully-deterministic Physics-based Models for Southern California. **Callaghan, S. A.**, Milner, K. R., Goulet, C. A., Shaw, B. E., Maechling, P. J., *et al.*	Mendocino Triple Junction: Terraces and Tectonics in the Latest and Greatest Quaternary. **Patton, J. R.**	Phase Picking on Distributed Acoustic Sensing Data Using Semi-supervised Learning. **Zhu, W.**, Biondi, E., Ross, Z. E., Zhan, Z.	
11:30 PM–12:30 AM	SSA President's Address and Awards Ceremony			
12:30–2 PM	Lunch Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
9:15–10 AM	Poster Break		
	Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science	**Earthquake Source Processes at Various Scales: Theory and Observations**	**Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring**
10 AM	Seismic Station Expected Value Metrics for Earthquake Early Warning Networks. **Biasi, G.**, Stubailo, I., Alvarez, M.	STUDENT: Bayesian Dynamic Source Inversion With Rate-and-state Friction—Unified Seismic and Postseismic Rupture of the 2014 South Napa Earthquake. **Premus, J.**, Gallovic, F., Ampuero, J.	STUDENT: Marsquake Detection With Deep Learning. **Dahmen, N. L.**, Clinton, J. F., Meier, M., Stähler, S. C., Giardini, D.
10:15 AM	Development of a Companion Questionnaire for 'Did You Feel It?': Assessing Response in Earthquakes to Include Earthquake Early Warning. Goltz, J., Wald, D. J., **McBride, S. K.**, de Groot, R., Breeden, J., *et al.*	STUDENT: Constraining Kinematic Rupture Scenarios of an Mw 6.2 Earthquake in Central Italy. **Čejka, F.,** Pacor, F., Felicetta, C., Sgobba, S., Gallovič, F.	FastMapSVM: Classifying Seismograms Using the Fastmap Algorithm and Support Vector Machines. **White, M. C. A.**, Sarma, K., Li, A., Kumar, T., Nakata, N.
10:30 AM	Exploring Evidence-based Guidelines for Protective Actions and Earthquake Early Warning Systems. **McBride, S. K.**, Smith, H., Morgoch, M., Sumy, D. F., Jenkins, M. R., *et al.*	STUDENT: Stress-strain Characterization of Complex Seismicity Along California Faults. **Juárez Zúñiga, A.**, Jordan, T. H.	Assessing the Limits of Predictive Uncertainty in Seismic Event Discrimination Using Bayesian Neural Networks. **Garcia, J. A.**, Linville, L., Catanach, T. A.
10:45 AM	Real-time Performance of the PLUM Earthquake Early Warning Algorithm for the West Coast of the US. **Cochran, E. S.**, Kilb, D., Saunders, J. K., Bunn, J., O'Rourke, C. T., *et al.*	STUDENT: The Mw 5.7 Pica Earthquake: A Crustal Event in Northern Chile with Large Ground Accelerations and Stress Drop. **Herrera, C.**, Cassidy, J. F., Dosso, S. E., Dettmer, J., Rivera, E., *et al.*	STUDENT: Towards a Dynamic Multi-net Approach for Earthquake Association. **Chuang, L. Y.**, Williams, J., Barama, L., Peng, Z., Newman, A. V.
11 AM	Superconducting Earthquake Early-warning Device (SEED) for Detection of Prompt Gravity Signals from Earthquake Ruptures. **Paik, H.**, Collins, C. J., Metzler, Z., Shawhan, P. S., Meng, L., *et al.*	Reexamination of the Earthquake Source Spectrum and the Inferred Source Parameters. **Archuleta, R. J.**, Ji, C.	STUDENT: Measures for Evaluating Neural Phase Pickers on Continuous Waveform Data. **Park, Y.**, Beroza, G. C.
11:30 PM–12:30 AM	SSA President's Address and Awards Ceremony		
12:30–2 PM	Lunch Break		

Thursday, 21 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?		**Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science**	**The 15 January 2022 Tonga Eruption and Tsunami**
2 PM	PSHA Input Considerations in Central Asia. **Onur, T.**, Gok, R., Mackey, K., Berezina, A., Mikhailova, N., *et al.*		STUDENT: Real-time and Data-driven Ground Motion Prediction Equations for Earthquake Early Warning. **Chatterjee, A.**, Trugman, D. T.	What Produced the Giant Hunga Tonga-Hunga Ha'apai Eruption Cloud?. **Mastin, L. G.**, Van Eaton, A. R., Schneider, D. J., Kern, C., Schwaiger, H. F.
2:15 PM	'We're Gonna Need a Bigger Boat': Wrestling a Large Seismic Hazard Model for Seismic Risk Assessment in Canada. **Hobbs, T. E.**, Kolaj, M., Journeay, M., Rao, A.		STUDENT: Detecting Earthquakes in Noisy Real-time GNSS Data With Machine Learning. **Dybing, S. N.**, Melgar, D., Thomas, A. M., Mencin, D.	Seismic, Infrasound and Hydroacoustic Analysis of the 2022 Tonga Eruption. **Ichinose, G.**, Kim, K., Pasyanos, M. E., Rodd, R. L., Gok, R., *et al.*
2:30 PM	STUDENT: Probabilistic Seismic Hazard Assessment in Lebanon. **El Kadri, S.**, Beauval, C., Bard, P., Brax, M., Klinger, Y.		Applications of Nonergodic Site Response Models to ShakeAlert Case Studies in the Los Angeles Area. **Lin, R.**, Parker, G. A., McGuire, J. J., **Baltay, A.**	Air Waves From the 2022 Tonga Explosion: Theoretical Studies and an Oversight in the Reporting of DART Sensor Data. **Okal, E. A.**
2:45 PM	Earthquake Recurrence Model for the Colombia–Ecuador Subduction Zone Constrained From Seismic and Geodetic Data, Implication for PSHA. Marinière, J., **Beauval, C.**, Nocquet, J., Chlieh, M., Yepes, H.		Ground Motion Forecasting for Large Events With HR-GNSS and Deep Learning. Lin, J., **Melgar, D.**, Thomas, A. M., Sahakian, V. J., Searcy, J.	The 15 January 2022 Hunga Tonga-Hunga Ha'apai (HTHH) Explosive Eruption and the Challenges It Presented to the Pacific Tsunami Warning Center (PTWC). **Weinstein, S. A.**, Becker, N., Goosby, S., Koyanagi, K., McCreery, C., *et al.*
3 PM	A Strategy to Build a Unified Dataset of Moment Magnitude Estimates for Low-to-moderate Seismicity Regions Based on European-Mediterranean Data: Application to Metropolitan France. **Laurendeau, A.**, Scotti, O., Clément, C.		Exploring Two-station Alerting With Epic and Machine Learning Classifier. **Chung, A.**, Henson, I., Meier, M., Allen, R.	From a Boom and a Plume to Observation and Inundation: The US National Tsunami Warning Center's Unique Response to the Most Powerful Volcanic Tsunami Since Krakatoa. **Ohlendorf, S. J.**, Heath, B. A., Snider, D. J., Popham, C., Hale, D., *et al.*
3:15 PM–4:30 PM	Poster Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors	**Shakes in Lakes: Frontiers in Lacustrine Paleoseismology**	**Seismo-geodetic Approaches for Seismic and Tectonic Processes**
2 PM	Taiwan Milun Fault Drilling and All-inclusive Sensing (MiDAS) Project: Downhole Optical Fiber Through Frequent Slip Active Fault Zone. **Ma, K.**, Lin, C., Ku, C., Huang, H., von Specht, S., *et al.*	Towards a Paleoseismic Record of Intraslab Earthquakes in the Alaskan Subduction Zone. **Van Daele, M.**, Praet, N., Haeussler, P. J., Witter, R. C., De Batist, M.	INVITED: Imaging the Rupture Process and Postseismic Deformation of the 2019 Ridgecrest Earthquake Sequence with High-resolution Geodetic Data. **Wang, K.**, Bürgmann, R.
2:15 PM	High-resolution Eikonal Traveltime Tomography of the Long Valley Caldera Using Distributed Acoustic Sensing. **Biondi, E.**, Zhu, W., Williams, E. F., Li, J., Zhan, Z.	INVITED: Using Lacustrine Paleoshaking Evidence to Quantitatively Determine Earthquake Source Parameters. **Wils, K.**, Vanneste, K., Vervoort, M., Moernaut, J., De Batist, M., *et al.*	INVITED: Demonstrating the Utility of Seafloor Geodetic Instrumentation: A Case Study of the Simeonof-Sand Point-Chignik Earthquake Sequence Along the Alaska Subduction Zone. **DeSanto, J.**, Brooks, B., Crowell, B. W., Ericksen, T., Goldberg, D. E., *et al.*
2:30 PM	Subsurface Imaging of Distributed Acoustic Sensing Data Using a Dark Fiber Line in Reno, Nevada. **Mirzanejad, M.**, Seylabi, E., Tyler, S. W., Hatch, R., Saltiel, S., *et al.*	Lakes as Paleoseismic Records in a Seismically-active, Low-relief Area: An Example From the Rieti Basin, Central Italy. **Noble, P. J.**, Archer, C., Michetti, A., Sagnotti, L., Florindo, F., *et al.*	Validation of Peak Ground Velocities Recorded on Very-high-rate GNSS Against NGA-West2 Ground Motion Models. **Crowell, B. W.**, DeGrande, J., Dittmann, T., Ghent, J. N.
2:45 PM	Monitoring Ocean Surface Waves Offshore the Oregon Coast With Distributed Acoustic Sensing. **Viens, L.**, Spica, Z. J.	Sedimentological and Geochemical Characterization of Earthquake-generated Turbidites in Fault-proximal Glacial Lakes of the Teton Range, Grand Teton National Park, Wyoming. **Larsen, D. J.**, Blumm, A. R., Crump, S. E.	Expansion of Global GNSS-based Seismic Monitoring. **Melbourne, T. I.**, Szeliga, W. M., Santillan, M. V. I., Scrivner, C. W. I.
3 PM	STUDENT: DAS Can Record Storm-induced Seismic Signals in Urban Areas. **Shen, J.**, Zhu, T.	Lacustrine Paleoseismic Records of Cascadia Megathrust Earthquakes From Lake Ozette, Washington. **Brothers, D. S.**, Sherrod, B. L., Singleton, D. M., Hill, J., Ritchie, A., *et al.*	Impart of Three-dimensional Structure of Subduction Zone on Time-dependent Crustal Deformation Measured by HR-GNSS. **Fadugba, O. I.**, Sahakian, V. J., Melgar, D., Rodgers, A.
3:15 PM–4:30 PM	Poster Break		

Thursday, 21 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?		**Development, Enhancement and Validation of Seismic Velocity Models**	
4:30 PM	Earthquake Probabilities Using the Long-term Fault Memory Model. Neely, J., **Salditch, L.**, Stein, S., Spencer, B.		Seismic Velocity – Depth Relations for San Francisco Bay Area Sediments and Effects on Simulated Ground Motion in the East Bay. **Hirakawa, E. T.**, Aagaard, B. T.	
4:45 PM	Comparison of Natural and Mining-induced Seismicity Hazard: A Case Study for Sudbury, Ontario. **Assatourians, K.**, Novakovic, M., Yenier, E., Atkinson, G. M.		Validation of the Southern California Earthquake Center (SCEC) Community Velocity Model (CVM) Version S4.26-M01 Using 0-5 Hz Deterministic 3D Ground Motion Simulations for the 2014 La Habra, California, Earthquake. **Olsen, K. B.**, Hu, Z., Day, S. M.	
5 PM	A Regionally Adaptable Ground-motion Model for Fourier Amplitude Spectra of Shallow Crustal Earthquakes in Europe. **Kotha, S.**, Bindi, D., Cotton, F.		Inverting for Velocity Profiles in California Using Low- and High-frequency Rayleigh-wave Dispersion With Horizontal-to-vertical Spectral Ratios. **Seylabi, E.**, Tehrani, H., Boyd, O. S.	
5:15 PM	STUDENT: High-pass Corner Frequency Selection for Implementation in the USGS Automated Ground Motion Processing Tool. **Ramos-Sepulveda, M. E.**, Parker, G. A., Thompson, E. M., Brandenberg, S. J., Li, M., *et al.*		A Large-scale Application of Multizonal Transdimensional Bayesian Inversion for Developing a 3D Geophysical Model in Basel, Switzerland. **Imtiaz, A.**, Panzera, F., Hallo, M., Dresmann, H., Steiner, B., *et al.*	
5:30 PM	STUDENT: Developing an Empirical Relationship Between Different Distances Metrics for Seismic Hazard Assessment. **Kayastha, M.**, Pezeshk, S., Tavakoli, B.		STUDENT: Three-dimensional Seismic Response of Maar Volcanic Structures. **Labuta, M.**, Burjánek, J., Opršal, I.	
6 PM– 7 PM	*Plenary:* Joyner Lecture			
7 PM– 8 PM	Joyner Reception			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	The 15 January 2022 Tonga Eruption and Tsunami	**Extraterrestrial Seismology: Seismology from Mars, the Moon and Everywhere**	**Insights from Earthquakes in and Around Alaska in the 20 Years Since the Denali Fault Earthquake**
4:30 PM	Using Infrasound and Umbrella Cloud Radius to Estimate the Size of the Hunga Tonga Eruption. **McNutt, S. R.**, Thompson, G., Constantinescu, R., Connor, C. B.	INVITED: Development of Balloon-based Seismology for Venus Exploration. **Krishnamoorthy, S.**, Martire, L., Komjathy, A., Pauken, M. T., Cutts, J. A., *et al.*	Twenty Years of Intraplate Alaska Earthquakes Since the 2002 Denali Fault Earthquake. **Tape, C.**, McPherson, A., Smith, K., Chow, B.
4:45 PM	STUDENT: Water Level and Atmospheric Pressure Data From the Hunga Tonga-Hunga Ha'apai Tsunami: A Retrospective Analysis. **Santellanes, S.**, Melgar, D., Ruiz-Angulo, Á.	Analysis of Thermal Moonquakes Within the Apollo 17 Lunar Seismic Profiling Experiment. **Civilini, F.**, Weber, R. C., Husker, A.	New Look at the m7.9 2018 Offshore Kodiak Aftershock Sequence With the AACSE Ocean Bottom Broadband Deployment. **Ruppert, N.**, Matulka, P., Wiens, D. A.
5 PM	The 15 January 2022 Hunga Tonga-Hunga Ha'apai Eruption as Recorded by MERMAID. **Simon, J. D.**, Yu, Y., Pipatprathanporn, S.	An Update on the Seismicity of Mars as Recorded by InSight's Marsquake Service. **Clinton, J. F.**, Ceylan, S., Giardini, D., Horleston, A., Kawamura, T., *et al.*	Subduction Megathrust Coupling in the Shumagin Gap Region Inferred From the 2020-2021 Earthquake Sequence. **Herman, M. W.**, Furlong, K. P.
5:15 PM	STUDENT: Hunga Tonga-Hunga Ha'apai: Spectral Characteristics of Traveling Ionospheric Disturbances From the January 2022 Eruption and Tsunami. **Ghent, J. N.**, Crowell, B. W.	Lateral Variations of the Martian Crustal Thickness From Insight Measurements and the Observed Gravity Field. **Drilleau, M.**, Samuel, H., Garcia, R. F., Wieczorek, M. A., Rivoldini, A., *et al.*	INVITED: STUDENT: Structure and Kinematics of the Eastern Denali Fault From Drone and Crewed Airborne Lidar Surveys. **Finley, T.**, Salomon, G., Stephen, R., Nissen, E., Cassidy, J. F., *et al.*
5:30 PM	The Hunga Tonga-Hunga Ha'apai Eruption of 15 January 2022 Observed on the Multi-technology International Monitoring System Network. **Le Bras, R. J.**, Mialle, P., Bittner, P.	INVITED: Constraints on the Crustal Structure of Mars From P- and S-receiver Functions and Ambient Vibrations Autocorrelations. **Knapmeyer-Endrun, B.**, Panning, M. P., Joshi, R., Bissig, F., Khan, A., *et al.*	Queen Charlotte Plate Boundary: Insights From Earthquake Relocations and Seismic Tomography. **Oliva, S.**, Bostock, M., Schaeffer, A., Roecker, S., Nedimovic, M., *et al.*
6 PM– 7 PM	*Plenary:* Joyner Lecture		
7 PM– 8 PM	Joyner Reception		

Thursday, 21 April *(continued)*

Poster Sessions

EVERGREEN BALLROOM

Insights from Earthquakes in and Around Alaska in the 20 Years Since the Denali Fault Earthquake

1. Estimating Vs30 in Anchorage, Alaska Using HVSR of Earthquakes vs. HVSR of Ambient Noise: A Comparison. **Feenstra, J. P.**, Thornley, J. D.
2. Catalog of Coseismic Displacements Across Alaska. **Freymueller, J. T.**, Xiao, Z., Rollins, C., Elliott, J., Grapenthin, R., *et al.*
3. STUDENT: Relocating the 2021 and 1938 Chignik Alaska Aftershock Sequences with Station Corrections from AACSE Array to Improve Rupture Area Estimates. **Reid-McLaughlin, A. M.**, Abers, G. A., Barcheck, G.
4. Aftershock Regions of Aleutian-Alaska Megathrust Earthquakes, 1938-2021. **Tape, C.**, Lomax, A.
5. STUDENT: Seismic Velocity Structure Near 2020-2021 Major Earthquakes at the Alaska Peninsula. **Wang, F.**, Wei, S., Ruppert, N., Zhang, H.
6. STUDENT: Along-strike Variation in Plate-bending Seismicity and Relationship to the Seismic Cycle in the Alaska Subduction Zone. **Matulka, P.**, Wiens, D. A., Li, Z., Barcheck, G., Abers, G. A., *et al.*
7. STUDENT: Potential Megathrust Co-seismic Slip During the Sand Point Alaska Strike-Slip Earthquake. **Santellanes, S.**, Melgar, D., Crowell, B. W., Lin, J.

WITHDRAWN

8. The 2020 M7.6 Sand Point Alaska Earthquake: Slip Model, Stress Change Contributions and Tsunami Implications. **Grapenthin, R.**, Elliott, J., Xiao, Z., **Parameswaran, R. M.**, Freymueller, J. T., *et al.*
9. Earthquakes, Interseismic Coupling and Stress Triggering Along the Eastern Alaska Subduction Margin. **Elliott, J.**, Grapenthin, R., Parameswaran, R. M., Xiao, Z., Freymueller, J. T., *et al.*

Seismo-geodetic Approaches for Seismic and Tectonic Processes

10. STUDENT: Generation and Validation of Synthetic HR-GNSS Data for New Zealand Megathrust Rupture Scenarios. **Solares-Colón, M. M.**, Melgar, D., Crowell, B. W., Howell, A., D'Anastasio, E., *et al.*
11. Reconciling Seismic and Geodetic Magnitude Estimates for Rapid Earthquake Characterization. **Parameswaran, R. M.**, Grapenthin, R., West, M. E., Fozkos, A.
12. STUDENT: Earthquake Detection Sensitivity of GPS Time-differenced Carrier Phase Velocities. **Dittmann, T.**, Hodgkinson, K., Morton, J., Mencin, D., Mattioli, G.
13. Spatiotemporal Variations of Stress and Strain in the Crust Near 2019 Ridgecrest Earthquake Sequence. **Abolfathian, N.**, Fielding, E. J.

WITHDRAWN

14. Tectonic Tremor Used as a Proxy for Slow Slip Can Be Used to Remove Its Effect From a GNSS Signal and Reveal Changes Due to Annual Rainfall. **Husker, A.**, Santoyo, M., Alvarado-Santiago, G., Radiguet, M., Kazachkina, E., *et al.*
15. STUDENT: Multifractal Analysis of Point Source Distributions Obtained From InSAR Inversion. **Saylor, C.**, Rundle, J. B.

Characteristics, Hazards and Evolution of the Gorda Region of the Cascadia Subduction Zone

16. The December 2021 Cape Mendocino Earthquake Sequence. **Hellweg, M.**, Dreger, D. S.
17. Revisiting the M6.5 21 December 1954 Korbel Earthquake. **Hellweg, M.**, McPherson, R. C., Dengler, L., Dreger, D. S.
18. The Humboldt Bay Seismic Network: 1974 to 1986. **McPherson, R. C., Dengler, L.**
19. The Redwood Coast Tsunami Work Group: Twenty-five Years of Evolving Outreach on California's North Coast. **Dengler, L.**, Admire, A., Ozaki, V., Nicolini, T., Aylward, R.
20. The Seismic Saga of the Humboldt Bay Nuclear Power Plant. **Dengler, L.**, McPherson, R. C.
21. Tsunami Hazard Mapping: Comparison of California Mapping with Oregon Mapping. **Patton, J. R.**, Wilson, R. I., Allan, J.

Shakes in Lakes: Frontiers in Lacustrine Paleoseismology

22. Hunting For Norway's Biggest Historical Earthquake. **Redfield, T. F.**, Lakeman, T., Hermanns, R. L., Fabian, K., Klugh, M.
23. Are Wasatch Front Earthquakes Preserved in the Great Salt Lake Sedimentary Record? **DuRoss, C. B.**, Brothers, D. S., Thompson Jobe, J. A., Briggs, R. W., Singleton, D. M., *et al.*
24. STUDENT: Investigating Earthquake Rupture History of the Cascadia Subduction Zone Using Coastal Lacustrine Diatoms, Lake Ozette, Washington, USA. **DePaolis, J. M.**, Dura, T., Brothers, D. S., Singleton, D. M., Sherrod, B. L.
25. Developing a Chronology of Crustal and Megathrust Earthquake Records in the Pacific Northwest: Preliminary Results from Lakes Whatcom and Sammamish in Washington. **Hill, J.**, Brothers, D. S., Sherrod, B. L., Dartnell, P., Ponton, C., *et al.*

26. Constraining the Initiation, Spatial Distribution and Sedimentary Source of Lake Turbidites Triggered by the 2018 Anchorage Earthquake. **Singleton, D. M.**, Brothers, D. S., Haeussler, P. J., Witter, R. C., Hill, J.
27. Preliminary Lacustrine Paleoseismology From Chelatna Lake, Southcentral Alaska, From Chirp Profiles and Short Cores. **Haeussler, P. J.**, Singleton, D. M., Witter, R. C., Brothers, D. S., Hill, J.

Extraterrestrial Seismology: Seismology from Mars, the Moon and Everywhere

28. Detection of Seismic Events Originating from Europa's Silicate Interior. **Marusiak, A. G.**, Panning, M. P., Vance, S., Nunn, C., Stähler, S. C., *et al.*
29. STUDENT: Classifying Deep Moonquakes Using Machine Learning Algorithms. **Khatib, A. S.**, Schmerr, N. C., Lekic, V., Maguire, R.
30. Investigating the Heterogeneous Nature of the Deep Martian Mantle With Geodynamically-constrained Inversions of InSight Seismic Data. **Samuel, H.**, Drilleau, M., Garcia, R. F., Rivoldini, A., Lognonne, P., *et al.*
31. STUDENT: Deep and Shallow Quakes in the Presence of a Clathrate-lid on Titan. **Bryant, A. S.**, Panning, M. P., Marusiak, A. G.
32. Mars Interior Revealed From Over Three Years of InSight on Mars. **Panning, M. P.**, Banerdt, W. B., Smrekar, S. E.
33. Constructing an Earthquake Site Response Model for the Lunar South Polar Region. **Schleicher, L. S.**, Schmerr, N. C., Watters, T. R., Banks, M. E., Bensi, M. T., *et al.*
34. Lunar Gravitational-wave Antenna. Harms, J., Bonforte, A., Frigeri, A., Giunchi, C., van Heijningen, J., Komatsu, G., Majstorović, J., Marka, S., Melini, D., Olivieri, M., **DeSalvo, R.**, The LGWA Collaboration

Everything Old Is New Again—Resurging Use of Analog Data

41. A Directory for the Discovery of Legacy Seismic Data. **Hwang, L. J.**, Kwong, D.
42. The ISC Electronic Archive of Printed Station and Network Bulletins. Di Giacomo, D., Armstrong, A., **Storchak, D. A.**
43. WFNE Repository and Nuclear Explosion Legacy Data. **Oancea, V.**, Murphy, J. R., **Kung, Y.**, Piraino, P. E.
44. Nuclear Explosion Legacy Data in Central and Eastern Europe. **Oancea, V.**, **Kung, Y.**, Murphy, J. R., Piraino, P. E., Popa, M., *et al.*
45. Recovery and Digitization of Soviet Peaceful Nuclear Explosions From Legacy Analog Seismograms. **Mackey, K.**, Alexei, M., Vinogradov, Y., Dyagilev, R., Butyrin, P., *et al.*
46. STUDENT: Revisiting the M7.3 1948 Ashgabat Earthquake Using Historic Seismograms and Satellite Imagery. Marshall, N., **Ou, Q.**, Walker, R., Grützner, C., Bergman, E.
47. STUDENT: Examining Digitization Parameters to Produce High Quality Data from Historical Analog Seismograms. **Stibitz (Burkhard), K.**, Burk, D., Mackey, K.

Advances in Earthquake Early Warning: Research, Development, Current State of Practice and Social Science

48. STUDENT: MyShake + ShakeAlert: Using Smartphone Seismic Data for Earthquake Early Warning. **Patel, S. C.**, Chung, A., Strauss, J., Allen, R., Kong, Q.
49. Earthquake Location Performance of ShakeAlert's Epic Algorithm for Recent Offshore Events Near Cape Mendocino, California. **Williamson, A.**, Chung, A., Allen, R.
50. Can PLUM Earthquake Early Warning (EEW) Ground Motion Estimates in Southern California Be Improved by Incorporating Empirically Derived Site-Term Corrections? **Kilb, D.**, Bunn, J., Devin, E., Parker, G. A., Baltay, A., Saunders, J. K., **Cochran, E. S.**, Minson, S. E., Clements, T., O'Rourke, C. T.
51. The Potential for Small-world Phenomena in Ground Motion-based Earthquake Early Warning. **Clements, T.**, Cochran, E. S., Yoon, C., Minson, S. E., Baltay, A.
52. Enabling Inclusion of Magnitude Estimates Based on Peak Ground Displacement in the ShakeAlert Solution Aggregator. **Murray, J. R.**, Crowell, B. W., Ulberg, C., Hagerty, M., Smith, D. E., *et al.*
53. Testing the Finite-fault Rupture Detector (FinDer) in New Zealand. Böse, M., Behr, Y., **Massin, F.**, Andrews, J.
54. An Earthquake Early Warning System for the Lower Rhine Embayment, Germany. Najdahmadi, B., **Pilz, M.**, Razafindrakoto, H., Oth, A., Cotton, F.
55. Low-latency Digitization, Communication and Alerting for Earthquake Early Warning Systems: Güralp Minimus. **Lindsey, J. C.**, Reis, W., Watkiss, N., Hill, P., Cilia, M.
56. STUDENT: Qube Network: A Low-cost Consumer Seismic Network for Earthquake Monitoring and Earthquake Early Warning. **He, V.**, Clayton, R. W.
57. Performance and Effectiveness of Earthquake Early Warning in Mitigating Seismic Risk. Böse, M., Papadopoulos, A. N., Danciu, L., **Clinton, J. F.**, Wiemer, S.
58. How Low Should We Alert? Quantifying Intensity Threshold Alerting Strategies for Earthquake Early Warning in the United States. **Saunders, J. K.**, Minson, S. E., Baltay, A.
59. Testing the Latency and Geofence of Wireless Emergency Alerts Intended for the ShakeAlert® Earthquake Early Earning System, West Coast, USA. **McBride, S. K.**, Sumy, D. F., Llenos, A., Parker, G. A., McGuire, J. J., *et al.*
60. ShakeAlert Past Present and Future: Analysis of ShakeAlert's Time-to-alert Using the BDSN. **Terra, F.**, Valen, C., Boyd, O., Marty, J., Henson, I., *et al.*

Thursday, 21 April *(continued)*

Development, Enhancement and Validation of Seismic Velocity Models

61. Deep Crustal P and S Wave Velocity Models for Oklahoma Based on Common-mid-point Sorting and Stacking of Local Earthquake Waveforms. **Ratre, P.**, Carpenter, B. M., Behm, M.
62. 3D Wave Propagation Simulations of m6.5+ Earthquakes on the Tacoma Fault Considering the Effects of Topography, a Geotechnical Layer and a Near-fault Damage Zone. **Stone, I.**, Wirth, E. A.
63. STUDENT: Mapping Los Angeles Basin Depth With Converted Seismic Phases. **Yang, Y.**, Clayton, R. W.
64. Incorporating Realistic Near-surface Structure Into the Cascadia Seismic Velocity Model for 3D Earthquake Simulations. **Wirth, E. A.**, Grant, A., Stone, I., Frankel, A. D., Stephenson, W. J.
65. STUDENT: High Resolution 3D Shear Wave Velocity Model of Salt Lake Valley via Joint Inversion of Rayleigh Wave Ellipticity and Phase Velocity From the Magna Aftershock Nodal Array. **Zeng, Q.**, Lin, F., Allam, A. A.
66. STUDENT: A High-resolution Phase Velocity Inversion for Crustal Structure of the Southeastern US Using Non-linear Signal Comparison. **Barman, D.**, Pulliam, J. R.
67. STUDENT: Calibration, Validation and Application of a Seismic Velocity Model for Coastal South America Using 3D Deterministic Numerical Simulations. **Xu, K.**, Roten, D., Olsen, K. B.
68. 3D P- and S-wave Active-Source Seismic Tomography of Rock Valley, the Nevada National Security Site. **Harding, J. L.**, Preston, L. A., Bodmer, M. A.

Fault Damage Zones: What We Know and Do Not

69. Long-distance Propagation of Guided Waves Along Ridgecrest Faults and Evaluation of Connectivity With the Owens Valley and Garlock Faults. Catchings, R. D., **Goldman, M. R.**, Chan, J. H., Steidl, J. H., Criley, C. J.
70. High-resolution P-wave Velocities Across the Creeping Section of the San Andreas Fault at Mee Ranch, Central California. **Goldman, M. R.**, Catchings, R. D., Nevitt, J. M., Chan, J. H., Sickler, R. R., *et al.*
71. STUDENT: Internal Variations of the Banning and Mission Creek Fault Zones Near the Thousand Palms Oasis Preserve From a Large-N Seismic Array. **Reinhard, H. R.**, Share, P.
72. STUDENT: Characterization of Damage Zone Structure Along the Elsinore and Superstition Hills Faults: Towards Quantification of Mmax. **Gaston, H. E.**, Griffith, A., Rockwell, T. K.
73. STUDENT: Margin-scale Damage Zone Along the Queen Charlotte Fault. **Perrin, R.**, Lauer, R., Miller, N., Brothers, D. S.
74. STUDENT: Structure and Geometry of an Exposed Active Subduction Zone Splay Fault: The Deception Creek Strand of the Patton Bay Fault, Montague Island, Alaska. **Fintel, A.**, Tobin, H., Haeussler, P. J., Witter, R. C., O'Sullivan, P.
75. Seismic Imaging Across the San Gregorio Fault Zone at Pescadero, California. **Chan, J. H.**, Catchings, R. D., Goldman, M. R., Rymer, M. J., Criley, C. J., *et al.*
76. Mid-crustal Structure of an Exhumed, Multiply Reactivated Proterozoic Plate Boundary: Active-source and Borehole Seismic, Geologic Mapping and 3D Microgravity in the Homestake Shear Zone, Colorado. **Levandowski, W.**

Earthquake Source Processes at Various Scales: Theory and Observations

77. Analysis of the 2015 Gorkha-Dolakha (Central Nepal) Foreshocks and Aftershocks Sequence Through Transients in B Values. **Parija, M.**
78. STUDENT: Lab-generated Earthquakes in Heterogeneous Faults With Varying Roughness. **Brotherson, L.**, Edwards, B., Faulkner, D.
79. STUDENT: Seismic Magnitude Clustering Is Prevalent in Laboratory and Field Catalogs. **Gossett, D.**, Brudzinski, M. R., Xiong, Q., Lin, Q., Hampton, J. C.
80. STUDENT: Velocity Structure and Deep Earthquakes Beneath the Kinnaur, NW Himalaya: Constraints From Relocated Seismicity and Moment Tensor Analysis. **Biswal, S.**, Kumar, S.
81. STUDENT: Scattering of Moment Tensors During Aftershock Sequences at Global and Local Scales. **Wilding, J.**, Ross, Z. E.
82. Toward a Self-consistent Mw Catalog for the Central Walker Lane Fault System. **Taira, T.**, Mayeda, K., Roman-Nieves, J. I., Gok, R., Walter, W. R., *et al.*
83. Fault Interactions Enhance High-frequency Earthquake Radiation. **Chu, S.**, Tsai, V. C., Trugman, D. T., Hirth, G., Elbanna, A.
84. A New Focal Mechanism Calculation Algorithm Using Inter-event Relative Radiation Patterns. **Cheng, Y.**, Allen, R.
85. A Fast Procedure to Estimate the Prevailing Rupture Propagation Direction and How It Applies to the 2016-2017 Central Italy Seismic Sequence. **Calderoni, G.**, Di Giovambattista, R., Ventura, G.
86. STUDENT: Effects of Station Distribution and Rupture Directivity on Stress Drop Estimates in the Ridgecrest 2019 Earthquake Sequence. **Neupane, A. S.**, Ruhl, C. J., Abercrombie, R. E.
87. Characterization of Foreshocks for Mainshocks (Mj3.0 to 7.2) of Onshore Japan During 2001 to 2021. **Peng, H.**

88. Student: Insights on Earthquake Source Processes From the 2019 Ridgecrest Earthquake Source Spectra and Its Azimuthal Variation. **Liu, M.**, Neo, J., Huang, Y.
89. The Southern Alps Long Skinny Array (SALSA): Virtual Earthquake Analysis of the Alpine Fault Between Milford Sound and Maruia. **Townend, J.**, Holden, C., Chamberlain, C. J., Warren-Smith, E., Juarez-Garfias, I., *et al.*
90. Relocation of the 1975 Oroville ML 5.7 Earthquake Sequence and Insights Into Its Origin. **Smith, S.**, Wong, I. G., Humphrey, J., Hoirup, D.
91. Student: Mainshock-aftershocks and Swarm Sequences Highlighted by Fluid-driven Process (Ubaye Region, French Western Alps). **Baques, M.**, De Barros, L., Godano, M., Duverger, C., Jomard, H.

Machine Learning Techniques for Sparse Regional and Teleseismic Monitoring

92. Student: Using Machine Learning to Improve Pacific Northwest Earthquake Catalog. **Ni, Y.**, Denolle, M. A.
93. Student: Automated Real-time Earthquake Energy Discriminator of Deep Earthquakes: A Comparison of Conventional and Ml Methods. **Barama, L.**, Newman, A. V.
94. Expansion and Transferability of Seismic Deep CNN Denoiser to Global Networks. **Koch, C.**, Tibi, R., Young, C. J.
95. Deep Learning Seismic Signal Detection on the International Monitoring System. Heck, S. L., **Garcia, J. A.**, Young, C. J.
96. Analysis of the 2020 Albanian Durres Aftershock Sequence, Benchmarking Machine Learning Approaches. **Rietbrock, A.**, Woollam, J., Van der Heiden, V., Dushi, E., Schurr, B., *et al.*

Fiber Optic Seismology: Understanding Earth Structure and Dynamics with Distributed Sensors

97. High-resolution Ambient Seismic Noise Monitoring of Geothermal Systems in California's Imperial Valley Using Dark Fiber Distributed Acoustic Sensing (DAS). **Rodríguez Tribaldos, V.**, Cheng, F., Nayak, A., Wood, T., Robertson, M., *et al.*
98. Reno, Nevada Dark Fiber DAS Experiment: Frequency Response Among Various Seismic Instruments. **Hatch-Ibarra, R. L.**, Seylabi, E., Mirzanejad, M., Tyler, S. W., Saltiel, S., *et al.*
99. Student: Directional Sensitivity of DAS and Its Effect on Rayleigh Wave Tomography. **Fang, J.**, Yang, Y., Shen, Z., Biondi, E., Wang, X., *et al.*
100. Student: De-noising DAS Data Using an Adaptive Frequency-wavenumber Filter. **Isken, M. P.**, Heimann, S., Dahm, T.
101. Student: Towards Inversion of the Microseismic Moment Tensor With DAS: Application to Boreholes. **Tuinstra, K. B.**, Lanza, F., Fichtner, A., Zunino, A., Grigoli, F., *et al.*
102. A Comparison of Approaches To Convert DAS Measurements to Ground Motion. **St. Clair, J. T.**, Sprinkle, P., Chojnicki, K., Knox, H.
103. Combining Dark Fiber and Seismic Interferometry to Measure Physical Properties of an Earthquake Swarm. **Matzel, E.**, Morency, C., Templeton, D., Ajo-Franklin, J.
104. Local Earthquake Detectability Using Long-haul Fiber Cables With DAS Technology. **Chen, X.**, McKnight, J. G., Hu, Y., Hu, M., Li, Z., *et al.*
105. Initial Steps Towards a DAS Metadata Model. **Mellors, R. J.**, Hodgkinson, K., DAS RCN Data Management Working Group

Rethinking PSHA: Are We Using Appropriate Inputs for the End Goal?

106. Composite ShakeMaps for Earthquake Sequences and for Testing and Observed Probabilistic Seismic Hazard Analyses. **Quitoriano, V.**, Salditch, L., Powers, P. M., Wald, D. J.
107. Evaluating Ground Motions From Deep Earthquakes in Malawi. **Holmgren, J. M.**, Werner, M. J., Goda, K., Silva, V., Villani, M.
108. Homogeneization of the Moment Magnitude Estimates Available in the French Datasets and Implications on Ground Motion Model Variability. **Laurendeau, A.**, Kotha, S.
109. A First Look at the Revised Seismic Hazard in Southwest Iceland From Synthetic Finite-fault Earthquake Catalogs Predicted by a New Physics-based Bookshelf Fault System Model. **Kowsari, M.**

WITHDRAWN

110. Student: Precariously Balanced Rock Validation of Earthquake Ground-motion Models in Southern California. **Rood, A. H.**, Rood, D. H., Balco, G., Stafford, P. J., Brune, R. J., *et al.*

The 15 January 2022 Tonga Eruption and Tsunami

111. Tonga Tsunami Modeling. **Titov, V. V.**, Wei, Y., Moore, C., Sannikova, N., Arcas, D.
112. World-wide Simulation of Ocean-coupled Air Waves Generated by the 2022 Volcanic Explosion in Tonga. **Okal, E. A.**, Salaree, A.
113. Array Studies of the Propagation of Air Waves From the Tonga Explosion at Two European Arrays. **Okal, E. A.**, Dias, F., Bergin, C., Kokina, T., Kalligeris, N., *et al.*
114. An Antipodal Seismic and (Infra)acoustic View on the 15 January 2022 Hunga-Tonga Hunga-Ha'apai Eruption from Central Europe. Kraft, T., **Ling, A.**, Toledo, T., Stähler, S., Clinton, J., *et al.*
115. The 15 January 2022 Event at Hunga Tonga-Hunga Ha'apai, Recorded by Multiparametric Stations in Italy. Braun, T., Bonforte, A., Cannata, A., Catania, R., Cesaroni, C., Delle Donne, D., Ippolito, A., Di Lieto, B., Lorenzetti, A., Massa, M., Maugeri, R., Peluso, R., Privitera, E., Rizzo, A., Romano, P., Sciotto, M., Spogli, L., **Hellweg, M.**, Doglioni, C.
116. Effects and Observations in Canada of the 15 January 2022 Hunga Tonga-Hunga Ha'apai Eruption. **Bent, A. L.**, McCormack, D. A.
117. Observations of the 15 January 2022 Tsunami in Tidal Lagoons of S.E. Australia. Moresi, L., **Miller, M. S.**
118. California Geological Survey Tsunami Event Response Program: Tonga Tsunami 2022. **Patton, J. R.**, Wilson, R. I., Bott, J., Graehl, N. A., Pridmore, C., *et al.*
119. Improving Tsunami Event Response and Decision Support Tools in California Based on an Assessment of the Tsunami Generated by the 15 January 2022 Hunga Tonga-Hunga Ha'apai Volcano Eruption. **Wilson, R. I.**, Patton, J. R., Bott, J., Graehl, N. A., Olson, B. P. E., *et al.*
120. Tsunami Response and Observations in Santa Cruz, California, USA From the 15 January 2022 Hunga Tonga-Hunga Ha'apai Volcano Eruption. **Graehl, N. A.**, Bott, J., Patton, J. R., Wilson, R. I., La Selle, S., *et al.*
121. The 15 January 2022 Tonga Tsunami Advisory on California's North Coast: Notification, Response and Outreach. **Dengler, L.**, Admire, A., Nicolini, T., Aylward, R., LaDuke, Y.
122. Tsunami Velocity and Water Height Measurements of the 2022 Tonga Event Along Northern California and Southern Oregon. Crawford, G., Admire, A., **Dengler, L.**
123. Hunga-Tonga Games: Unravelling the Timing and Size of the Biggest Volcanic Explosion in 30 Years. **Thompson, G.**, McNutt, S. R., Scruggs, M., Spera, F., Zheng, Y., *et al.*
124. Source Characterization of the 15 January 2022 Hunga Tonga-Hunga Ha'apai Eruption Using Regional and Teleseismic Waveform Analysis. **Garza-Giron, R.**, Lay, T., Pollitz, F., Kanamori, H., Rivera, L.
125. Seismoacoustic Yield Estimation of the January 2022 Hunga-Tonga Eruption. **Delbridge, B. G.**, Alfaro-Diaz, R., Begnaud, M. L., Blom, P., Carmichael, J. D., *et al.*

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Friday, 22 April 2022—Oral Sessions

Presenting author is indicated in bold.

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Earthquakes in the Urban Environment	**New Developments in Physics- and Statistics-based Earthquake Forecasting**	**Frontiers in Earthquake and Tsunami Science—Model Integration, Recent Advances, Ongoing Questions**	**Earthquake Source Processes at Various Scales: Theory and Observations**
8 AM	Assessment of Earthquake Hazard and Risk for Tofino, British Columbia. Novakovic, M., Borozan, J., Yenier, E., **Assatourians, K.**, Atkinson, G. M., *et al.*	Space-time Variations of Seismicity: Quantitative Assessment and Systematic Changes Before Large Earthquakes. **Zaliapin, I.**, Ben-Zion, Y.	Influence of Subducting Rift Propagator Wakes on Cascadia Forearc Deformation and Earthquake Segmentation. **Goldfinger, C.**, Beeson, J.	STUDENT: Are Most Earthquakes' Non-double-couple Components Artifacts? **Rösler, B.**, Stein, S.
8:15 AM	Recorded Earthquake Response of the New Self Anchored Suspension (SAS) Bridge of the San Francisco Bay Bridge System–A Preliminary Study. **Celebi, M.**	STUDENT: A b-value Based Analysis of Earthquake Sequences for Japan Using Deep Learning. **Köhler, J.**, Li, W., Chakraborty, M., Faber, J., Fenner, D., *et al.*	INVITED: Upper Plate Structure and Tsunamigenic Faults Near the Kodiak Islands, Alaska. **Ramos, M. D.**, Liberty, L. M., Haeussler, P. J.	S/P Amplitude Ratios Derived from Single-component Seismograms and Their Potential Use in Resolving Focal Mechanism Complexity of Micro-earthquake Sequences. **Shelly, D. R.**, Skoumal, R. J., Hardebeck, J. L.
8:30 AM	Ground Motion Spatial Variability Due to Combined Effects of Site and City Responses in a Sedimentary Basin. **Rohmer, O.**, **Bertrand, E.**, Régnier, J., Glinsky, N., Santisi D'Avila, M.	Physical Properties of the Crust Influence Aftershock Locations. **Hardebeck, J. L.**	Evaluating Rupture Models of the 1700 CE Tsunami With Detailed Mapping of Tsunami Deposits and Sediment Transport Modeling. **La Selle, S.**, Nelson, A., Jaffe, B., Witter, R. C., Gelfenbaum, G., *et al.*	Utility of Seismic Source Mechanisms in Mining. **Malovichko, D.**
8:45 AM	STUDENT: Testing Machine Learning Models for Regional Scale Building Damage Prediction. **Ghimire, S.**, Guéguen, P., Giffard-Roisin, S., Schorlemmer, D.	STUDENT: Does Abundant Afterslip Mean Productive Aftershock Sequences? **Churchill, R. M.**, Werner, M. J., Biggs, J., Fagereng, A.	INVITED: STUDENT: The 2021 South Sandwich Island Mw 8.2 Earthquake: A Slow Event Sandwiched Between Regular Ruptures. **Jia, Z.**, Zhan, Z., Kanamori, H.	Because Small Earthquakes Matter: Lessens Learned From Extensive Testing of CMT Inversion for Regional Earthquakes. **Petersen, G.**, Cesca, S., Heimann, S., Niemz, P., Dahm, T., *et al.*
9 AM	INVITED: STUDENT: High-resolution Amplification Model for an Urban Area Using the Weak Motion From Earthquakes and Ambient Vibration Data. **Janusz, P.**, Perron, V., Knellwolf, C., Bonilla, L., Fäh, D.	INVITED: Finding the Next Layer of Seismicity Patterns in High-resolution Catalogs. **Page, M. T.**, van der Elst, N.	3D Acoustic-elastic Coupling with Gravity: The Dynamics of the 2018 Palu, Sulawesi Earthquake and Tsunami. Krenz, L., Uphoff, C., Ulrich, T., **Gabriel, A.**, Abrahams, L. S., *et al.*	Detection Limits and Near-field Ground Motions of Fast and Slow Earthquakes. **Kwiatek, G.**, Ben-Zion, Y.
9:15–10 AM	Poster Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Advances in Seismoacoustic Methods for Explosion Monitoring	**Distributed Deformation from Surface Fault Rupture**	**Site Response Characterization in Seismic Hazard Analysis**
8 AM	Aftershocks of the Announced Underground Nuclear Tests Conducted by the DPRK Found by Waveform Cross Correlation: From 2013 to 2022. Kitov, I., **Le Bras, R. J.**, Wang, H.	Distributed Deformations for Dip Slip Events Within PFDHA. **Moss, R.**, Thompson, S. C., Kuo, C., Younesi, K., Chao, S.	STUDENT: Evaluation of the P-wave Seismogram Approach to Estimate Vs30 in California. **Li, M.**, Rathje, E. M.
8:15 AM	ML:MC Applied to Nuclear Explosions Detonated at the Nevada Test Site. **Holt, M. M.**, Koper, K. D., Pyle, M., Walter, W. R.	Distributed Fault Displacement Hazard Assessment at a Critical Facility in Southern California: Lessons Learned From Comparing Site Data to Empirical Models for Probabilistic Hazard Analysis. **Thompson, S. C.**, Zandieh, A., Lindvall, S. C., Hartleb, R., Rockwell, T. K.	STUDENT: Estimation of Vs30 using the P-wave Seismogram Method in California, USA. **Mun, E.**, Kim, B.
8:30 AM	Moment Tensors and Explosion Monitoring. **Pasyanos, M.**, Chiang, A., Ichinose, G., Ford, S. R., Walter, W. R.	Asymmetrical Surface Rupture Width and Dependence on Shallow Fault Geometry and Topographic Slope in a >100-Year-Old Reverse Faulting Rupture, Kyrgyzstan. **Elliott, A. J.**, Wilkinson, R., Arrowsmith, R., Dianala, J. D., Tsai, C., *et al.*	Evaluation of the Vs30-Kappa Relationship for Anchorage, Alaska. **Thornley, J. D.**, Dutta, U., Douglas, J., Yang, Z.
8:45 AM	3D Nonlinear Modeling of Underground Nuclear Explosions and the Generation of Seismic Waves. **Stevens, J.**, O'Brien, M. S.	Role of Fault Maturity on the Relationship Between Surface Displacement and Rupture Length. **Wang, Y.**, **Goulet, C. A.**	Estimating Shallow Shear-wave Velocity Profiles in Alaska Using the Initial Portion of P-waves From Local Earthquakes. **Skarlatoudis, A.**, Thio, H., Somerville, P. G.
9 AM	Stochastic Methods for Full Moment Tensor Inversion and Uncertainty Quantification. **Thurin, J.**, Ding, L., Liu, Q., Modrak, R., Gupta, A., *et al.*	STUDENT: Quantifying Near-field Ground Displacements in Historical Normal Earthquakes Using Optical Image Correlation. **Andreuttiova, L.**, Hollingsworth, J., Vermeesch, P., Mitchell, T.	Three-dimensional S-wave Velocity Model of Napa, California Obtained from Microtremor Array Measurements and Horizontal to Vertical Spectral Ratio. **Hayashi, K.**, Burns, S., Roughley, C.
9:15–10 AM	Poster Break		

Friday, 22 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Earthquakes in the Urban Environment	**New Developments in Physics- and Statistics-based Earthquake Forecasting**	**Structure and Seismogenesis of Subducting Slabs**	
10 AM	Urban Seismology: Installing a BASIN Seismic Array in Yangon, Myanmar During COVID-19. **Persaud, P.**, Thant, M., Kyaw, Z., Win, K., Oo, T., *et al.*	STUDENT: How Can Probabilistic Forecasts Learn From Physics-based Simulators? A Full-bayesian Approach to Forecast Recalibration. **Vazquez, L.**, Jordan, T. H.	INVITED: Deep Slab Seismicity Limited by Rate of Slab Deformation in the Transition Zone. **Billen, M.**, Fildes, R. A., Thielmann, M.	
10:15 AM	INVITED: STUDENT: Continuous Seismic Monitoring of a Building Over 20 Years. **Williams, E. F.**, Heaton, T. H., Zhan, Z., Lambert, V.	STUDENT: Statistical Analysis of Low-frequency Earthquake Catalogs. **Ducellier, A.**	Deep Earthquake Stress Drops and Body-wave Tomography of the Tonga Subduction Zone. **Wei, S.**, Tian, D., Wang, F., Adams, A., Wiens, D. A.	
10:30 AM	STUDENT: A New Approach for Soil-structure Interaction Assessment and Its Application to the Matera Experiment. **Skłodowska, A.**, Parolai, S., Petrovic, B., Romanelli, F.	STUDENT: Relaxing ETAS's Assumptions to Better Capture the Real Behavior of Seismicity. **Mizrahi, L.**, Nandan, S., Savran, W. H., Wiemer, S., Ben-Zion, Y.	STUDENT: Aftershock Properties of Intermediate-depth Earthquakes Beneath Japan: Implications for Rupture Mechanism. **Baez, C. M.**, Warren, L.	
10:45 AM	STUDENT: Numerical Coupling Of 3D Physics-based Ground Motion Simulation With Structural Response. **Sangaraju, S.**, Paolucci, R., Smerzini, C.	STUDENT: The Neural Temporal Point Process: A Scalable and Flexible Tool for Earthquake Forecasting. **Dascher-Cousineau, K.**, Shchur, O., Brodsky, E. E., Günnemann, S.	STUDENT: Aftershock Distributions, Moment Tensors and Stress Evolution of the 2016 Iniskin and 2018 Anchorage Mw 7.1 Alaskan Intraslab Earthquakes. **Drolet, D.**, Bostock, M., Plourde, A., Sammis, C. G.	
11 AM	STUDENT: Seismic Soil-structure Interaction Analysis of Multi-story RC Building Subjected to Different Earthquake Ground Motions Considering Various Soil Types. **Faizan, A.**, Kirtel, O.	Neural-network Based Models for Earthquake Rate Prediction. Zlydenko, O., **Bar-Sinai, Y.**, Elidan, G., Hassidim, A., Kukliansky, D., *et al.*	Duplex and Moho Earthquakes Beneath the Lesser Himalaya in India. **Mendoza, M. M.**, Ghosh, A., Rai, S. S.	
11:30 AM–12:30 PM	*Plenary:* Frontiers in Seismology			
12:30–2 PM	Lunch Break			

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Advances in Seismoacoustic Methods for Explosion Monitoring	**Earthquake Source Processes at Various Scales: Theory and Observations**	**Site Response Characterization in Seismic Hazard Analysis**
	Developing a Consistent Travel-time Framework for Comparing Three-dimensional Velocity Models for Seismic Location Accuracy. **Begnaud, M.**, Davenport, K., Conley, A., Ballard, S., Hipp, J.	Source Spectral Properties of Earthquakes in the Yellowstone Caldera. **Florez, M. A.**, Strozewski, B., Ross, Z. E.	What Are the Primary Site Response Parameters and Proxies? **Wang, Z.**, Carpenter, S.
10:15 AM	3D SEM Modeling of Wave Propagation at the Source Physics Experiment Phase II Site to Quantify Shear Wave Generation by Explosions at Short Distance (<3km). **Larmat, C.**, Chen, T., Abrams, J., May, A. P., Alfaro-Diaz, R. A., *et al.*	Investigation of the Induced Earthquake Sequence Near Stanton, Texas. **Woo, J.**, Ellsworth, W. L.	How Well Can We Predict Earthquake Site Response So Far? Machine Learning vs. Physics-based Modeling. **Zhu, C.**, Cotton, F., Kawase, H., Nakano, K.
10:30 AM	Acoustic Arrivals From Weak Explosive Sources Recorded on Distant Airborne Platforms. **Bowman, D. C.**, Krishnamoorthy, S., Silber, E. A.	Stress and Fluid Earthquake Triggering During the 2015–2017 Pamir Earthquake Sequence. **Bloch, W.**, Schurr, B., Ratschbacher, L., Metzger, S., Yuan, X., *et al.*	What Is the Importance of Two- and Three-Dimensional Site Effects? An Investigation of Single-Station Earthquake Records. **Pilz, M.**, Zhu, C., Cotton, F.
10:45 AM	Non-linear Simulation of the 2020 Beirut Explosion: Energy Coupling at Ground-air-sea Interfaces, Cratering, Hydroacoustic and Seismoacoustic Conversion and Signatures. **Ezzedine, S. M.**	High-frequency Emissions From Stimulation Microearthquakes in the Ambient Crust. Malin, P. E. A., **Zimakov, L. G.**, Leary, P. C.	STUDENT: Multidimensional Site Effects at the Treasure Island Downhole Array Using Seismo-VLAB and a Site-specific 3D Model. **Hallal, M. M.**, Cox, B. R., Asimaki, D., Ayoubi, P.
11 AM	Quantifying the Impact of Simulation Frequency Fidelity on Waveform-based Bayesian Inference for Seismic Monitoring Using Bayesian Experimental Design. **Catanach, T. A.**	Spatial-temporal Evolution of In-situ Vp/Vs Ratio in the Gofar Transform Fault Zone, East Pacific Rise. **Liu, T.**, Gong, J., Fan, W., Lin, G.	Characterization of Non-ergodic Site Effects at Selected Hard-rock Sites in Western Canada. **Hassani, B.**, Atkinson, G. M., Stewart, J. P., Fairhurst, M., Sheffer, M., *et al.*
11:30 AM–12:30 PM	*Plenary:* Frontiers in Seismology		
12:30–2 PM	Lunch Break		

Friday, 22 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Network Seismology: Recent Developments, Challenges and Lessons Learned	**Adjoint Waveform Tomography: Methods and Applications**	**Multi-scale Dynamics of Complex Earthquake Faulting and Seismic Wave Propagation**	**Structure and Seismogenesis of Subducting Slabs**
2 PM	INVITED: Earthquake Detection in Northern California With Graph Neural Networks. McBrearty, I. W., **Beroza, G. C.**	Adjoint Tomography of the Hikurangi Subduction Zone and the North Island of New Zealand. **Chow, B.**, Kaneko, Y., Tape, C., Modrak, R., Mortimer, N., *et al.*	Kinematic Rupture Models of Listric Normal Faulting in Earthquake Ground Motion Simulations. **Pitarka, A.**, Scalise, M., Zeiler, C., Rodgers, A., Walter, W. R.	INVITED: The Role of Subducted Fluids in the Genesis of Deep Earthquakes: Evidence From Deep Diamonds and Subduction Zone Thermal Modeling. **Shirey, S. B.**, Wagner, L. S., Walter, M. J., Pearson, D. G., van Keken, P. E.
2:15 PM	Toward Integrating Machine Learning Phase Pickers Into the Southern California Seismic Network Earthquake Catalog. **Yoon, C.**, Tam, R., Andrews, J., Bhadha, R., Ross, Z. E., *et al.*	STUDENT: The Lithospheric Structures Beneath Central and Southern Appalachians Revealed by Joint Full-waveform Inversion of Ambient Noise and Teleseismic Data. **Lei, T.**, He, B., Wang, K., Du, N., Liu, Q.	The Dynamics of Unlikely Slip: 3D Dynamic Rupture Modeling of Low-angle Normal Fault Rupture at the Mai'iu Fault, Papua New Guinea. **Gabriel, A.**, Biemiller, J. B., Ulrich, T.	Metamorphism-facilitated Faulting in Deforming Orthopyroxene: Implications for Global Intermediate-depth Seismicity. **Wang, Y.**, Shi, F., Wen, J., Yu, T., Zhu, L., *et al.*
2:30 PM	On-premises Integration of Machine Learning Models at UUSS—Distributed Computing and Messaging. **Baker, B.**, Armstrong, A., Pankow, K. L., Koper, K. D.	STUDENT: SASSY21: A 3D Seismic Structural Model of the Lithosphere and Underlying Mantle Beneath Southeast Asia from Multi-scale Adjoint Waveform Tomography. **Wehner, D.**, Blom, N., Rawlinson, N., Daryono, S., Miller, M. S., *et al.*	Exploring Fault Segmentation and Rupture Length on the Sierra Madre Fault Zone With Dynamic Rupture Simulations. **Lozos, J.**	Scaling Relations Between High Pressure, High Temperature Transformational Faulting Experiments and Natural Seismicity. **Officer, T.**, Zhan, Z., Zhu, L., Yu, T., Wang, Y.
2:45 PM	Event-based Training in Label-limited Regimes. **Linville, L.**	WUS256: An Adjoint Waveform Tomography Model of the Western United States for Improved Waveform Simulations. **Rodgers, A.**, Krischer, L., Afanasiev, M., Boehm, C., Doody, C. D., *et al.*	STUDENT: The Effects of Precursory Seismic Velocity Changes on Earthquake Sequence Simulations. **Thakur, P.**, Huang, Y.	STUDENT: Using High Frequency Mode-converted Phases at the Plate Interface to Characterize the Properties and Along-strike Variability of the Alaska-Aleutian Subducting Plate. **Daly, K. A.**, Abers, G. A.

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy	**Advances in Seismoacoustic Methods for Explosion Monitoring**	**Site Response Characterization in Seismic Hazard Analysis**
2 PM	STUDENT: Strawberry Mountains Slip Rates in Suspiciously Seismically Still Eastern Oregon. **Dunning, A.**, Streig, A. R., Madin, I., Amidon, W., Balco, G., *et al.*	Mine Explosion Identification Using Machine Learning Methods. **Rabin, N.**, Bregman, Y., Niv, I.	Site Characterization of Seismic Stations in Metropolitan Lima, Peru. **Gonzales, C.**, **Moya Huallpa, L. A.**, Ccahua, A., Lazares, F., Yamazaki, F., *et al.*
2:15 PM	Deep Coseismic Slip in the Cascadia Megathrust Can Be Consistent with Coastal Subsidence. **Melgar, D.**, Sahakian, V. J., Thomas, A. M.	An Alternative Multi-processor Configuration for Network Processing at the CTBTO. **Le Bras, R. J.**, Kushida, N., Strachota, P., Ali, S., Miljanovic-Tamarit, V.	STUDENT: Reducing the Epistemic Uncertainty in Ground Motion Prediction Equations by Incorporating Site Fundamental Frequency Using Japanese Stations in NGA-West2 Database. **Yazdi, M.**, Motamed, R., Anderson, J. G.
2:30 PM	STUDENT: Interseismic Deformation in the Dead Sea Fault Region Inferred by InSAR and GNSS Measurements. **Golriz, D.**, Hamiel, Y., Bock, Y., Xu, X., Sandwell, D. T.	Near Field Modeling of the Large Surface Explosion Coupling Experiment (LSECE). **Vorobiev, O.**, Ford, S. R., Walter, W. R.	STUDENT: A Practical Approach for Accounting for Vs Spatial Variability Using 1D Site Response Analyses. **Pretell, R.**, Ziotopoulou, K., Abrahamson, N.
2:45 PM	INVITED: Earthquake Behaviors in Earthquake Cycle Simulations With Fault Damage Zones. **Huang, Y.**, Thakur, P.	A New Approach for Simulating Sound Wave Propagation Based on Lab Experiments Using 3D-printed Models. **Wang, J.**, Park, S.	STUDENT: Linear Site Response of Soft Peaty Organic Soil Sites in California's Bay-Delta Region. **Buckreis, T. E.**, Wang, P., Brandenberg, S. J., Stewart, J. P.

Friday, 22 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
	Network Seismology: Recent Developments…	**Adjoint Waveform Tomography…**	**Multi-scale Dynamics of Complex Earthquake…**	**Structure and Seismogenesis …**
3 PM	Nodal Deployments and Their Role in Regional Seismic Monitoring. **Walter, J.**, Ogwari, P. O., Chen, X.	STUDENT: The Collaborative Seismic Earth Model: Generation 2. **Noe, S.**, van Herwaarden, D., Thrastarson, S., Masouminia, N., Böhm, C., *et al.*	Dynamic Off-fault Failure and Tsunamigenesis at Strike-slip Restraining Bends. **Ma, S.**, Du, Y.	STUDENT: Complex Structure in the Nootka Fault Zone Revealed by Double-difference Tomography and a Newly Determined Earthquake Catalog. **Merrill, R.**, Bostock, M., Peacock, S. M., Schaeffer, A., Roecker, S.
3:15 PM–4:30 PM	Poster Break			
		Adjoint Waveform Tomography: Methods and Applications		**Advances in the Use of Seismic and Acoustic Methods to Constrain Physical Processes at Volcanoes**
4:30 PM		A New Model of the Australasian Region From Adjoint Tomography. **Boehm, C.**, Afanasiev, M., Krischer, L., van Driel, M., Fichtner, A.		Deep-learning-based Earthquake Catalog Production at Axial Seamount From 2014 to 2021. **Wang, K.**, Waldhauser, F., Tolstoy, M., Wilcock, W. S. D., Tan, Y., *et al.*
4:45 PM		STUDENT: Using K-means Clustering to Compare Adjoint Waveform Tomography Models of California and Nevada. **Doody, C. D.**, Rodgers, A., Boehm, C., Afanasiev, M., Krischer, L., *et al.*		STUDENT: Hydroacoustic Investigation of Lava-water Interactions During the 2018 Kilauea Eruption. **Atkins, C. M.**, Costa, O., Caplan-Auerbach, J.
5 PM		STUDENT: Regional Experiments on Source-encoded Adjoint Waveform Tomography. **Cui, C.**, Tromp, J., Bachmann, E., Peter, D. B.		Low-frequency Seismicity Registered at Ceboruco Volcano, Mexico. **Núñez, D.**, Núñez-Cornu, F. J., Rowe, C. A.
5:15 PM		STUDENT: Accelerating Full Waveform Modeling and Inversion With Neural Operators. **Yang, Y.**, Gao, A. F., Castellanos, J. C., Ross, Z. E., Azizzadenesheli, K., *et al.*		Recent Eruptive Activity of Sangay Volcano Observed by an Infrasound Array. **Ruiz, M. C.**, Acero, W., Hernandez, S., Palacios, P., Angelis, S. D., *et al.*

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Advances in Earthquake Geology…	**Advances in Seismoacoustic…**	**Site Response Characterization in Seismic Hazard Analysis**
3 PM	STUDENT: Juicy Data — Preliminary Results From a Drone Lidar System Applied to Tectonic Geomorphology. **Salomon, G.**, Finley, T., Stephen, R., Nissen, E.	Verifying the Presence of an Acoustic Duct Using Balloon-borne Infrasound. **Albert, S. A.**, Bowman, D. C., Dannemann Dugick, F. K., Silber, E. A.	Nonlinearity of the Vertical Ground Motion Component. **Kamai, R.**, Frid, M., Baram, A.
3:15 PM–4:30 PM	Poster Break		
	Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy	**Network Seismology: Recent Developments, Challenges and Lessons Learned**	**Frontiers in Marine Seismology**
4:30 PM	Distributed Faulting and Off-fault Deformation Revealed by Optical Image Correlation Using Unmanned Aerial Vehicle Imagery of the 2019 Ridgecrest Earthquake Sequence. **Chupik, C.**, Jobe, J. A. T.	INVITED: Learning Lessons and Sharing Solutions With ANSS NetOps Workshops. **Biasi, G.**, Withers, M., Bhadha, R.	STUDENT: Microplate Evolution in the Queen Charlotte Triple Junction and Explorer Region: New Insights from Microseismicity. **Littel, G.**, Bostock, M., Schaeffer, A., Roecker, S.
4:45 PM	Continued Building of STEPS: Slip Time Earthquake Path Simulations. **Hatem, A. E.**, Briggs, R. W., Gold, R., Scharer, K., Minson, S. E., *et al.*	Data Mining a Large Station Metrics Database to Guide Station Siting. **Hutko, A.**, Marczewski, K., Ulberg, C., Hartog, R.	Rapid Formation of Pack Ice in Shallow Coastal Waters, as Observed by Seafloor Distributed Acoustic Sensing. **Baker, M. G.**, Abbott, R. E.
5 PM	Student: The Mechanics and Frequency of Joint Earthquake Ruptures of the San Andreas and San Jacinto Faults. **Rodriguez Padilla, A. M.**, Oskin, M. E., Rockwell, T. K., Delusina, I., Singleton, D. M.	An Overview of Quality Assurance Efforts at the Alaska Earthquake Center. **McFarlin, H.**, Ruppert, N., Holtkamp, S., Murphy, N., West, M. E.	STUDENT: OBS Noise Reduction Using Harmonic-percussive Separation Algorithms. **Zali, Z.**, Rein, T., Krüger, F., Ohrnberger, M., Scherbaum, F.
5:15 PM	INVITED: Constraining a Long History of Paleolake and Paleoearthquake Activities Using Deep Boreholes at the Ancient Lake Cahuilla, Coachella, California. **Saha, S.**, Argueta, M. O., Moon, S., Rockwell, T. K., Scharer, K., *et al.*	Posthole N4: Potential Improvements in Data Quality and Station Reliability From Posthole Versus Vault Installations. **Wolin, E.**, Anderson, J., Roberts, S., Patton, J. V., Ploetz, S., *et al.*	Novel Autonomous and Cabled OBS Solutions for Offshore Seismic Research. **Lindsey, J. C.**, Reis, W., Watkiss, N., Hill, P., Cilia, M.

Friday, 22 April *(continued)*

Time	*Grand A*	*Grand B*	*Grand C*	*Grand E–K*
		Adjoint Waveform Tomography…		**Advances in the Use of Seismic and Acoustic….**
5:30 PM		Automatic Differentiation for Seismic Inversion. **Zhu, W.**, Xu, K., Darve, E., Biondi, B., Beroza, G. C.		STUDENT: Matched Filter Detection of Lava Lake Seismicity Using a Dense Short Period Network on Mount Erebus Volcano. **Jaski, E.**, Aster, R., Grapenthin, R., Chaput, J.

Poster Sessions

EVERGREEN BALLROOM

Frontiers in Earthquake and Tsunami Science—Model Integration, Recent Advances, Ongoing Questions

1. STUDENT: Exploring Potential Causes for Observed Overprediction of Ground Shaking by USGS Hazard Maps Relative to Historical Shaking Data. **Gallahue, M.**, Salditch, L., Lucas, M. C., Neely, J., Stein, S., *et al.*
2. A Comparison of Foraminifera and Diatom-based Transfer Function Estimates of Coseismic Subsidence During the 1700 CE Earthquake Along the Oregon Coast. **Dura, T.**, Hemphill-Haley, E., Cahill, N., Kelsey, H. M., Hawkes, A., *et al.*
3. STUDENT: Diatom-based Quantification of Coseismic Land-level Change From Cascadia Subduction Zone Earthquakes in Southern Oregon. **Bruce, D.**, Dura, T., Witter, R. C., Kelsey, H. M.
4. The Cascadia Offshore Paleoseismic Record: A Visual Tour of the Systems Approach and Some Updates. **Goldfinger, C.**, Hamilton, T. S., Enkin, R. J., Patton, J. R.
5. Stochastic Tsunami Modeling Including Source Kinematics. **Riquelme, S.**, Fuentes, M.
6. Tsunami Generated From Asteroids Impacting Earth's Oceans: Consequences on Coastlines of USA for Disaster Response and Management Preparedness. **Ezzedine, S. M.**, Syal, M., Dearborn, D., Miller, P.

New Developments in Physics- and Statistics-based Earthquake Forecasting

7. Phebus: A Full Bayesian Workflow to Estimate Earthquake Recurrence Parameters and Uncertainties for Seismic Hazard Models. **Duverger, C.**, Keller, M., Senfaute, G.
8. STUDENT: Ranking Earthquake Forecasts Using Proper Scoring Rules: Binary Events in a Low Probability Environment. **Serafini, F.**, Naylor, M., Lindgren, F., Werner, M. J., Main, I.
9. A New Seismic Moment Magnitude (Mwg) and Moment Magnitude (Mw): Common Root and Differences. **Das, R.**, Meneses, C., Gonzalez, G.
10. Assessing the Predictive Skills of Global and Regional Earthquake Forecasting Models for California, Italy and New Zealand. **Bayona, J.**, Savran, W. H., Werner, M. J.
11. pyCSEP: A Python Tool-kit for Earthquake Forecast Developers. **Savran, W. H.**, Bayona, J., Iturrieta, P., Asim, K., Bao, H., *et al.*
12. STUDENT: An Interactive Web Tool to Visualize and Improve USGS Operational Aftershock Forecasts. **Paris, G. M.**, Michael, A. J.

Network Seismology: Recent Developments, Challenges and Lessons Learned

13. STUDENT: Evaluation of MEMS Sensor Reliability Through Comparative Analysis of Seismic Records and Field Experiment Using 2021 Jeju Earthquake. **Jang, D.**, Kim, M., Yoo, B., Kwak, D.
14. The Colorado Geological Survey Seismic Network, Collaboration and Outreach. **Bogolub, K. R.**, Morgan, M., Fitzgerald, F. S., Broes, L. D., Radach, K. C.
15. System Monitoring During Stressful Times. **Bhadha, R.**, Stubailo, I., Bruton, C. P., Biasi, G., Watkins, M. B., *et al.*
16. Swiss Shakemap at Fifteen: Distinctive Local Features and International Outreach. **Cauzzi, C.**, Clinton, J. F., Kästli, P., Fäh, D., Bergamo, P., *et al.*
17. Mission-critical Real Time Data Acquisition: An Earthquake Early Warning Case Study. Laporte, M., Perlin, M. M., Tatham, B., **Pelyk, N.**

Time	*Cedar*	*Regency A–C*	*Regency E–G*
	Advances in Earthquake Geology: Spatiotemporal Variations…	**Network Seismology: Recent Developments…**	**Frontiers in Marine Seismology**
5:30 PM	STUDENT: Do Earthquakes Rupture Through Releasing Bends in the Western Nepal Fault System? **Curtiss, E.**, Bemis, S., Murphy, M., Taylor, M., Styron, R., *et al.*	Raspberry Shake Citizen Seismological Network. **Blanco, J. F. C.**, Christensen, B.	SMART Repeaters: Sensor-enabled Submarine Fiber Optic Repeaters for Multi-scale and Multi-use Monitoring and Observing. **Fouch, M. J.**, Lentz, S. T., Howe, B. M., Avenson, B.

18. The Community Seismic Network (CSN): 1000 Stations in the Los Angeles Basin. **Clayton, R. W.**, Kohler, M., Heaton, T. H., Guy, R., Bunn, J., *et al.*
19. Idaho National Laboratory Seismic Monitoring Program. **Bockholt, B.**
20. STUDENT: Aftershock Relocations Using Nonlinear Inversion, 1D and 3D Velocity Models and Machine Learning to Image Fault Structure. **Wells, D.**, Baker, B., Pankow, K. L.
21. Digital Radio Telemetry Issues in Network Seismology. **Rusho, J. A.**, Trow, A. J., Forbes, N. M., Alexander, J.
22. Arizona's Seismic Network: A Case Study in Balancing Growth, Risk and Resources. **Ben-Horin, J. Y.**, Peavey, H.
23. Caravel: A New Seismic Monitoring System. **Scognamiglio, L.**, Bono, A., Lauciani, V., Quintiliani, M., Battelli, P., *et al.*
24. QuakeSaver: Smart Seismic Sensors and Fleet Management. **Isken, M. P.**, Kriegerowski, M., Dolling, M.
25. The Advanced National Seismic System ComCat Earthquake Catalog: Nine Years of Amassing Earthquake Source Parameters and Impact Data. **Earle, P.**, Ambruz, N. B., Benz, H. M., Yeck, W. L., Fee, J. M., *et al.*
26. Earthworm and AQMS for Earthquake Data Acquisition and Management in the Cloud at the California Strong Motion Instrumentation Program. **Friberg, P. A.**, Hadaddi, H., Hagos, L., Branum, D., Gold, M., *et al.*
27. Determining Seismic Station Timing Accuracy Using Regional Stations. **Wilson, D. C.**, Wolin, E., Storm, T., Ringler, A. T.
28. ISC Datasets for Seismology. **Storchak, D. A.**, Harris, J., Di Giacomo, D., Garth, T., Team, I.
29. Improving the Reliability of the Alaska Earthquake Center's Field Monitoring Networks. **Murphy, N.**, Ruppert, N., McFarlin, H., Place, M., Reynolds, M., *et al.*
30. Ensuring Timing From Nodal and Network Seismic Systems Is Synchronized. **Zeiler, C.**, Turley, R., Scalise, M., White, R., Caylor, J.
31. Use of the SCARDEC Method for Monitoring and Research Applications. **Vallee, M.**
32. STUDENT: Pyrocko—A Versatile Software Framework for Seismology. Heimann, S., **Isken, M. P.**, Kriegerowski, M., Nooshiri, N., Petersen, G., *et al.*
33. STUDENT: Pyrocko—The Other Seismology Toolbox in Python. Heimann, S., Kriegerowski, M., Isken, M. P., Nooshiri, N., Petersen, G., *et al.*
34. STUDENT: Visualizing Global Seismic Phases With AlpArray. **Ling, A.**, Stähler, S. C., Giardini, D.
35. Denoising Seismic Waveforms Using the Continuous Wavelet Transform. **Aguiar, A. C.**, Chiang, A., Myers, S. C.

Distributed Deformation from Surface Fault Rupture

41. New Constraints on the Location and Subsurface Structure of the Holocene Birch Bay Fault, Northwestern Washington, USA. **Duckworth, W. C.**, Zaleski, M. P., Zellman, M., McClymont, A. F.
42. Paleoseismic Evidence for a Near Historic Rupture within the Seattle Fault Zone. **Angster, S.**, Sherrod, B. L., Pearl, J. K., Johns, W.

Multi-scale Dynamics of Complex Earthquake Faulting and Seismic Wave Propagation

43. STUDENT: Investigating the Effects of Fault Dip Angle on Rupture Propagation Along Branch Fault Systems using 3D Dynamic Rupture Simulations. **Marschall, E.**, Douilly, R.
44. The Ingredients Needed for Realistic Dynamic Earthquake Rupture Simulations. **Harris, R.**
45. STUDENT: Revisiting the 1906 M 7.1 Meishan, Taiwan, Earthquake: A Dynamic Rupture Modeling Perspective on Single-fault Versus Multi-fault. **Lin, C.**, von Specht, S., Ma, K.

Friday, 22 April *(continued)*

46. Peculiar Rupture Path of the 2019 Peru Intraslab Earthquake Suggests a Key Role of the Surface-reflected Dynamic Stresses. **Vallee, M.**, Xie, Y., Grandin, R., Villegas, J., Nocquet, J., *et al.*
47. High-frequency Ground-shaking Variability From Rough-fault Ruptures. **Vyas, J.**, Galis, M., Mai, P.
48. Calibration of Subsurface Dynamic Parameters and Fault Geometry From Surface Fault Rupture Observations: An Example From the Shallow 2019 mw4.9 Le Teil, France, Event. Sassi, R., **Hok, S.**, Klinger, Y., Delouis, B.

Site Response Characterization in Seismic Hazard Analysis

49. Within-site Variability in Earthquake Site Response. **Zhu, C.**, Cotton, F., Kwak, D., Ji, K., Kawase, H., *et al.*
50. Student: Minimizing Geophysical Site Characterization Procedures to Estimate Vs30 Through the Use of Vr40. **Gomez, J.**, Yong, A., Hayashi, K., Martin, A., Kottke, A., *et al.*
51. Student: Evaluation of Modified Simplified Equations for Estimating Kinematic Soil-structure Interaction Effects in Buildings With Large Footprints and Embedment Depths: A Finite Element Approach. **Boushehri, R.**, Zogh, P., Motamed, R.
52. Student: Vs30 Site Characterization Near the Strong-motion Recording Site at Fremont Central Park, California, Using S-wave Refraction Tomography and Multichannel Analysis of Surface Waves Methods. **Gomez, A. J.**, Catchings, R. D., Goldman, M. R., Chan, J. H., Criley, C. J., *et al.*
53. Modeling of the Surface-to-depth Spectral Amplification in 3D Media. **Oprsal, I.**, Hallo, M., Fäh, D., Burjanek, J.
54. Future Directions of the COSMOS Site Characterization Committee. **Pilz, M.**, Askan, A., D'Amico, S.
55. Student: Vs30 Site Characterization in the Hayward Hills, San Leandro, California, Using Multiple Methods. **Samuel, D. A.**, Catching, R. D., Goldman, M. R., Chan, J. H., Criley, C. J., *et al.*
56. Energy Partitions Among Elastic Waves for Dynamic Surface Loads in Layered Media. **Piña-Flores, J.**, Cárdenas-Soto, M., Martínez-González, J. A., García-Jerez, A., Sánchez-Sesma, F. J.
57. S-wave Site Amplification Factors From Observed Ground Motions in Japan: Validation of Delineated Velocity Structures and Proposal for Empirical Correction. **Ito, E.**, Nakano, K., Senna, S., Kawase, H.
58. Student: Evaluation of Kinematic Soil-structure Interaction Effects for Vertical Motions at Multiple Instrumented Sites with Large and Deeply Embedded Foundations. **Zogh, P.**, Motamed, R., Ryan, K. L.
59. Student: Analysis of Ground Motions Using Recorded Earthquakes and Ambient Vibrations in the Matanuska-Susitna Valley and Eagle River, Alaska. **Holland, J.**, Dutta, U., Yang, Z., Zhao, Y.
60. Student: Machine Learning-based Models to Predict Ground Motion Intensity in South Korea. **Kim, J.**, Seo, H., Kim, B.
61. Implementing Non-ergodic Ground-motion Models in Probabilistic Seismic Hazard Programs. **Lacour, M.**, Abrahamson, N., Sung, C.
62. Student: Uncertainty Quantification of Conditioned Simulation of Ground Motions. **Tamhidi, A.**, Kuehn, N., Bozorgnia, Y.
63. Student: Shear Wave Velocity Profile Using Seismic Motion and Ambient Noise HVSR at KMA Seismic Observatory Stations. **Yoo, B.**, Lim, D., Jang, D., Kwak, D.

Structure and Seismogenesis of Subducting Slabs

64. Student: Backazimuth Dependence of Shear Wave Splitting Patterns in Japan and Instraslab Anisotropy. **Appini, S.**, Zheng, Y., Hu, H., Li, J.
65. An Inclusion Model for the Origin of Slab Anisotropy and the Influence on Earthquake Moment Tensors. **Zheng, Y.**, Lin, R., Thomsen, L., Li, J., Hu, H.
66. Characterization of the Anisotropic Mantle Lid in the Cascadia Subduction Zone. **Bloch, W.**, Audet, P., Bostock, M., Brownlee, S.
67. Student: Exploring Strain-rate Constraints on Deep Earthquake Occurrence Within Subducting Lithosphere and the Viability of Thermal Shear Instability as a Potential Failure Mechanism. **Fildes, R. A.**, Billen, M., Thielmann, M.
68. Student: A Deep Dry Slab Core Beneath the Japan Sea Revealed by Inter-source Interferometry. **Shen, Z.**, Zhan, Z., Jackson, J. M.
69. Student: Systematic Detections of Intermediate-depth Earthquakes in the Subduction Zone of Japan Before and After the M9 Tohoku-Oki Earthquake and M5+ Intermediate-depth Earthquakes. **Zhai, Q.**, Mach, P., Peng, Z., Matsubara, M., Obara, K., *et al.*
70. Student: Seismic Tomography in the Coastal Range of Chile, Between 27° and 31°S: Latitudinal Differences in the Double Seismic Zone. **Navarro-Aranguiz, A.**, Comte, D., Roecker, S., Farías, M., Calle-Gardella, D., *et al.*
71. Student: A Systematic Detection of Intermediate-depth Earthquakes within the Bucaramanga Earthquake Nest. **Tsuchiyama, A.**, Frank, W. B., Prieto, G. A.
72. Focusing and Multi-pathing of the Teleseismic Wavefields by the Cascadia Slab. **Pang, G.**, Abers, G. A.

Earthquakes in the Urban Environment

73. Student: Regionally Adjusted Empirical Ground-motion Models: Application to Greece. **Sunny, J.**, De Angelis, M., Edwards, B.
74. Student: Exploring Sources Uncertainties in Building Response Prediction Using Real Earthquake Data. **Ghimire, S.**, Guéguen, P., Astorga, A.

75. The Seismic Fingerprint of Large Vehicles in an Industrial Facility. **Marcillo, O.**, Maceira, M., Chai, C.
76. Student: Development of the Korean Peninsula VS30 Map Based on Terrain Classification Derived from DEM. **Choi, I.**, Heo, G., Ryu, B., Yang, S., Kwak, D.

Frontiers in Marine Seismology

77. Anisotropic Tomography of the Eastern North American Margin: Mantle Structure and Flow Across the Continent-ocean Transition. **Brunsvik, B. R.**, Eilon, Z. C., Lynner, C.
78. Student: An Improved Earthquake Catalog from the Alaska Amphibious Community Seismic Experiment (AACSE). **Wei, X.**, Shen, Y.
79. Using Machine Learning to Improve Earthquake Catalogs for Amphibious Seismic Networks: Application of EarthquakeTransformer to the Alaska Amphibious Community Seismic Experiment. **Barcheck, G.**, Abers, G. A., Ruppert, N., Roland, E., Schwartz, S.
80. Student: Long-term Earthquake Catalog for the Endeavour Segment of the Juan De Fuca Ridge Highlights the Influence of Propagating Rifts on Hydrothermal Venting. **Krauss, Z.**, Wilcock, W. S. D., Heesemann, M., Schlesinger, A., Kukovica, J., *et al.*
81. Student: Augmenting the Global Earthquake Database With OBS Phases for Key Events. **Stanbury, C. W.**, Rowe, C. A., Begnaud, M.
82. Upper-mantle Shear Attenuation and Velocity From Ocean-bottom Observations in the Pacific. **Russell, J. B.**, Dalton, C. A.
83. Student: Looking for Love Across the Hawaiian Swell. Xue, S., **Olugboji, T.**, Zhang, Z.
84. Insights into Bend-faulting and Mantle Hydration at the Marianas Trench from Seismic Anisotropy. **Mark, H. F.**, Wiens, D. A., Lizarralde, D.
85. Investigating the Mantle Transition Zone Below the Central Pacific With Ps Receiver Functions From the NoMelt Experiment. **Flanagan, M. P.**, Li, J., Maguire, R., Gaherty, J. B.
86. Fault Architecture of the Westmost Gofar Transform Fault, East Pacific Rise. **Gong, J.**, Fan, W.
87. Student: Body Wave Imaging Beneath Oceans, Glaciers and Sediments Using Tuned Dereverberation Filters. **Zhang, Z.**, Olugboji, T.
88. Student: Characterizing the Acoustic Structure of the Southeastern Caribbean Sea Using Multichannel Seismic Reflection Data. **Renzaglia, J.**, Magnani, M. B.
89. Student: Waveform Modeling of Seismo-acoustic Records From MERMAID Instruments in the Pacific. **Pipatprathanporn, S.**, Simons, F. J., Simon, J. D., Irving, J. C. E.
90. Next-generation Broadband Seafloor Instruments To Support New Discovery. **Perlin, M.**, Bainbridge, G., Townsend, B., Moores, A., Pelyk, N., Parker, T.,

Advances in Earthquake Geology: Spatiotemporal Variations in Fault Behavior From Geology and Geodesy

91. Student: Investigating the Mechanics of Strain Partitioning at the Rakhine-Bangladesh Megathrust Using InSAR Time-series. **Chong, J.**, Lindsey, E.
92. Evidence for Substantial Dip Slip on the Fastest Ocean-continent Transform Plate Boundary: Repeated Coseismic Uplift on the Fairweather Fault, Southeast Alaska. **Witter, R. C.**, Kelsey, H. M., Lease, R. O., Bender, A. M., Scharer, K., *et al.*
93. Student: Marine Geomorphology Across the Seattle Fault Zone: Clues for One or More Ruptures Since Deglaciation. **Davis, E. J.**, Crider, J. G., Roland, E., Moore, G.
94. Student: Rates and Kinematics of Active Faulting on the Western North Olympic Fault Zone. **Chaffeur, J.**, Amos, C. B., Schermer, E. R., Jensen, C. E., Rittenour, T. M.
95. Updated Estimates of Vertical Deformation Across the Indio Hills, Southern San Andreas Fault, California. **Scharer, K.**, Blisniuk, K.
96. Hosgri Fault Zone-driven Uplift of the Irish Hills, Central Coastal California: Viscoelastic Crustal Deformation Modeling Results. Turner, J., **O'Connell, D. R. H.**, Levandowski, W.
97. Do Terrestrial Lidar Data Improve Understanding of Fault Offsets From the 2019 Ridgecrest Earthquake? **Willard, J.**, DeLong, S., Kendrick, K., Pickering, A., Zielke, O.
98. Lidar Data Reveal New Faults in the Epicentral Region of the 2020 M 6.5 Stanley, Idaho Earthquake. **Zellman, M.**, Lifton, Z. M., DuRoss, C. B., Thackray, G. D.
99. Student: HDBSCAN Cluster Analysis of Legacy Earthquake Surface Rupture Datasets. **Quintana, M.**, Rodriguez Padilla, A. M., Chadly, D., Oskin, M. E.
100. How Reliable Is the Geomorphic Record of Multiple Strike-slip Earthquakes? **Reitman, N.**, Briggs, R. W., Gold, R., Klinger, Y.
101. Student: Morphologic Variation in Fault Scarp Profiles From the Stillwater Seismic Gap Associated With Hydrothermal Alteration. **Brigham, C. A. P.**, Callahan, O. A.
102. Student: Stochastic Analysis of Hydraulic Fracturing-induced Seismicity and Seismogenic Potential Distribution in NEBC and Alberta, Canada. **Wozniakowska, P.**, Eaton, D. W.
103. Constraining the Uplift History of the Montezuma Hills, Sacramento Delta Region, California. **Philibosian, B.**, Trexler, C., Sickler, R. R., Willard, J., Mahan, S.
104. Landslides as Paleoseismological Indicators: Experiences Using Geotechnical Back-analyses in the Andes. **Sepúlveda, S. A.**, Junquera-Torrado, S., Moreiras, S. M., Pinto, L., Urrejola, J. T.
105. Student: Examining Tectonically Offset Geomorphic Features Using Aerial Imagery and Field Mapping to Estimate Slip Distribution and Slip-per-event for Paleoearthquakes Along the Southernmost San Andreas Fault. **Buckley, W. C.**, Rockwell, T. K., Williams, P. L., Scharer, K.

Friday, 22 April *(continued)*

Advances in Seismoacoustic Methods for Explosion Monitoring

106. Numerical Simulation of High-frequency, Near-regional Seismic Phase Ratio Discriminants With Insights From the Source Physics Experiment. **Ford, S. R.**, Pitarka, A., Pyle, M., Walter, W. R., Vorobiev, O., *et al.* WITHDRAWN
107. Regional Long-period Moment Tensor Analysis of Mining Events and Potential mb-Ms Explosion Screening False Alarms. **Ichinose, G.**, Pasyanos, M., Gok, R., Ford, S. R., Walter, W. R.
108. Joint Yield Estimation by Local Seismoacoustic Observations from the 2020 Large Surface Explosion Coupling Experiment. **Kim, K.**, Pasyanos, M.
109. Source Analysis of the 1993 Rock Valley Earthquake, Southern Nevada. **Kintner, J.**
110. Design and Testing of Discriminants for Local Seismic Events Recorded During the Redmond Salt Mine Monitoring Experiment in Utah. **Tibi, R.**, Downey, N., Brogan, R.
111. Enhancing Data Sets From Rudna Deep Copper Mine, SW Poland: Implications on Detailed Structural Resolution and Short-term Hazard Assessment. **Sobiesiak, M. M.**, Leptokaropoulos, K., Staszek, M., Poiata, N., Bernard, P., *et al.*
112. A Robust Seismic Discrimination Technique for Low Signal-to-noise Events Recorded in Regions of Interest. **Napoli, V.**, Yoo, S.
113. Denoising Seismic Signals Using Wavelet-transform-based Neural Networks. **Quinones, L.**, Tibi, R., Porritt, R. W., Young, C. J.
114. Automated Seismic Array Quality Control—Testing a Jackknifing SVD Method in a Python Application. **Rowe, C. A.**, Stanbury, C. W.
115. Using Deep Learning to Develop a High Resolution Planetary Boundary Layer Model for Infrasound Propagation. **Albert, S. A.**, Bowman, D. C., Seastrand, D. R., Wright, M. A.
116. High Altitude Balloon-borne Acoustic Detection of the October 2020 Large Surface Explosion Coupling Experiment (LSECE). Silber, E. A., **Bowman, D. C.**, Weiss, C. J. C.
117. Student: Evaluating Spatio-temporal Trends in Infrasound Propagation Using Seismo-acoustic Arrivals From Repeating Explosions. **Wynn, N. R.**, Dannemann Dugick, F. K., Carmichael, J., Thiel, A.
118. Hydroacoustic and Seismoacoustic Responses of Explosions in Different Materials: A Parametric Study of Different Emplacements and Different Energy Depositions, and Comparisons With Experimental Data. **Ezzedine, S. M.**, Vorobiev, O., Saikia, C., Rodgers, A., Antoun, T., *et al.*
119. Characterizing Blast Wave Behavior From Cavities Embedded in Lab-scale Polymer Cubes. **Chojnicki, K.**, Nelsen, J. M.
120. Numerical Modeling of Seismic Sources for Underground Explosions Within Jointed Rock. **Lei, Z.**, Larmat, C., Euser, B. J., Patton, H. J.
121. Student: Characterizing the January 2016 DPRK Nuclear Test Based on InSAR and FEM with Validation from Chemical Explosion SPE-6. **Slead, S. R.**, Wei, M.

Advances in the Use of Seismic and Acoustic Methods to Constrain Physical Processes at Volcanoes

122. Attenuation of Seismic Waves Beneath the Krýsuvík Volcanic System, Reykjanes Peninsula, South-West Iceland. **Malek, J.**, Fojtikova, L., Fischer, T., Hersir, G. P., Gudnason, E. A., *et al.*
123. The Internal Structure of Öraefajökull, Iceland Imaged by Local Earthquake Tomography. **Walsh, B.**, Tryggvason, A., Williams-Jones, G.
124. Student: Fundamental and First Higher Mode Rayleigh Wave Ambient Noise Tomography of the Island of Hawaii. **Wei, X.**, Shen, Y. WITHDRAWN
125. Student: Identifying Lava Bombs in Seismometer Data During the 2018 Kilauea Eruption. **Wang, C.**, Shen, Y., Banerjee, P.
126. Earthquake Sequences of the 2018 Kīlauea Volcano Eruption. **Shiro, B. R.**, Chang, J. C., Dotray, P., Burgess, M. K., Okubo, P. G., *et al.*
127. Student: Understanding the Interplay Between the Volcanic and Tectonic Processes at Mount Hood. **Johnson, B.**, Hartog, R.
128. Advancing Eruption Research Through an Updated Monitoring Network at Semisopochnoi Volcano. **Lyons, J.**, Iezzi, A., Haney, M. M., Fee, D.
129. Student: Determining Ash-rich vs. Vapor-rich Explosions Using Continuous Infrasound at Volcán De Fuego. **Satterwhite, T. L.**, Roca, A., Johnson, J. B., Bosa, A. R., Pineda, A., *et al.*
130. Crumbling Volcanoes: A Summer of Debris Flows in the Cascades. **Hotovec-Ellis, A. J.**, Thelen, W. A., Dawson, P. B., Moran, S. C., Connor, A., *et al.*
131. Time-lapse Seismic Velocity Changes Coincident With Dome Emplacement at Great Sitkin Volcano, Alaska. **Haney, M. M.**, Miller, D. J., Hotovec-Ellis, A. J., Thurber, C., Dietterich, H. R.
132. Numerical Simulation of Flow, Transport of Heat and Chemical Transport Processes in Volcanic Chambers Partially Filled With Molten Rock and Consequence on Dynamic Seismo-acoustic Signatures. **Ezzedine, S. M.**, Velsko, C., Sun, Y., Cassata, W., Vorobiev, O., *et al.*
133. A Compact Digital Broadband Seismometer for Permanent and Temporary Volcano Monitoring: Güralp Certimus. **Lindsey, J. C.**, Reis, W., Watkiss, N., Hill, P., Cilia, M.
134. It's Baaaaack. Uplift and Seismicity Near South Sister, Oregon. **Thelen, W.**, Montgomery-Brown, E. K., Moran, S. C., Poland, M. P.

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Implicit Biases: Why We Have Them and How They Impact STEM

THURSDAY, 12 MAY

Organized by ADVANCEGeo, this workshop will explore the concept of implicit biases and the ways in which those biases operate. Several examples will be shared about how implicit biases have negatively impacted marginalized groups in STEM. Most importantly, the workshop will describe concrete, specific steps that individuals can take to minimize the impacts of implicit bias in STEM.

How to Grow a Career Over the Long-Term

WEDNESDAY, 18 MAY

Whether you are at the beginning of your career or have been in the workforce for a while, this SSA Connects mentoring session will give the tools you need to build a successful career.

Mentors: Delaine Reiter (Applied Research Associates, Inc), Lisa Schleicher (USGS),
Seth A. Stein (Northwestern University)

How to Apply for Jobs

TUESDAY, 24 MAY

Led by Alaina Levine, this webinar will focus on the components of a successful job application. We will also discuss ways to ensure that your application advances beyond initial computer filtering systems. This event will be helpful for those interested in academia, governmental jobs and careers in industry.

Virtual Interviewing: Champion Yourself Through Storytelling

WEDNESDAY, 22 JUNE

Interviewing is about demonstrating how your experience, skills and enthusiasm are aligned with the employer's needs. In this webinar led by Alaina Levine, we will discuss how to do that by: leveraging virtual platforms; crafting and delivering stories before, during and after the interview; adjusting different elements of a virtual experience (such as light and sound); and delivering an oral presentation.

Proposal and Grant Writing

TUESDAY, 14 JUNE

The ability to write effective proposals is the key to both funding and advancing your research. Bring your questions to our panel of successful grant and proposal writers in this SSA Connects mentoring session.

Mentors: Luciana Astiz (National Science Foundation), Cynthia J. Ebinger (Tulane University),
Gabi Laske (University of California, San Diego)

Networking for Scientists

TUESDAY, 19 JULY

In this webinar, aimed at building your networking confidence, we will discuss strategies and tactics for finding new collaborators and building mutually beneficial partnerships with professionals across the globe. We will also practice our networking and explore specific wording and questions to use to spark meaningful conversations.

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Seismic Tomography

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Keynote Speakers:

SERGEI LEBEDEV, University of Cambridge and Dublin Institute for Advanced Studies: *"Increasing the Resolution of Global and Regional Tomography: Progress and Challenges"*

NICHOLAS RAWLINSON, University of Cambridge: *"From Travel Time to Adjoint Waveform Tomography in Southeast Asia, Where Never the Twain Shall Meet..."*

JEROEN RITSEMA, University of Michigan: *"Heterogeneity of Seismic Wave Velocity in Earth's Mantle"*

BARBARA ROMANOWICZ, University of California, Berkeley and College de France: *"Forty Years of Global Mantle Tomography: Achievements and Challenges Ahead"*

CARL TAPE, University of Alaska Fairbanks: *"Seismic Imaging of Sedimentary Basins with Complex Seismic Wave Propagation"*

JEROEN TROMP, Princeton University: *"Source Encoding and Uncertainty Quantification for Global Waveform Inversion"*

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Ambitious and forward-thinking abstracts invited through 31 May 2022:
seismosoc.org/tomography

FAULT SCARP, BAINBRIDGE ISLAND

Sharp breaks in the fluted topography make it easy to identify geologically recent faults. This one, called the Toe Jam Hill fault, on Bainbridge Island west of Seattle shows evidence of the 900 AD Seattle Fault earthquake.
Image by Daniel E. Coe, Washington Geological Survey

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