2020 BASIN AND RANGE PROVINCE EARTHQUAKE WORKING GROUP MEETING SUMMARY

Wednesday, February 5, 2020
Utah Department of Natural Resources Building, Auditorium (1st Floor)
1594 West North Temple, Salt Lake City, Utah

WELCOME AND INTRODUCTION

The Basin and Range Province Earthquake Working Group (BRPEWG) aims to bridge the gap between Basin and Range Province (BRP) and Intermountain West (IMW) state geological survey earthquake research programs to address the need for effective communication and collaboration in applied earthquake-hazard research in the region. BRPEWG previously convened at the Utah Department of Natural Resources building in 2006, 2011, 2018, and 2019. The 2019 meeting of BRPEWG was not funded by the U.S. Geological Survey (USGS) External Grants Program, but the meeting was still held due to the need to build on a successful meeting in 2018. After welcoming Working Group members and guests, Emily Kleber (Utah Geological Survey [UGS]) summarized the BRPEWG's past activities and outlined the Working Group's purpose and goals for the future.

BRPEWG Purpose and Goals

- Establish and coordinate earthquake-hazard research agenda in the BRP, especially collaborative work across state lines.
- Provide a space and resource for Basin and Range states to determine and discuss technical issues related to fault behavior in the Basin and Range Province.
- Share best practices and reports of ongoing earthquake research at state geological surveys in the Basin and Range.
- Identify and prioritize BRP cross-border Quaternary faults and future paleoseismic investigations in order to attribute fault characteristics in Basin and Range state fault databases and the USGS *Quaternary Fault and Fold Database of the United States.*

TECHNICAL PRESENTATIONS AND DISCUSSIONS

- USGS Earthquake Geology Intermountain West (IMW) Update: Ryan Gold, U.S. Geological Survey Intermountain West
- State of Seismic Hazard Assessment, Arizona: Jeri J. Young, Arizona Geological Survey
- California Seismic Hazard Assessment and Zonation Program: Gordon Seitz, California Geological Survey
- Update and Issues Facing Earthquake Research in Colorado 2020: Jim McCalpin, GeoHaz Consulting
- Idaho Earthquakes and Seismic Hazard Activity: Zach Lifton, Idaho Geological Survey

- Montana Activities 2019: Mike Stickney, Montana Bureau of Mines and Geology
- Paleoseismic and Seismic Studies in New Mexico: Daniel Koning, New Mexico Bureau of Geology and Mineral Resources
- Earthquake Program at NBMG: Rich Koehler, Nevada Bureau of Mines and Geology
- Issues Facing Wyoming: Seth Wittke, Wyoming Geological Survey
- Basin and Range Province Earthquake Working Group—Utah Update: Emily Kleber, Utah Geological Survey
- Initial Paleoseismic Investigation of the Phillips Valley Fault, Teton County, Wyoming: Mark Zellman, BCG Engineering, Inc.

Ridgecrest Earthquake Response

The July 2019 Ridgecrest earthquake sequence occurred in the area of Ridgecrest, California, and the Searles Valley, northern Mojave Desert. Several members of the BRPEWG were part of the scientific response to the earthquake sequence, mobilizing to collect perishable geologic field data. Based on a survey sent out in December 2019, the BRPEWG was interested in learning more about the scientific response to the earthquake sequence and discussing implications for the Basin and Range Province. Gordon Seitz, Rich Koehler, and Ryan Gold led an hour-long discussion about the response. Other BRPEWG members who responded to the Ridgecrest earthquake sequence included Alex Hatem and Chris DuRoss.

The panel represented the state survey where the earthquake happened (Seitz), a responding state survey (Koehler), and the USGS (Gold). Seitz started by giving some scientific context for the earthquake sequence and the multi-method approach used in scientific response. He emphasized the importance of open access to data and strong communication to improve the characterization of surface fault rupture, which will inform future efforts in mitigation and zoning in California. Koehler then presented the work completed by his team from the Nevada Bureau of Mines and Geology (NBMG), ASU, CSU Fullerton, PG&E, and the Geotechnical Engineering Earthquake Response (GEER) to measure and characterize surface fault rupture outside of the Naval Air Weapons Station, China Lake. Koehler talked about experiencing the M 7.1 mainshock earthquake and the chaos immediately after the mainshock around Ridgecrest. He emphasized the importance of scientific response not interfering with emergency services. After the M 7.1 mainshock, Koehler's team went to several sites where they had previously observed road damage from the M 6.4 foreshock. Roads and infrastructure are important and perishable data post-earthquake, since road crews tend to repair quickly. Finally, Gold offered the USGS response perspective. The Ridgecrest sequence is unique since a majority of the surface fault rupture occurred on a Federal Naval base, which was most easily accessed by federal agencies, including the USGS. Some of the challenges Gold pointed out were then discussed with the group included field communication, coordinating teams, data collection standards, long and warm days in the summer heat, data ownership, and data access. Gold highlighted that the working relationship between the CGS and the USGS was strong before, during, and after the event.

U.S. Geological Survey Update and National Seismic Hazard Map Effort

Ryan Gold, Intermountain West (IMW) Coordinator for the USGS Earthquake Hazards Program, gave a summary of ongoing collaborations of earthquake geology investigations in IMW states. In 2023, the USGS plans to update the National Seismic Hazard Model (NSHM), which will require input from the

intermountain states. The IMW has 75% of all faults in the *USGS Quaternary Fault and Fold Database of the United States.* There is a huge importance to updating any pertinent geologic data and fault geometry information for IMW faults.

Alex Hatem, USGS Mendenhall Postdoctoral fellow at the USGS Earthquake Hazards Program presented more details about the effort to incorporate additional geologic data into the 2023 update of the NSHM. The importance of this update for the IMW is that there will be more geologic data incorporated into the 2023 model. Data like geologic slip rates, paleoearthquake timing, slip-per-event, and detailed fault geometries will improve the data used for IMW faults in the last model (2015). Hatem presented information about the timeline for data submissions and discussed some areas of improvement among Basin and Range states for the NSHM.

WORKING GROUP PRIORITIES DISCUSSION

After state update presentations and discussions about the Ridgecrest earthquake response, the BRPEWG discussed several items relevant to the current and future work of Basin and Range states. Overall, this group benefits from annual meetings to discuss science, share partnerships, and keep up to date with earthquake investigations in neighboring states. Additionally, the introduction of newer state survey representatives for earthquake geology programs are imperative to the transfer of knowledge in Basin and Range states.

On February 1–5, 2021, the Basin and Range Earthquake Summit (BRES), formally the Basin and Range Province Seismic Hazard Summit (BRPSHS) will convene at the Utah Department of Natural Resources building in Salt Lake City. The BRPEWG agreed to attend the conference and hold a lunch meeting to discuss BRPEWG priorities for 2022. Emily and Zack are currently exploring funding opportunities to include other state surveys

The group discussed the possibility of having the BRPEWG meeting in other locations in the future. While everyone seemed in agreement that this was a good idea, some limiting factors to holding the meeting elsewhere are locating a venue and having an easy and affordable city to travel to. The group loosely agreed to continue meeting in Salt Lake for the foreseeable future.

Cross-border faults in the Basin and Range Province that need improved mapping (not a complete list of all cross-border faults):

- MT-ID: Hope fault, Lewis and Clark shear zone, Centennial fault
- ID-WY: Grand Valley (Prater Mountain Section)
- NV-ID: O'Neil Basin fault zone, faults near Owyhee (unnamed)
- UT-WY: Hogsback faults, Porcupine Mountain faults, Crawford Mountains (west side) faults, Saletatus Creek fault
- UT-AZ: Bright Angel fault system
- UT-NV: Lime Mountain fault, Snake Valley faults
- UT-ID: Grouse Creek and Dove Creek Mountains faults, Raft River Mountains fault

WORKING GROUP PRODUCTS AND RELATED DATA

The final agenda, speaker presentations, and this summary document are available on the BRPEWG web page at https://geology.utah.gov/hazards/info/workshops/working-groups/basin-and-range-earthquakes/.

MEETING ATTENDANCE
Working Group Members (* Speaker)

Jeri Ben Horin*	Arizona Geological Survey
Steve Bowman	Utah Geological Survey
Chris DuRoss	U.S. Geological Survey, Earthquake Hazards Program
Ryan Gold*	U.S. Geological Survey, Earthquake Hazards Program, IMW Coordinator
Julia Howe	U.S. Bureau of Reclamation
Emily Kleber*	Utah Geological Survey (BRPEWG Chair)
Rich Koehler*	Nevada Bureau of Mines and Geology
Daniel Koning*	New Mexico Bureau of Mines and Geology
Zach Lifton*	Idaho Geological Survey
William Lund	Utah Geological Survey, Emeritus
James McCalpin*	GeoHaz Consulting (representing the Colorado Geological Survey)
Gordon Setiz*	California Geological Survey
Mike Stickney*	Montana Bureau of Mines and Geology
Seth Wittke*	Wyoming Geological Survey

Guests

Camille Collette	U.S. Geological Survey, Earthquake Hazards Program
Gordon Douglass	Utah Geological Survey
Rich Giraud	Utah Geological Survey
Alex Hatem*	U.S. Geological Survey, Earthquake Hazards Program
Michael Hylland	Utah Geological Survey
Bill Keach	Utah Geological Survey
James Mauch	Wyoming Geological Survey
Greg McDonald	Utah Geological Survey
Adam McKean	Utah Geological Survey
Matthew Morriss	Utah Geological Survey
Jim Pechmann	University of Utah Seismograph Stations
Grant Willis	Utah Geological Survey
Mark Zellman*	BCG Engineering, Inc.