WSSPC
WESTERN STATES
SEISMIC POLICY
COUNCIL

We develop seismic policies and share information to promote programs intended to reduce earthquake related losses.

A non-profit earthquake consortium for the western states

Winter 2021
e-Newsletter

Western States
Seismic Policy Council
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In This Issue

WSSPC NEWS

WSSPC Awards Nominations

Every year we recognize outstanding colleagues and projects which have had an impact on seismic risk reduction. If you know of such a person or project, please nominate them for a WSSPC Awards in Excellence, Lifetime Achievement Award, or WSSPC Leadership Award. The nomination deadline is **February 28, 2021**. Nomination forms and eligibility guidelines can be found on the website at: *https://www.wsspc.org/awards/call-nominations/*

- **WSSPC 2021 Polices have been returned to the committees.** The public view of the revised drafts are on our WSSPC website at: https://www.wsspc.org/public-policy/2020-wsspc-draft-policy-recommendations/ . We ask that you complete your second review and return your edits/recommendations to WSSPC NLT **February 26, 2021**. This allows for a few weeks to collate and get them to the Board prior to the Spring Board and Annual Business Meeting.
- **The WSSPC 2021 Spring Board and Annual Business Meeting will be virtual** due to ongoing COVID-19 conditions. The meeting date is TBD. If a voting member cannot attend the Annual Business Meeting, please insure you have a proxy available to represent your state or territory. Thank you!
- **Steve Masterman (AK) has decided to step down as a member of the WSSPC Board f Directors.** WSSPC sincerely appreciates his years of service to our organization and membership! Accordingly, WSSPC is currently soliciting nominations for the soon-to-be vacant Board Director position. Based on our bylaws, we must fill his position with a member's State Geologist/Director. This allows our Board to maintain a balance between Emergency Management Directors and State Geologist/Directors. Nominations will be open until **February 26, 2021.** Nominations can be either self-nominations or provided by others.
- **WSSPC Social Media Outreach** continues to increase! If we haven't "followed" your organization, please let us know. We also ask that you follow us. Let's support each other in getting our messages out. If you have a targeted audience you want to reach, let us know. Part of our mission is to "share information" and "promote programs."
- **The Spring 2021 Newsletter will include a new section!** Based on recommendations made during monthly calls, the WSSPC Newsletter will include a "Jobs Listing" section where opportunities in WSSPC members' geologic and/or emergency management fields will be published. *Note: this requires us to be aware of the opportunity in order for us to publish it. Please either ask your HR to provide us with the listing and link or send it to us yourself.*

WSSPC Members Recent Earthquakes (4.0 or higher with "Felt Reports")

South El Monte, CA	M4.5	19 September 2020
Sand Point, AK	M7.6	19 October 2020
Sand Point, AK	M4.8	20 October 2020
Big Lake, AK	M5.1	07 November 2020
Mina, NV	M5.3	13 November 2020
Mina, NV	M4.3	13 November 2020
Nikolski, AK	M6.4	01 December 2020
Mina, NV	M4.3	01 December 2020
Mina, NV	M5.1	01 December 2020
Mina, NV	M4.9	03 December 2020
Mina, NV	M4.0	03 December 2020
Sand Point, AK	M4.7	03 December 2020
Lakeport, CA	M4.4	06 December 2020
Waimea, HI	M4.4	14 December 2020
Fern Forest, HI	M4.4	21 December 2020

A Final Thank You to Our 2020 WSSPC Affiliate Members

WSSPC welcomes all members of the professional community who share the common goal of reducing losses from earthquakes. We were honored to be supported by:

Government

City of Las Vegas Building and Safety

Clark County Building and Fire Prevention

Non-Profit

Applied Technology Council

Remember, It's Not Too Late to Join WSSPC as an Affiliate Member for 20201

Your benefits will include:

- Recognition of support with a link on the WSSPC website to your organization
- The opportunity to participate on WSSPC Committees and provide input to policy recommendations
- Quarterly E-Newsletters and Monthly Bulletins
- Opportunities to exhibit and sponsor activities

There are so many ways to stay connected!

Online- www.wsspc.org
Twitter- @WSSPC
Facebook- www.facebook.com/WSSPC

NEWS

Alaska Tsunami Warning Statement

On May 14, 2020, the State of Alaska released a warning statement reading, "The threat of a large and potentially dangerous is looming in Prince William Sound…" Per Steve Masterman, director of Geological and Geophysical Surveys (DGGS), his staff and a coordinated working group have received indications that "the rapid retreat of the Barry Glacier from the Barry Arm . . . could release millions of tons of rock into the Harriman Fjord…" This would have the potential to trigger a major tsunami. Previous Alaskan tsunamis triggered by landslides have occurred in 1958, 1967, and 2015. The 1958 Lituya Bay tsunami killed five people and had a maximum height of 1,720 feet.

As specified in the memo and at Alaska DGGS Barry Arm Landslide and Tsunami Hazard page,"The Barry Arm fjord is in an area referred to as the "accretionary prism," where plate tectonics forced sedimentary rocks to collide and merge with the southern shore of the Alaska mainland long ago in geologic history." It has fractured bedrock and unstable slope which increase the chance of a significant landslide. Unfortunately, the increased chance still does not tell us when one will occur.

For additional resources and information on the Barry Arm, please see the bottom of the Alaska DGGS webpage previously linked.

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Seismic Building Code Provisions for New Buildings to Create Safer Communities

In October 2020, FEMA published the Fact Sheet ***Seismic Building Code Provisions for New Buildings to Create Safer Communities***. This fact sheet emphasizes that one of the key actions a community can take to mitigate against earthquakes is to have the most recent seismic code provisions included in their Building Codes and to properly enforce them.

Per the fact sheet, the 2020 NEHRP Recommended Seismic Provisions for New Buildings and Other Structures (the Provisions) "will introduce the following major changes and other important improvements, modifications, new concepts, and background information:

- New seismic design ground motion values and maps based on the 2018 USGS National Seismic Hazard Model, which includes new seismic ground motion models for the central and eastern United States, basin effect modeling for the Los Angeles, Seattle, San Francisco, and Salt Lake City areas, and updates to the catalog of past earthquakes;
- New multi-period response spectra which improve the accuracy of earthquake design ground motion criteria and correct an underestimation of earthquake impact for mid- to high-rise buildings at soft soil sites near major faults;

- A new design force formula for non-structural components which will improve seismic resistance for major nonstructural systems such as architectural, mechanical, and electrical components;
- New alternate design procedures for improving the seismic performance of large one-story commercial and industrial buildings constructed with rigid walls (e.g. masonry or tilt-up concrete) and flexible roof diaphragms (e.g., wood sheathing or bare metal deck). Such buildings are commonly used as warehouses and large department or grocery stores; and
- New provisions for concrete and composite steel coupled shear wall buildings, which have been shown to provide good seismic performance for high-rise buildings in high seismic hazard areas."

The fact sheet also notes that increased resiliency requires communities to also strengthen infrastructure, lifelines, and critical facilities.

This document directly supports the concepts expressed in the WSSPC "Lifeline Infrastructure" and "Functional Recovery" policies currently undergoing their second review for 2021.

Global Earthquake Social Vulnerability Maps

The Global Earthquake Model Foundation (GEM) has released a series of maps which show "*Global Earthquake Social Vulnerability*." The maps focus on the areas of:

- Social vulnerability—defined as "a composite index that was developed to measure characteristics or qualities of social systems that create the potential for loss or harm."
- Economic Vulnerability—defined as " a composite index that was designed primarily to measure the potential for economic losses from earthquakes due to a country's macroeconomic exposure."
- Reconstruction and Recovery—defined as "closely aligned with the concept of disaster resilience."

The maps and process was virtually launched at the "Understanding Risk 2020" conference during the first week of December 2020.

Social vulnerability is something emergency managers and others have known about . This mapping/modeling process allows for a quantified visualization which can be used to improve emergency planning and response in addition to understanding where non-event resources can be prioritized to reduce community vulnerability and improve sustainability.

Earthquake swarm rattles ground near new Calaveras Dam

An article published October 10, 2020 by Tremblor discusses the vulnerability of the Calaveras Reservoir, which provides drinking water storage, to earthquakes. The reservoir is the second largest one in the San Francisco Bay area and has recently been subjected to a swarm of small earthquakes.

The Calaveras Fault passes underneath the northern end of the reservoir. It branches out to create the Hayward Fault. For more information on the Calaveras Fault see: ***Field Trip to the Calaveras and San Andreas Faults: Hollister and San Juan Bautista Region***

Distribution of Aseismic Deformation Along the Central San Andreas and Calaveras Faults From Differencing Repeat Airborne Lidar

(From the article published October 26, 2020)
"Repeated dense measurements of topography reveal how the Earth's surface shifts and deforms at tectonic plate boundaries. Along some active faults, deformation and offset occur continuously even in the absence of large earthquakes; this is referred to as fault creep which generally proceeds at rates of millimeters to tens of millimeters per year."

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The study uses historical, airborne LIDAR elevation data sets and compares them to newer data to measure current fault creep rates. The creep rates, depending on where they were measured along the fault, are shown to be between less than 8mm/year to over 30 mm/year with a mean rate of 22mm/year for the San Andres fault between Parkfield, California, and San Juan Bautista, California

Per the article, fault creep rates " indicate reduced seismic moment accumulation" as movement pressure and energy is released rather than stored at fault locked points to be released in a sudden seismic event. However, the release of energy as a result of creep fault does not preclude the possibility of more regular, moderate earthquakes from occurring. The risk also remains as faults are irregular, deep and there is uncertainty in how creep rates change with depth.

The State of Stress on the Fault Before, During, and After a Major Earthquake | Annual Review of Earth and Planetary Sciences (annualreviews.org)

(From the Abstract)
"Earthquakes occur by overcoming fault friction; therefore, quantifying fault resistance is central to earthquake physics. Values for both static and dynamic friction are required, and the latter is especially difficult to determine on natural faults.

However, large earthquakes provide signals that can determine friction in situ. The Japan Trench Fast Drilling Project (JFAST), an Integrated Ocean Discovery Program expedition, determined stresses by collecting data directly from the fault 1–2 years after the 2011 M_w 9.1 Tohoku earthquake. Geological, rheological, and geophysical data record stress before, during, and after the earthquake. Together, the observations imply that the shear strength during the earthquake was substantially below that predicted by the traditional Byerlee's law. Locally the stress drop appears near total, and stress reversal is plausible. Most solutions to the energy balance require off-fault deformation to account for dissipation during rupture. These observations make extreme coseismic weakening the preferred model for fault behavior."

This study lead to the following article: ***A surprisingly weak fault led to a massive earthquake*** which explains the study in more of a layman's language and how the evidence was gathered which allowed for the data to be quantified. One of the key conclusions, as stated by the article is, "This result means that scientists can formulate a relationship between stress on a fault and an earthquake's magnitude, which brings them closer to forecasting the size of an event if they can estimate the stress buildup beforehand. This, Brodsky notes, "is why we spent so much time, energy and money on understanding the friction.""

New observations in Central Italy of groundwater responses to the worldwide seismicity

(From the article's Introduction as published October 20, 2020)
"Many studies have highlighted the sensitivity of fluid behaviour related to the modification of the stress field, both the static and the dynamic one. In particular, hydrogeological and geochemical responses include: changes in groundwater level, temperature, water chemistry, stream flow, and gas geochemistry. Among these parameters, a change in groundwater level is more commonly recorded due to the simplicity of doing so through the use of inexpensive devices.

Methodology used in this study was measurements of groundwater via drilled wells under normal conditions plus during and after distant seismic events. Changes in the ground water measures were attributed to the compression of the aquifer as the "body rock is dilated and compressed by earthquake waves" and "amplification by the water column momentum moving in the well due to the fractured system."

Per the conclusion, the study may support the characterizations and identification of teleseismic effects, differentiating between distant and near-field earthquakes.

Alaska Earthquake Center's seismic network covers new ground | Alaska Earthquake Center

This University of Alaska, Fairbanks, Alaska Earthquake Center article dated October 30, 2020 discusses the dramatic expansion of their permanent seismic monitoring system during 2019 and 2020. Key to the expansion was the acquisition of 96 of 158 temporary USArray sites in Alaska. In addition to the 96 "adopted" by the earthquake center, they were able to integrated the 11 "adopted" by the Alaska Volcano Observatory hese sites were originally installed as part of the USArray portion of the multi-year, multi-million-dollar EarthScope Project funded by the National Science Foundation (NSF).

From the article:
"While the original EarthScope goals were focused on investigating the earth's structure through seismic data, by the time the USArray reached Alaska the instrumentation package had expanded to include meteorological sensors, soil temperature probes, and infrasound sensors. The additional instrumentation allowed researchers and agencies to stretch across different fields and combine efforts to better understand the dynamic and unique Alaska system in new ways and new locations. Looking at the aurora as recorded on USArray sites, using the meteorological data to forecast forest fire behavior, monitoring changes in North Slope permafrost, and better recording of seismic sequences (such as the August 12, 2018 magnitude 6.4 earthquake and its aftershock sequence on the North Slope) are just some of the ways these stations have already benefited the state."

Additional description of how the new sensors will support Alaskan studies is described in the November 11, 2020 article, ***New Multidisciplinary Project Will Boost Understanding of Earthquakes and Artic Change in Alaska*****.** From the article: "The five-year, $6.9 million project funded by the National Science Foundation focuses on enhancing measurements of Arctic change across western and northern Alaska. Led by the Alaska Earthquake Center, the Alaska Climate Research Center and a diverse team of investigators from the University of Alaska Fairbanks Geophysical Institute, the project will enable use of real-time observations to help track earthquakes and landslides, detect permafrost changes, monitor sea ice, measure the aurora, forecast wildfire behavior and North Slope weather, and more."

The article emphasizes the difficulty of acquiring sensors to use in remote locations and the cooperative partnerships required to make it happen. It specifies that one of the key benefits of the acquisitions and partnerships is the variety of instruments on each sensor, allowing for the expanded and still interconnected use of the data gathered. The variety of instrumentation opens up new areas of data applicability and opportunities for research.

Special Collection on Computational Approaches to Enable Smart and Sustainable Urban Systems

The American Society of Civil Engineers (ASCE) has published a special collection of papers originally written in 2018 and 2019 focused on the idea of "tackling challenges and developing new computational and data-driven methods for enabling smart and sustainable urban systems." The papers cover topics to include open space usage, interoperability of systems, urban data integration framework, etc.

ShakeOut 2020

Due to COVID-19, ShakeOut 2020 required and developed new outreach strategies. Further, and also due to the pandemic, outreach was hindered due to the increased work load and time constraints placed on those who coordinated the efforts. Because of these factors, the 2020 participation was down when compared to 2019 numbers.

In spite of the lower numbers, states and territories should be proud of what was accomplished under these difficult circumstances. Congratulations to ShakeOut , Southern California Earthquake Center (SCEC), and all partners for a successful campaign!

continued

Reminder—now is the time to start basic planning for ShakeOut 2021. Please let us know if there are ways you feel WSSPC can assist you in his process.

The Normal-Faulting 2020 Mw 5.8 Lone Pine, Eastern California, Earthquake Sequence

A new research article published in the Seismological Research Letters analyzes the "largest earthquake on the Owens Valley fault zone, eastern California, since the nineteenth century." Per the Abstract, determination is made that this event was not an aftershock of the Ridgecrest main shock.

Optimally Oriented Remote Triggering in the Coso Geothermal Region

From the "Plain Language Summary": "Using 13 years of earthquake data (2004–2016) from the EarthScope USArray Transportable Array and the Southern California Seismic Network, we search for remotely triggered earthquakes in an extended region encompassing the Coso Geothermal Field (CGF+), California. . . . We conclude that the fault geometry and local stress orientations in the CGF+ region are uniquely positioned to host remotely triggered earthquakes following large earthquakes originating from the West Pacific and South America."