SSA 2026 Annual Meeting Sessions - Pasadena, California, 14 - 18 April 2026

All conveners are listed in alphabetical order by last name. Corresponding conveners are listed in bold.

32. Observation and Analysis of Topography and Deformation: Relating Earthquakes to Cascading Hazards
33. On the State of Knowledge/Art/Practice for mHVSR Analyses; A Prelude to the ESG7-COSMOS mHVSR Pre-Event Forum
34. Physical Properties of Fault Zones from the Seismic Source to Earth's Surface
35. Physics of Earthquakes: Insights from Theory and Observations
36. Planetary and Gravitational Wave Seismology
37. Recent Contributions of Social Science Research to Understanding Earthquakes
38. Recent Research on Ground Motion Directionality
39. Regional Source, Path, and Site Effects in Earthquake Ground Motions
40. Seismology for All: Expanding STEM Education Through Accessible Tools and Global Collaboration
41. Seismotectonics of Southern and Baja California
42. Source Properties of Microearthquakes: Insights from Laboratory, Induced, and Natural Events
43. Southern California Seismicity: Past, Present, and Future
44. SSJ-SSOC-SSA Joint Session: From Slow to Fast Earthquakes: Bridging the Spectrum of Fault Slip
45. SSJ-SSOC-SSA Joint Session: Lessons from Recent Major Earthquake Sequences Around the World
46. Subaqueous Evidence for Earthquakes, Coseismic Landslides, Tsunamis and other Cascading Hazards
47. Time-Dependent Seismic Hazard Assessment: Models, Data, and Applications

Action at a Distance: Understanding Seismic Triggering

A variety of geological/geophysical phenomena may follow shaking or deformation by earthquakes. Examples of triggered phenomena include other earthquakes (aftershocks, foreshocks, swarms, etc.), volcanic eruptions, mud volcanoes, landslides, geysering, seiches and liquefaction. While the underlying physical processes involved may not be universal, triggering can be described as a sudden departure from an equilibrium state followed by a return, often gradual, to a new equilibrium. Triggering only initiates the disequilibrium process, rather than providing the energy that powers it, so the triggered site must be close to disequilibrium or "ripe." An enhanced understanding of triggering could improve characterizing geohazards, communicating them to stakeholders, understanding cascading events and mapping the state of internal Earth forces and materials. Yet, recognizing and understanding triggering is tricky, in part due to the difficulty of determining if a purportedly triggered event would have taken place had the triggering event not happened. Inferences of triggering, which inherently are probabilistic, are challenged by the fact that Earth processes are slow and recurrence intervals are long relative to the observational record. Moreover, the relevant Earth observations are generally difficult to acquire and imprecise. At a target site, triggering presumably involves both the triggering event's deformational products (i.e., seismic waves, quasi-static deformation), and the relevant and sometimes altered conditions (often involving fluids). Assessing the ripeness of a triggered site may be particularly challenging. Given this broad topic and the hope of unifying a disparate and difficult subject, we invite contributions related to understanding the elements or observations of triggering. This includes theoretical studies, field observations, laboratory studies and communication to stakeholders of triggering potential in the aftermath of an earthquake.

Conveners

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Advances and New Challenges in Investigating Seismic Site Response

Site effects represent moderate-to-strong modification of ground shaking caused by the local subsoil structure, geotechnical and geomorphologic conditions. They can result in a strong amplification of ground motion in site-specific frequency bands and an increase of the shaking duration, as evidenced by seismometric records. Such effects often play a key role in seismic hazard assessment.

Site effects can be affected by 3D conditions; in such cases, they are poorly represented by 2D or, worse, 1D numerical simulations and/or simple approximations commonly used in seismic hazard analyses. 3D conditions are often present in sedimentary basins as well as areas of variable topography; these include amplified rock sites (with fractured/weathered layers), where the use of 3D geophysical imaging approaches may better support realistic modeling.

This session encourages a debate on open questions in the field of site effect research and application, including topics such as numerical modeling for hazard/ground motion, soil nonlinearity, fault zone effects, ambient noise measurements to determine soil and building response, innovative geophysical applications for site characterization along with multidisciplinary and multiscale studies that pull together a variety of datasets to shed light on complex site characterization problems in different geological contexts.

Conveners

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Advancing Earthquake Early Warning: Science, Technology and Engagement in the U.S. and Beyond

Earthquake Early Warning (EEW) systems are expanding globally, offering critical seconds of warning to reduce risk and enhance resilience. This session invites contributions highlighting the performance, innovations and future directions of EEW systems and their integration into everyday life, with a focus on the ShakeAlert system in the United States and comparable efforts worldwide. We welcome presentations on algorithmic advancements such as seismic phase identification, finite fault characterization, rapid magnitude/location estimation and ground motion estimation. Submissions exploring the integration of diverse data types, low-cost sensors, fiber-optic technologies and AI/ML approaches are encouraged. We also invite abstracts focused on communication, education and outreach (CEO), including strategies for public messaging, alert delivery, user training and engagement with technical and institutional users. Additionally, we welcome perspectives on the critical role of governmental emergency management agencies in operationalizing EEW, coordinating response and supporting public readiness. International collaboration is also key, and we encourage contributions from agencies like Natural Resources Canada (NRCan) and others working to advance EEW across borders. Join us to explore how cutting-edge science, technology and partnerships are shaping the future of EEW.

Conveners

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Advancing Seismic Hazard and Risk Assessment through Multi-Disciplinary Approaches

This session brings together a diverse community of researchers and practitioners working across disciplines to tackle the complex challenges of seismic hazard and risk assessment, before and after earthquakes occur. We welcome contributions that enhance understanding of and preparedness for earthquake disasters, with an emphasis on multidisciplinary modeling and assessment approaches. We also encourage submissions that highlight the development and application of community models and databases, including those that integrate post-earthquake observations and datasets, which serve as foundational tools for collaborative research, rapid assessment and decision-making.

We particularly encourage contributions on advanced risk modeling frameworks that trace the complete pathway from earthquake initiation to societal impacts, incorporating innovations such as digital twins, real-time or near-real-time post-earthquake data and rapid hazard and risk assessment systems to support emergency response and recovery. Presentations addressing broader topics — including the evolving built environment, building codes, challenges in hazard mitigation planning and risk communication — are also welcome.

We invite contributions that integrate seismology, geology, geomorphology, and geodesy in earthquake forecasting and hazard–risk frameworks. Topics include forecasting across multiple timescales; fault source characterization; complex and multi-segment rupture modeling; multi-cycle simulators; dynamic rupture processes; and ground-motion modeling with associated uncertainties, including physics-based simulations, non-ergodic models, and site effects. The session also welcomes studies on exposure databases describing populations, buildings, and infrastructure, as well as physical vulnerability and fragility models based on observations, simulations, and post-earthquake damage data, including time-dependent effects such as aging, deterioration, and cumulative damage. Applications of the International Macroseismic Scale and national annexes are also encouraged.

By convening this diverse community, we aim to share insights from recent earthquakes, compare methodologies and identify pathways to strengthen modeling capabilities, support rapid post-event decision-making and enhance societal resilience.

Conveners

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Advancing the U.S. Geological Survey National Seismic Hazard Models

The USGS National Seismic Hazard Models (NSHMs) are a bridge between best-available earthquake science and public policy. In this session we will present (1) revisions to the 2023 50-State NSHM; (2) the recently completed 2025 Puerto Rico and the U.S. Virgin Islands NSHM; (3) draft models for the 2026 Guam and the Northern Mariana Islands and American Samoa NSHMs; and (4) planned updates for the 2029 50-State NSHM. We invite additional presentations on topics that will influence future seismic hazard models, via earthquake rupture forecasting, ground-motion characterization and NSHM applications. Topics include, but are not limited to, seismicity catalogs, declustering and smoothed seismicity models, fault models, geologic and geodetic deformation models, fault system inversions and time-dependent forecasts; ground-motion models, including non-ergodic models, incorporation of physics-based 3D simulations, basin effects, site response and directivity; and quantification and propagation of epistemic uncertainty. We also invite presentations on the use of NSHMs for scenario development, building codes, risk assessment for both buildings and infrastructure and risk mitigation within the insurance industry. We are also interested in contributions that highlight potential impacts of hazard modeling uncertainties on downstream applications.

Conveners

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Constraining GMMs via Physics-Based Simulations and Complementary Observations: Integration and Practice

Ground-motion models (GMMs) play a vital role in seismic hazard analysis and are essential for earthquake early warning systems, shake maps and rapid response. Over the past two decades, an abundance of instrumental recordings has facilitated advancements in non-ergodic GMMs across multiple regions. However, challenges remain in accurately constraining source-, path- and site-specific effects, particularly in areas with limited data, scaling to large magnitudes and more complex ruptures and 2D/3D site and basin effects.

Recent progress in high-performance, physics-based ground-motion simulations, combined with enhanced source modeling and high-resolution regional 3D velocity models, offers a novel approach to supplement and refine empirical GMMs. This session focuses on the practical integration, validation and application of 2D/3D simulations and/or complementary observational datasets (*e.g.*, macroseismic intensity and low-cost sensor measurements) in the development of GMMs.

This session is targeted at studies focused on integrating simulations and complementary datasets into empirical ground-motion models. It includes regional-scale seismological simulations designed to constrain wave propagation within complex geologic structures, addressing site and path effects as well as source-specific characteristics. The session also covers the treatment of simulation input uncertainties and their propagation into ground motion uncertainty. In addition, topics related to data and metadata formats, along with the information required for combining simulated and observed ground motions in GMM development, are addressed. The integration of complementary datasets to constrain non-ergodic effects is also a key focus of the session.

A central theme is the use of these inputs to constrain regionally varying GMMs, moving from ergodicity toward non-ergodic approaches. The session also welcomes advanced empirical approaches and the use of new datasets (*e.g.*, NGA-W3) to develop GMMs, as well as studies that address epistemic uncertainty and aleatory variability in the application of PSHA.

Conveners

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Cryoseismology: Advances in Technology and Scientific Discovery

Polar and glaciated regions have long posed formidable science challenges due to extreme cold, prolonged darkness, difficulty generating and storing power, limited communications infrastructure and logistical remoteness. These conditions, historically, dramatically limited data acquisition. The lack of both long- and short-term geophysical observations strongly contrasts with the critical need for enhanced understanding of ice structure, glacial processes and other cryospheric phenomena that are increasingly relevant for forecasting and mitigating geological hazards in a changing world.

Over the past two decades, technological advances in polar power systems, cold-rated broadband seismometers, distributed acoustic sensing (DAS), novel vehicles, satellite links and ice drilling have transformed cryoseismology. These innovations enable unprecedented access to remote regions and subsurface ice environments, higher-resolution studies and new multidisciplinary collaborations. For example, collaboration with the IceCube Neutrino Observatory has extended Antarctic ice sheet broadband deployment capabilities to 2.4 km depth, while large-N nodes and DAS open new studies in source processes, ice boreholes, firn-ice transition and sub-ice conditions. This session invites contributions that highlight new or emerging cryoseismological research, including conceptual or pilot studies exploring the scientific potential of a deep, three-dimensional seismic and/or DAS observatory at the South Pole, or elsewhere. We additionally welcome submissions focused on advances in polar instrumentation as well as in ocean, ice traverse or airborne logistics, ice drilling, remote sensing and other methodologies.

Conveners

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Data-Driven Advances in Liquefaction Hazard Analysis

Liquefaction continues to play a major role in earthquake damage worldwide. This session focuses on advances in liquefaction hazard analyses derived from observational and analytical data, with an emphasis on liquefaction-induced ground deformation, lateral spreading and impacts on critical infrastructure and lifelines. Contributions are encouraged that highlight field reconnaissance, geotechnical and seismological analyses, remote sensing of ground failure and discussions of model calibration using both historical and new case histories.

We welcome innovative approaches that apply emerging tools, such as machine learning and other data-driven methods, to earthquake reconnaissance, data integration and hazard assessment. Presentations that explore the implications of these advances for improving liquefaction hazard mapping and resilience are especially encouraged.

Conveners

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Data-Driven and Computational Characterization of Non-Earthquake Seismoacoustic Sources

Non-earthquake seismoacoustic sources, such as landslides, avalanches, volcanoes, glacial calving, utilities and industrial blasts, bolide airburst and their impacts on Earth, are commonly recorded by seismoacoustic monitoring networks. This session focuses on data-driven and computational methods and algorithms that aim to better understand and characterize these non-earthquake sources, and to ultimately better monitor and mitigate their associated hazards. We encourage contributions from studies that include, but are not limited to, seismoacoustic, geodetic and remote sensing techniques at all relevant spatiotemporal scales with emphasis on multisensors Bayesian & Dempster-Shafer statistical data integration and fusion, high-performance deterministic and stochastic computational modeling and simulation, and AI-driven and physics-informed ML techniques. We solicit studies that include, but are not limited to, source detection, location, characterization, modeling, classification, monitoring and hazard mitigation.

Conveners

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Detecting, Characterizing and Monitoring Mass Movements

Evolving climate patterns and land-use changes coupled with improved monitoring capabilities have caused a notable increase in geophysical detections of mass movements, such as landslides, debris and snow avalanches, lahars and glacial failures. Recent examples include the Blatten landslide in Switzerland, the Wanrog rock avalanche in Taiwan and the Tracy Arm tsunamigenic landslide in Alaska, USA. Mass movements couple energy into the Earth and atmosphere, making seismic and infrasound analysis useful for detecting, characterizing and monitoring these events. While these sources are not routinely monitored in real-time like earthquakes, recent advancements in seismic and infrasound instrumentation and processing offer opportunities for rapid early warning and post-event detection and analysis. Combining seismic and infrasound methods with auxiliary datasets from remote sensing, ground-based flow monitoring and distributed sensing further improves event characterization. Passive seismic analysis can also provide valuable information about incipient or ongoing slope instabilities.

This session explores innovative research focused on improving our comprehension of various types of mass movements as seismic sources. We invite presentations that investigate the use of seismic and infrasound data as well as interdisciplinary datasets to expand our knowledge of fundamental landslide processes, enhance our ability to characterize and monitor mass movement events and mitigate associated hazards. Topics of interest encompass, but are not limited to, mass movement source detection, location, characterization, modeling and classification, precursory signal analysis, monitoring and hazard mitigation.

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Developing Data-Driven Methods in the AI Era: New Approaches to Earthquake Science

The rapid rise of artificial intelligence and statistical inference is reshaping earthquake science, enabling breakthroughs in earthquake detection, source characterization, forecasting and earthquake cycle simulations. For example, neural operators have sped up forward modeling and inversion, graph neural networks have successfully tackled a wide range of applications by leveraging the interconnected nature of seismic data and variational inference has effectively connected data to models in high-dimensional parameter spaces. This session highlights new data-driven approaches that improve upon traditional techniques or introduce new methods entirely. We welcome submissions that bring to light new trends and patterns in old datasets, highlight important signals that are seemingly buried in noise, and speed up scientific analysis when working with large volumes of data. Contributions that demonstrate how AI and statistical methods open fresh pathways for understanding existing problems in earthquake science are of particular interest.

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Earthquake Ground Motions and Structural Response: Emerging Tools and Applications

Understanding how buildings, bridges, energy infrastructure and the ground beneath them respond to earthquakes is central to both earthquake science and risk reduction. New monitoring approaches — ranging from permanent seismic networks and structural arrays to ambient vibration studies, and the rapid growth of low-cost MEMS and smartphone sensors — are expanding our ability to capture building dynamics and ground motion in unprecedented detail. These observations are providing new insights into structural health, damage processes, and soil-structure interaction and the region-wide distribution of risk for large earthquakes. Newly obtainable data also promises to support applications such as rapid post-event regional damage assessment and long-term seismic resilience.

This session invites contributions from across the seismological, engineering and hazard-modeling communities that address building and ground motion monitoring using traditional networks, emerging low-cost sensors, gradient based sensors such as distributed fiber optic sensing and rotational sensors, novel analytical methods or case studies from recent earthquakes and experiments. We especially encourage interdisciplinary studies that bridge seismology, structural engineering and risk mitigation; provide synergistic applications of unique data and high-performance simulations, as well as applications that highlight the potential for scalable monitoring at the urban or regional level.

Conveners

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Earthquake Rupture Hazard and Forecasts from Integration of Paleoseismic Datasets

Earthquake hazard forecasts are often constrained by or evaluated with geologic data on the timing of past large earthquakes. Yet these paleoseismic records have inherent complexities that stem from dating uncertainties, and additional assumptions are required to utilize the site-specific data at a fault system level. This session seeks presentations on paleoseismic datasets and contributions to method development for characterizing or utilizing such data in earthquake forecasting. We welcome investigations of earthquake recurrence statistics derived from paleoseismic or other geologic data, new approaches to improve dating of past events and studies of earthquake recurrence from historic datasets. We strongly encourage presentations on techniques to extrapolate site-level data to fault- or system-level behavior and new approaches to incorporate paleo-rupture models into earthquake rupture forecasts. Work may be local or global in scope, consider time-dependent or time-independent methods or compare physics-based modeling efforts with empirically constrained data.

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Earthquake Swarms Across the Earthquake Cycle: Precursors, Transients and Aftereffects

Earthquake swarms occur in diverse tectonic settings and reflect a broad spectrum of physical mechanisms, including fluid diffusion, aseismic slip, fault healing and postseismic relaxation. Rather than representing a single process, swarms can mark multiple stages of the earthquake cycle. They may act as precursors to major ruptures, indicators of transient deformation or aftereffects of stress redistribution.

This session invites contributions that explore the temporal and mechanical roles of earthquake swarms in fault evolution through observations, laboratory experiments, numerical modeling and theoretical analyses. We particularly welcome studies that link swarms with aseismic slip, fluid migration or stress interactions across spatial and temporal scales. By integrating seismic, geodetic and experimental perspectives, this session aims to advance understanding of how earthquake swarms modulate fault loading and release, bridging the gap between slow and fast deformation processes in the lithosphere. We encourage interdisciplinary approaches and global case studies that provide new insights into the diverse origins and implications of earthquake swarms.

Conveners

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Earth's Structure from the Crust to the Core

This session will cover all aspects of "structural seismology" and highlight new contributions to research on a wide range of topics, including, but not limited to, core and mantle dynamics, the role of the mantle transition zone in mantle convection, volcanism in different settings around the world, the structure of subducting slabs, lithospheric deformation and processes and lithosphere-asthenosphere interactions and their feedback into geohazards. We encourage submissions that introduce new or new combinations of seismological data types, advances in global and regional-scale seismic tomography, 3D waveform modeling, array-based approaches and the analysis of correlation wavefields.

Conveners

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ESC-SSA Joint Session: Advanced Methods for Harnessing Seismic Noise Analysis in Applied Seismology

There is a growing demand for advanced approaches to analyze seismic noise in order to improve the imaging and monitoring of shallow geological structures and to characterize their physical properties as well as study and monitor natural hazards. Such advancements are not only relevant from a scientific perspective but are also essential for practical applications, including land-use planning and risk mitigation in areas exposed to environmental hazards. Seismic noise analysis, when combined with both passive and active seismological methods, provides a reliable and cost-effective tool for subsurface investigations. Recent progress in this field has been driven by the availability of affordable acquisition systems, enhanced computational capacity for solving inverse problems and the development of more sophisticated modeling algorithms. Beyond traditional seismometer-based techniques, novel approaches now exploit large datasets from distributed acoustic sensing, dense nodal arrays and novel fiber sensing methods (*e.g.*, state of polarization, long-range interferometry). Applications of these methods are manifold, ranging from engineering seismology (site effects, site characterization, liquefaction and ground-motion amplification at various scales) to high-resolution fault imaging, fracture network characterization in reservoirs, volcanic and geothermal environments, landslide hazard assessment etc. Contributions exploring noise-based methods in aquatic environments are also encouraged.

This section will be a joint session between the SSA Annual Meeting 2026 and the 40th General Assembly of the European Seismological Commission (ESC2026).

Conveners

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ESC-SSA Joint Session: Interpreting Volcanic Unrest and Eruption Data for Effective Crisis Management

Volcanoes often undergo episodes of unrest that dedicated observatories should monitor, interpret and manage. The mechanisms driving unrests, their timescales and the associated precursory signals are challenging to translate into reliable forecasts of eruption style and intensity. Yet the consequences for nearby populations are potentially profound. Formulating hypotheses about the evolution, or cessation, of unrests requires understanding complex and deep earth processes, a task that is especially challenging when monitoring infrastructure is limited.

Interpreting both the historical and contemporary behavior of volcanic systems is complex but essential. In recent decades, numerous well-documented episodes of unrest have been observed, some of which have culminated in eruptions, while others have not. Notable non-eruptive cases include the Campi Flegrei caldera, Santorini, Dofen and the Chiles-Cerro Negro volcanic complex. By contrast, eruptive examples include Whakaari, Fuego, Kīlauea, Sierra Negra, Cumbre Vieja and many others. These events have yielded rich, multidisciplinary datasets that may enhance our understanding of processes driving unrest, eruption and co-eruptive dynamics within volcanic conduits, magmatic systems and flanks.

We invite contributions that investigate the underlying processes of volcanic unrest and focus on the interpretation driven by those global crises. Studies integrating seismic monitoring with complementary approaches, including infrasound, geodesy, gravimetry, geochemistry, petrology, thermal imaging and visual imaging, are particularly encouraged.

This section will be a joint session between the SSA Annual Meeting 2026 and the 40th General Assembly of the European Seismological Commission (ESC2026).

Conveners

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Evolving Frontiers in Explosion Monitoring and Source Physics

Advancing seismological techniques to improve the identification and characterization of anthropogenic activities of interest remains important for national security applications, industry and seismic hazards. This session invites abstracts on recent advancements in geophysical forensic analysis, and seismological tools applied to global security and explosion monitoring efforts. We seek topics involving the analysis of explosions and anthropogenic activity, analysis of seismicity in new sensing environments, event identification and source physics. We welcome submissions incorporating multi-modal observations, machine-learning applications and deployment of innovative instrumentation including distributed acoustic sensing, remote sensing and large-N arrays to improve the observation, modeling and characterization of seismic source signatures. Additionally, we seek to highlight recent advances in controlled source experiments and investigation of signal propagation and Earth structure. This session aims to promote collaboration among institutions and subject-matter experts to share scientific progress.

Conveners

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Fault Networks and Seismic Hazard in the Nevada-California Borderland

Nevada’s fast-growing cities lie within a region of poorly characterized seismic hazard. The tectonic setting in the Walker Lane, at the overlap between extensional and strike-slip provinces, results in a linked network of apparently short faults that are capable of complex quasi-static and dynamic triggering. Related hazards include liquefaction, rock falls and landslides, lake tsunami and vulnerable historic mines and unreinforced masonry buildings across the state.

As a multidisciplinary group, the newly formed Sierra Nevada Earthquake Consortium (SNEC), we invite contributions from across earthquake science and engineering relevant to: public safety, policy, fault mapping in 2-, 3- and 4D, paleoseismology, seismic swarms and sequences in characteristic Walker Lane style, general studies about transtensional deformation fields, localization or lack thereof, basin characteristics, topographic effects and technological, data and computational advances.

Conveners

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Fiber-Optic Sensing Applications in Seismology and Environmental Science

Fiber-optic sensing methods, such as Distributed Acoustic Sensing (DAS), Distributed Temperature Sensing (DTS) and Distributed Strain Sensing (DSS), are transforming seismology by advancing our understanding of seismic sources and Earth's structure. These innovative technologies convert fiber-optic cables into dense sensor arrays capable of capturing seismic and deformation signals across the solid Earth, oceans and glaciers with unprecedented resolution. We invite contributions on recent developments in fiber-optic seismology applications, including, but not limited to, the detection and characterization of various seismic sources (*e.g.*, earthquakes, icequakes, volcanic activities, ocean processes, atmospheric phenomena, energy extraction and storage activities and anthropogenic signals), Earth's structure imaging (*e.g.*, urban setting, offshore and cryosphere), environmental monitoring (*e.g.*, the dynamics of oceans, rivers, lakes, critical zones, soil moisture, groundwater, permafrost and glaciers) and natural hazard mitigation (*e.g.*, earthquake, landslides, tsunami and volcanic eruption monitoring and early warning). We also welcome recent engineering advancements in the theoretical, methodological and instrumental aspects of fiber-optic sensing for future Earth and planetary applications, with particular interest in the state-of-the-art use of transmission fibers in operational subsea cables. Contributions from the computational and data science communities focused on exploring fiber-optic data are encouraged, including areas such as machine learning, advanced signal processing techniques, data compression, high-performance computing and cloud computing and storage. We aim to bring together researchers from diverse fields, including Earth science, computational and data science and fiber-optic sensing engineering, to open a discussion on the future opportunities enabled by these new technologies.

Conveners

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From Drilling to Ground Shaking: Mechanisms, Monitoring and Mitigation of Induced Earthquakes

The widespread occurrence of induced earthquakes has generated substantial scientific and societal concerns. These seismic events result from expanded oil and gas extraction — driven by increasing energy demands — as well as geothermal energy production, mining operations and carbon capture and storage activities. The spatiotemporal evolution of induced seismicity is governed by complex interactions among site-specific poroelastic responses, fluid budgets, injection and production histories, reservoir dimension, subsurface hydro-mechanical properties and fault slip behavior under varying drainage conditions. Subsurface stress redistribution depends on fault geometry, hydraulic connectivity and coupled fluid-mechanical processes that are difficult to model.

Understanding these interactions requires integrative and multidisciplinary approaches to illuminate underlying physical mechanisms and guide effective hazard mitigation strategies. We invite submissions that advance induced seismicity research through case studies, novel methodologies and innovative datasets. Topics of interest include, but are not limited to, seismological source studies and machine learning applications for source characterization, enhanced seismic network performance and sensitivity improvements, 3D fault imaging, stress field modeling, numerical simulations of pressure fields and InSAR modeling, ground motion prediction models for induced events and coupled hydrologic and geomechanical modeling informed by operational data.

We particularly encourage contributions leveraging large and integrated datasets, *e.g.* ,seismic, borehole, geodetic and experimental data, to explore the co-evolution of seismicity, stress, reservoir properties and hydro-mechanical processes. This session aims to deepen our understanding of induced seismicity and support the development of comprehensive mitigation strategies.

Conveners

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Generating, Calibrating and Validating Multi-Scale Seismic Velocity Models

Accurate multiscale velocity models are essential for estimation of realistic ground motions in seismic hazard, risk analysis and other applications. In many regions, multiple velocity models of different spatial extent and resolution have been developed using different methodologies and datasets (*e.g.*, earthquake tomography, noise cross correlations, receiver functions, well logs, active source data, etc.), with highly variable ground motion prediction efficacy. This session welcomes studies describing new velocity models, as well as efforts to combine (*e.g.*, using machine learning and other methods), calibrate and validate existing velocity models. We also solicit contributions that quantify the importance of various model features on the accuracy of predicted ground motions through physics-based numerical modeling, as well as contributions that aim to model realistic variability of the ground motions. Contributions that quantify and map uncertainty in velocity models into the resulting ground motions are also encouraged.

Conveners

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Geophysical Perspectives on Volcanic Systems: Seismicity, Structure and Dynamics

Over the past few decades, significant advances have been made in understanding the structure and dynamics of volcanic plumbing systems. Our perspective has shifted toward the concept of trans-crustal magmatic system (TCMS), in which magma is distributed across vertically extensive regions throughout the crust rather than only stored within shallow-melt-dominant chambers. However, geophysical imaging may only detect a small portion of the melt in the upper crust beneath many active volcanoes and it struggles to constrain magma storage in the mid- to lower crust. Direct evidence for TCMS beneath modern active volcanoes is lacking, raising a critical question: Do TCMS truly represent the nature of magma storage beneath volcanoes? Furthermore, answering fundamental questions regarding the mechanism and evolution of magma supply, storage and transportation remains an essential challenge.

This session invites contributions aimed to advance our knowledge of the volcanic plumbing system across various spatial and temporal scales, from mantle magmatic/tectonic processes to surficial hydrothermal/eruptive activities and from decadal to instantaneous activities. We encourage studies presenting recent advancements including, but not limited to, high-resolution and multiparameter (*e.g.*, velocity, anisotropy, attenuation) seismic imaging and monitoring that utilize phases from passive or active sources or full wavefields, analyses of volcanic seismicity such as volcanic-tectonic events, deep long-period earthquakes and tremors. Applications of artificial intelligence and machine learning in this context are encouraged, along with studies integrating multi-physics datasets such as magnetotelluric, geodetic and gravity data. We envision that the session discussion can help to gain new insights into the evolution of magmatic systems and their implications for volcanic hazards.

Conveners

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International Collaboration to Advance Earthquake Science and Disaster Response

International collaboration and post-earthquake response/reconnaissance activities improve access to data, advance earthquake science and fortify scientific and humanitarian response globally. Nonprofits, governments, private sector partners and universities participate in these international collaboration and response activities, which provide a multitude of opportunities and benefits. This work facilitates opportunities to learn from varied geological contexts and infrequent geophysical events, encourages diverse perspectives on complex seismic and related problems and strengthens relationships that enable scientists to call upon counterparts in other countries for technical and response support. This session will highlight advances in earthquake response capabilities and information products, case studies, benefits, recommendations, ethical considerations and challenges of working in a global, multi-country context to advance earthquake science.

Conveners

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The Landscape Record of Earthquakes and Faulting

Recent earthquakes have left vastly different records in the landscape, from coastal uplift in the 2025 Mw8.8 Kamchatka, Russia, earthquake to large lateral surface rupture in the 2025 Mw7.7 Mandalay, Burma (Myanmar), earthquake, and subtle surface displacement in the 2025 Mw7.1 Tingri, China, earthquake. How long the earthquake record remains in the landscape depends on the surface rupture (or lack thereof) and shaking signatures of the earthquake as well as the lithology and climate of the region. Field and remote sensing observations of recent and past ruptures highlight the variable rupture geometries, surface slip distributions, damage zones of distributed or off-fault deformation and ground shaking. The extent to which the complex and heterogenous patterns are consistent or variable between earthquakes is a fundamental question in earthquake science, critical for hazard modeling and remains largely unknown. Meanwhile, advances in numerical and physical models and laboratory experiments expand the ability to study strain accumulation and release and the landscape response and preservation through multiple earthquake cycles. In this session, we encourage abstracts that investigate spatial and temporal patterns in strain accumulation and release spanning coseismic to geologic timescales, including their causes and uncertainties. We welcome contributions from geodesy, earthquake geology, tectonic geomorphology, lacustrine paleoseismology, numerical modeling, analog experiments and especially contributions with novel approaches integrating multiple data sources to further our understanding of how strain accumulation and release are stored in, interpreted from, and alter the landscape.

Conveners

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Linking Subduction Zone Processes and Cascading Hazards in Alaska, Cascadia, Chile and Beyond

Subduction zone environments host some of the most dynamic interactions between geological processes and structures, from the deep to the shallow and surface and across timescales from seconds to millennia and beyond. Subduction zone hazards arise from and catalyze the enduring tectonic changes, often involving cascading, interlinked occurrences of earthquakes, tsunamis, volcanic eruptions, landslides and land-level changes that pose significant risks to society. Some of these hazards, such as joint ruptures of the subduction interface along with the upper/lower-plate faults, remain underobserved but complicate risk assessment. To illuminate the structure, source dynamics and hazard impacts in subduction zones, it is essential to integrate observations and models spanning a wide range of spatial and temporal scales. The deeper insights gained from comparing and contrasting the behaviors of archetypal convergent margins underpin the development of a systems-based framework for improving our predictive understanding of subduction zones.

This session is motivated by SZ4D (www.sz4d.org), a community-driven initiative for a long-term, interdisciplinary research program aimed at understanding how the different components of subduction zone systems interact to produce and magnify geohazards over time. We invite new contributions to studies of subduction zone systems globally, on topics including, but not limited to, sensing technologies, imaging, modeling and interpretation studies for faults and earthquakes (particularly linked ruptures of megathrust and crustal faults), lithosphere and asthenosphere, volcanoes, landscapes and associated geohazards and risk evaluation, across seismology, geodesy, geology, engineering and other related fields. Observational, theoretical, computational and laboratory studies on the SZ4D focus areas of Alaska, Cascadia and Chile, as well as other subduction zones offering relevant insights, are particularly welcome.

Conveners

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Mechanisms and Seismogenic Structure for Large Continental Earthquakes

Large continental earthquakes, particularly those near populated areas, have caused significant damage to society, as seen in the recent 2023 M7.7/7.6 Turkey doublet and the 2025 M7.7 Myanmar strike-slip earthquakes. Detailed investigations of the rupture process and high-resolution imaging of the seismogenic structure, utilizing observations from multiple disciplines, is essential for long-term and medium-term probability forecasting, the dynamics of nucleation and rupture, as well as for conducting physics-based ground motion simulations for effective hazard assessment. This session aims to explore the processes and mechanisms behind large continental earthquakes and their connections to crustal and mantle structures. We invite contributions about techniques in source inversion and seismic imaging and encourage submissions that examine large continental earthquakes from various disciplines, including, but not limited to, seismology, tectonics, geodesy and geodynamics.

Conveners

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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. To ensure networks best serve the public, media, government and academic communities, it is important to continue to develop monitoring networks' abilities to accurately and rapidly catalog earthquakes. 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 and generating earthquake products, 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 instrumentation, methods and techniques that would benefit network operations for detecting, locating and characterizing earthquakes, particularly in a near real-time environment.

Conveners

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New Developments in Earthquake Rupture Physics For Source Characterization and Ground Motion Modeling

Understanding the physical process of earthquake rupture and slip is central to advancing the applicability of physics-based ground motion modeling to seismic hazard assessment, where 3D regional-scale simulations are increasingly being used to improve empirical ground-motion models. Adequate source characterization, together with well-constrained 3D velocity structures, is critical for producing realistic ground-motion estimates suitable for hazard assessment.

Recent advances in rupture dynamics, kinematic modeling, laboratory friction experiments and theoretical fracture mechanics provide new opportunities to improve our physical representation of earthquake sources. At the same time, important challenges remain in integrating these diverse approaches into a coherent framework for seismic hazard applications.

This session invites contributions from across the spectrum of faulting physics, including dynamic and kinematic rupture modeling and simulations, experimental and theoretical studies of fault friction and fracture and case studies linking observations with source modeling. We particularly encourage submissions that highlight how advances in source characterization can be integrated with broader 3D simulations to improve the accuracy and reliability of physics-based seismic hazard assessment.

Conveners

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New Frontiers in Seismic Observations and Modeling with Innovative Methods and Emerging Data on Earth and Other Planets

Seismology is rapidly evolving due to vast amounts of data from classical and emerging instrumentation, as well as advances in theory and computation. The new observational tools include distributed acoustic sensing (DAS), dense nodal arrays, satellites and the ubiquitous cell phones, as well as ocean-bottom/underwater sensors and seismic packages deployed on planetary missions, which complement traditional seismometers. We can now both capture ephemeral surface observations and record wavefields with unprecedented spatial and temporal richness across Earth and other planetary bodies. At the same time, high-performance computing and scientific machine learning enable us to simulate, interpret and invert complex wave phenomena. This session aims to connect these developments by bringing together researchers working on forward and inverse modeling of seismic sources and multi-scale structures, physical interpretation of seismic observations, including unconventional or multi-modal records associated with strong ground motion and human-reported or engineered-environment observations in the near field.

Conveners

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New Possibilities for InSAR in Earthquake Science: the NISAR Mission and OPERA Displacement Maps

In the past year we have seen two milestone advances in Interferometric Synthetic Aperture Radar (InSAR) measurements: the launch of the NASA-ISRO Synthetic Aperture Radar (NISAR) Mission and the release of the Observational Products for End-Users from Remote Sensing Analysis (OPERA) displacement maps over North America. NISAR launched successfully on July 30, 2025, and will begin distributing science data as early as mid-October 2025, ramping up to full science operations – collecting all land and ice-covered surfaces every 12 days from ascending and descending orbit vantage points - in early November 2025. These data will be freely and openly distributed from the NASA Alaska Satellite Facility (ASF) within days of acquisition. The OPERA project collects data from satellite radar and optical instruments to generate a variety of products, among them maps of line-of-sight (LOS) displacement over North America for existing InSAR missions, which will likewise be distributed by ASF. NISAR observations and OPERA displacement products are capable of addressing fundamental and applied research topics in earthquake science, including global tectonics, the impact of anthropogenic processes on active faults and disaster response. This session invites contributions from those who plan to dive into these new datasets, showcasing early results.

Conveners

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Observation and Analysis of Topography and Deformation: Relating Earthquakes to Cascading Hazards

Earthquakes may initiate cascading or triggered phenomena such as flooding, landsliding, ground failure, tsunami, urban and wildland fire and post-seismic deformation. Conversely, earthquakes may occur in areas already impacted by hazards such as increased storm activity, drought, sea-level rise, subsidence, societal challenges and other circumstances that increase risk and vulnerability. These combinations of processes and circumstances may affect landscape and damage infrastructure in complex and under-anticipated ways. Understanding these hazards as linked phenomena requires advances in measurement and analysis of deformation and of topography, multidisciplinary research collaborations, scenario development and focused research and planning for new data and observational platforms.

Our aim is to bring together researchers that strive to understand process linkage among diverse hazards, researchers that are advancing remote sensing data acquisition and processing and those that consider the impacts of these processes. Current examples of these efforts include NSF's CLaSH Center, the newly launched NASA-ISRO SAR mission, NASA's Surface Topography and Vegetation study and others involving academic researchers, state and federal scientists and others who study hazard and risk associated with critical infrastructure. We are particularly interested in contributions from the geological, geomorphic, geodetic and remote sensing communities that are working to better understand the linkages between surface processes in a cascading hazard framework or have interest in doing so. We welcome novel research results, reports on community efforts to develop research collaborations, remote sensing infrastructure and other planning activities and more generally, presentations that consider how study of earthquakes help us understand other natural hazards and their impacts to society.

Conveners

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On the State of Knowledge/Art/Practice for mHVSR Analyses; A Prelude to the ESG7-COSMOS mHVSR Pre-Event Forum

Several analytical methods have been developed to estimate frequency-dependent site response for seismic hazard assessment. Most spectral analytic methods do not require supplementary data beyond earthquake recordings. However, sufficient earthquake recordings for robust analyses are often unavailable on a site-specific basis. Other site-specific approaches require an a priori prerequisite commonly known as site characterization. This field data acquisition can be costly and environmentally prohibitive.

To address these challenges, the single-station microtremor horizontal-to-vertical spectral ratio (mHVSR) analysis method is gaining traction as a stop gap when earthquake data is scarce. Given the global adoption of the mHVSR method, there is a need for updated standardized guidelines based on scientific consensus to ensure consistency and reliability in its application. The greatest challenges to an international standardization of mHVSR acquisition and analysis are two-fold: (1) the underlying composition of the microtremor wavefield is site dependent, therefore the appropriate theoretical model for inversion is still strongly debated; and, (2) there are many factors involved in the data acquisition, processing and interpretation stages that remain inconsistently applied, so that standardization cannot be implemented.

From the perspective of the historical development of the mHVSR technique — as well as the physical basis of the mHVSR — the international Consortium of Organizations for Strong Motion Observation Systems (COSMOS) invites the seismological and earthquake engineering communities to share their perspectives on the state of knowledge, art and practice on mHVSR analyses. This session is intended as a prelude to the 18 October 2026 7th Effects of Surface Geology (ESG7) special session titled ESG7-COSMOS mHVSR Pre-event Forum (Grenoble, France), where a main topic of interest is to define the roadmap for updating existing guidelines (*e.g.*, SESAME, 2004).

Conveners

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Physical Properties of Fault Zones from the Seismic Source to Earth’s Surface

The physical properties of fault zones — ranging from the frictional behavior of fault interfaces to the (in)elastic and hydrologic properties of surrounding rock — vary in both space and time, influencing deformation throughout the earthquake cycle and ground shaking during earthquakes. Many faults, for example, show spatially variable creep that may reflect heterogeneous frictional rate dependence. Additionally, fault zones generally differ in elastic moduli and permeability from the surrounding crust. These properties also evolve through successive earthquake cycles, reflecting processes like dynamic weakening and off-fault damage during coseismic rupture and healing during postseismic and interseismic periods. Such variations now underpin complex, physics-based models of seismic and aseismic processes enabled by advances in high-performance computing. Yet, significant challenges remain. Constraining the in-situ properties of fault zones and assessing their importance relative to other controls on fault mechanics, earthquake physics and seismic hazards, such as fault geometry and stress state are critical topics for investigation and discussion.

We welcome contributions that explore the physical properties (*e.g.*, frictional, elastic, inelastic, hydrologic) of fault zones from the seismic source to Earth's surface using field, laboratory, geodetic, borehole and/or seismic observations. We also invite studies of natural, experimental, or modeled fault slip behavior that evaluate how physical properties and their variability in space and time influence (a)seismic processes and their associated hazards.

Conveners

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Physics of Earthquakes: Insights from Theory and Observations

Understanding origin and spatio-temporal evolution of seismicity needs a careful quantitative analysis of earthquake source parameters for large sets of earthquakes in studied seismic sequences. Accurate determination of earthquake hypocenters, focal mechanisms, seismic moment tensors, static stress drop, apparent stress and other earthquake source parameters and their uncertainties provides an insight into tectonic stress and crustal strength in the area under study, fault material properties, fault roughness and prevailing fracturing mode (shear/tensile) in the focal zone and allows investigating earthquake source processes in greater details. In addition, studying relations between static and dynamic source parameters and earthquake size is essential for understanding the self-similarity of rupture processes and scaling laws and for improving our knowledge on ground-motion prediction equations.

This session focuses on methodological as well as observational aspects of earthquake source parameters of natural or induced earthquakes in broad range of scales from large natural earthquakes through reservoir-scale microseismicity, to pico- and femto-seismicity from in-situ laboratories and laboratory experiments on rock samples. Presentations of new approaches, methodologies or datasets (*e.g.*, traditional seismic vs. emerging technologies like DAS) for determination of source characteristics as well as case studies related to analysis of earthquake source parameters in the context of earthquake physics are welcome. We also invite contributions related to scaling of static and dynamic source parameters, to self-similarity of earthquakes and inversions for stress and other physical parameters in the focal zone.

Conveners

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Planetary and Gravitational Wave Seismology

Seismology is not anymore the appanage of the Earth, with several past and future planetary missions with deployed seismometers on the Moon (with Apollo and, in near future FSS, LEMS and ChangE-7), on Mars (with Viking and InSight) and other future missions toward Titan (Dragonfly). Seismology is also not only used to search for quakes and other seismic sources, but is also considered for recording planetary vibrations excited by space-time metrics fluctuations associated to gravitational waves. This was the goal of the Apollo 17 gravimeter and will be the goal of several lunar projects aiming to measure strains variations (*e.g.*, LILA) or ground accelerations (*e.g.*, LGWA) generated by gravitational waves emitted by black holes merging, among other astrophysical sources.

The goal of this session is to present the most recent analysis in planetary seismology and in seismic analysis related to gravitational waves detections, including for future projects.

In planetary seismology, we will welcome presentations on recent analysis of the InSight and Apollo seismic data, as well as progress status of selected projects and performances of new instruments or detection concepts in development for future planetary missions. Targets might be terrestrial bodies (*e.g.*, Mars, the Moon, Titan, Venus) but also small bodies. We will also welcome numeral modeling aiming to better understand and model future data and seismic sources on other bodies, including impacts, airburst and atmospheric sources.

In gravitational waves, we will welcome concept and instruments descriptions, as well as modeling of the expected signals and of all sources of noise which might affect detection of GW signals, especially for the Moon which is targeted by several projects. We welcome presentations especially related to the seismic aspects of GW detection, such as estimations of the signals for 1D and 3D realistic lunar models and modeling of the seismic noise and other lunar environmental noises.

Conveners

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Recent Contributions of Social Science Research to Understanding Earthquakes

Collaborations with social scientists are critical to ensure that the geophysical information developed and produced about earthquakes is effectively used for risk reduction. As applied to real-world issues, including earthquake hazard warnings (*e.g.*, earthquake early warning and operational earthquake forecasting), general and public education regarding earthquake hazards and their societal consequences, establishing institutional trust and credibility and other areas involving communication with various publics, social scientists are increasingly called upon to provide insights based on empirical studies and theoretical orientations. The social and behavioral sciences can provide valuable information on the social and cultural environments in which scientific developments are shared and translated with community residents and various institutional sectors. This session will highlight research from various social sciences that has been used to inform earthquake risk reduction and will provide an opportunity for discussion of new potential directions and collaborations.

Conveners

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Recent Research on Ground Motion Directionality

Horizontal earthquake ground motion intensity at a site can vary significantly with changes in orientation. However, current ground motion models (GMMs) and regional seismic risk assessments neglect this important characteristic of ground motions, typically using scalar measures of central tendency of the intensity at a site. Older models often provided estimates of the geometric mean of the intensity recorded in two orthogonal horizontal directions, while modern models typically use the orientation-independent median of all horizontal intensities (*i.e.*, RotD50). By doing so, these measures of intensity overlook the fact that the actual intensity affecting structures in specific orientations can be significantly higher or significantly lower than the scalar (*e.g.*, RotD50) predicted by GMMs.

This session aims to present and discuss recent advancements in research on ground motion directionality. Examples of topics that could be addressed in the session include: ground motion directionality models, quantification of component-to-component variability, orientation of maximum ground motion intensity, effect of style of faulting on the orientation of maximum intensity, spatial distribution of polarization of ground motions, directionality of ground motions recorded at soft soil sites, directionality in the near-fault region, directionality in physics-based ground motion simulations, directionality in recent earthquakes, ground motion directionality using recently proposed alternative measures of intensity, consideration of directionality in design and evaluation of buildings and infrastructure and directionality in seismic risk assessments. Ground motion directionality is an emerging topic that is at the intersection of seismology and earthquake engineering, so we believe it could attract interest from both groups.

Conveners

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Regional Source, Path and Site Effects in Earthquake Ground Motions

Despite the use of global earthquake ground-motion models (GMMs), ground-motion observations typically show repeatable effects for individual source, path and site locations. Understanding these regional differences and their cause is important for accurate hazard estimates — especially when using global observations to inform local GMMs, or when using GMMs in regions for which they were not developed. We solicit studies focusing on regional aspects of ground motion and its generation from both empirical and numerical simulation perspectives. We are interested in studies of individual earthquakes that focus on source-specific effects on ground motion like directivity or supershear rupture, as well as studies that highlight the influence of regional site conditions on ground motions, such as local geologic variability, sediment thickness and basin structure or kappa. We hope to spark discussion on these types of physical processes, how they control observed regional ground motion variations and in particular how their effects can be predicted or modeled.

Conveners

David Barba Galdamez, North Carolina State University (dfbarbag@ncsu.edu)

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Seismology for All: Expanding STEM Education Through Accessible Tools and Global Collaboration

Seismology is uniquely positioned as a unifying discipline within STEM, combining global impact and a rich history of collaboration across demographics and of open data sharing across political boundaries. Seismology provides an inspiring curriculum to advance education at all stages of the learning process. This session seeks success stories and innovative practices in STEM engagement that use seismology and associated disciplines to spark curiosity and develop skills. From primary classrooms to community colleges and citizen science initiatives, we welcome examples of how demonstrations, hands-on tools and effective communication can make even advanced topics accessible to new learners. The cost of entry into seismology has never been more affordable with most devices having some form of seismometer and hobby kits, like the Raspberry Shake or Shake App for smart phones, that are joining communities across the world. We want to ensure that the seismological community is aware of such tools and encourage discussion of how to improve the impact of seismology in STEM engagement. We encourage discussion on the roadblocks that are hindering progress in STEM. The goal of this session is to strengthen the seismological community's role in shaping the next generation of scientists and informed global citizens.

Conveners

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Adam Pascale, Seismology Research Centre (adam.pascale@src.com.au)

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Seismotectonics of Southern and Baja California

Southern and Baja California offer tectonic flavors for every appetite, including domains of broad extensional basins and stacks of reverse faulted mountains, which are linked by strike-slip systems. Situated adjacent or above these seismic sources are dense urban population centers and critical infrastructure. This session seeks contributions that utilize geological and geophysical observations to improve characterization of earthquake hazard from central California through the Baja Peninsula, spanning from the outer Borderlands across the San Andreas Fault system. Welcome submissions include investigations of fault zones and fault intersections from geological and/or seismological data; insight into basin structure and velocity from seismology or gravity; geomorphic and geologic studies of late Quaternary fault activity; and consequences of the longer geologic history on the present structure and seismicity. We also welcome modeling investigations that illuminate how this geologic framework impacts earthquake hazard locally or regionally for the over 25 million people that inhabit this binational region. Through a diverse assembly of datasets and methods, we aim to connect the tectonic setting and earthquake hazard.

Conveners

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Source Properties of Microearthquakes: Insights from Laboratory, Induced and Natural Events

Microearthquakes provide a unique perspective for exploring earthquake source mechanisms and fault dynamics. Whether recorded under controlled laboratory conditions, induced by industrial activities, or occurring naturally, their source properties, such as estimated energy release and stress drop, provide critical insights to the rupture processes. This session welcomes contributions from seismology, rock mechanics, geophysical monitoring and numerical modeling, particularly studies that integrate multiscale and multi-source data, including high-precision locations, waveform inversion, stress and friction experiments and comparative analyses of induced and natural events. By combining laboratory experiments, field observations and numerical modeling, we aim to deepen our understanding of microearthquake source physics and advance the scientific knowledge base for earthquake hazard forecasting and risk mitigation. We especially encourage submissions that uncover subtle differences in source processes or propose innovative monitoring technologies and data analysis methods.

Conveners

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Yen-Yu Lin, National Central University (yenyulin@ncu.edu.tw)

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Southern California Seismicity: Past, Present and Future

Seismic investigation of Southern California began around a century ago to better understand the processes and hazards associated with several major fault zones, such as the San Andreas, and numerous other minor and subsidiary faults. The long history of seismic monitoring in the region – with regional/teleseismic instrumental monitoring dating back to ~1900, the local seismic network established in the 1920s and the official earthquake catalog starting in 1932 – has allowed for many ground-breaking studies on earthquakes and their effects. In this session, we welcome all presentations related to Southern California seismicity, from past events preserved in the geologic record to data analysis of recent events to modeling of what we may expect in the future. In order to fully understand both short-term seismic and long-term tectonic processes, we need contributions from seismology, geology and geodesy as well as from observational, experimental and theoretical work. We hope this session can help spur discussion and collaboration for furthering our understanding of Southern California seismicity and related hazards.

Conveners

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SSJ-SSOC-SSA Joint Session: From Slow to Fast Earthquakes: Bridging the Spectrum of Fault Slip

Over the past two decades, growing evidence has shown that earthquake faults accommodate a wide spectrum of slip behaviors, ranging from long-lasting slow slip events to unstable, fast ruptures that generate damaging seismic waves within seconds. Between these extremes exist a variety of intermediate phenomena. Together, these slip modes illustrate that fault slip is not a simple binary process, but rather a continuum that plays a fundamental role in nucleation, rupture dynamics and the spatial distribution of slip and energy release.

A central challenge is to understand how these slip behaviors are related, and in particular, how and when a slow earthquake transitions into a fast one. Answering this question requires careful examination of fault structure, stress, fluids and frictional properties and demands contributions from multiple disciplines. Observational seismology and geodesy provide constraints on where and when slow and fast slip occur, while geological and field studies reveal the physical record of past events. Laboratory experiments and rock mechanics shed light on the processes that govern slip modes, and numerical modeling and theoretical approaches offer frameworks for integrating observations and testing physical mechanisms.

This session invites contributions that advance our understanding of slow and fast earthquakes and their potential connections. We welcome geophysical observations, field and laboratory studies, theoretical and numerical investigations and methodological innovations. Submissions that integrate multiple observations and/or perspectives are strongly encouraged. Cutting-edge approaches in data science, machine learning and novel computational methods that enable the detection, analysis and interpretation of diverse slip modes are also particularly welcome. By bringing together these efforts, this session seeks to provide a more comprehensive understanding of the spectrum of fault slip and its role in earthquake generation.

This session is jointly organized by the Seismological Society of Japan, Seismological Society of China and Seismological Society of America.

Conveners

Aitaro Kato, University of Tokyo (akato@eri.u-tokyo.ac.jp)

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SSJ-SSOC-SSA Joint Session: Lessons from Recent Major Earthquake Sequences Around the World

Over the past few years, the global seismic community has observed a number of major earthquakes, including the 2023 M7.8/M7.6 Turkey doublet, the 2024 M7.5 Noto, Japan, the 2025 M7.1 Dingri, China, the 2025 M7.7 Mandalay, Myanmar, and most recently the M8.8 sequence off the coast of the Kamchatka Peninsula, Russia. Some events produced significant damage and casualties while others occurred in more remote regions with limited societal impact. Regardless of their consequences, each event presents a valuable opportunity to deepen our understanding of earthquake physics — shedding light on detailed rupture processes, foreshocks and precursory signals, aftershock triggering mechanisms and their connections to long-term tectonic loading and deep Earth structure.

This session invites contributions that explore new findings and emerging questions arising from these major earthquakes. We welcome studies utilizing seismic, geodetic, geologic, or remote sensing data to better understand the behaviors before, during and after the mainshocks. Given the diversity of tectonic settings — from continental normal and thrust faulting, strike-slip systems to subduction megathrusts — this session aims to foster cross-regional comparisons and synthesis. We are especially interested in contributions that highlight unexpected rupture behaviors, near-field and remote interactions or cascading hazard behaviors. By bringing together researchers who have studied these significant earthquakes around the world, we hope to identify common themes, highlight unique features and improve our overall understanding of major earthquake behaviors. The session aims to promote dialogue across disciplines and regions, and to support the SSA community's shared goal of advancing earthquake science for the benefit of society.

This session is jointly organized by the Seismological Society of Japan, Seismological Society of China and Seismological Society of America.

Conveners

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Zhigang Peng, Georgia Institute of Technology (zpeng@gatech.edu)

Dun Wang, China University of Geosciences (wangdun@cug.edu.cn)

Subaqueous Evidence for Earthquakes, Coseismic Landslides, Tsunamis and other Cascading Hazards

Large earthquakes, tsunamis and landslides can have major impacts on populations, infrastructure and habitats across local, regional and transoceanic scales. The destructive impact of these events can be compounded through associated triggering (*e.g.*, shaking induced landsliding and tsunami genesis). Subaqueous environments (*i.e.*, marine and lacustrine) can provide stratigraphic records and quantitative insights to reconstruct these catastrophic events across a range of temporal and spatial scales. High-resolution geophysical imagery combined with detailed geological sampling and geochemical analyses can provide critical context around preconditioning factors as well as the environmental response to these geohazards. We encourage submissions that integrate onshore and offshore geological, geophysical, geochronological and/or geotechnical datasets along active or passive margins to provide constraints on geohazard characterization and/or link fundamental geological processes to geohazards. In addition, we welcome submissions that combine physics-based modeling and geological or geophysical observations from marine, coastal and lacustrine environments to understand and anticipate geohazards.

Conveners

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Jillian Maloney, San Diego State University (jmaloney@sdsu.edu)

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Robert Witter, U.S. Geological Survey (rwitter@usgs.gov)

Time-Dependent Seismic Hazard Assessment: Models, Data and Applications

Time-dependent approaches to seismic hazard assessment are increasingly important for understanding and reducing earthquake risk. This session invites contributions that improve the modeling, testing and application of time-dependent seismic hazard frameworks across different scales. We welcome studies on renewal models of earthquake occurrence, physics-based fault system simulations, spatio-temporal patterns of seismicity and probabilistic time-dependent ground motion forecasts.

Submissions that explore the integration of geological, geodetic, seismological and paleoseismological data into time-dependent models are encouraged, as well as case studies that evaluate model performance against past earthquake sequences. Particular interest is given to approaches that quantify and communicate uncertainty, enhance fault interaction modeling, or directly support engineering design, emergency preparedness and policy decisions.

The goal of this session is to showcase the latest advancements in time-dependent hazard analysis and to encourage discussion among seismology, earthquake engineering and risk management communities. By bringing together modelers, observational seismologists and practitioners, we aim to examine both the scientific advances and the practical uses of time-dependent seismic hazard assessment.

Conveners

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