



2018 UTAH EARTHQUAKE WORKING GROUPS

UTAH EARTHQUAKE RESEARCH PRIORITIES FOR 2019

Utah Department of Natural Resources Building
1594 West North Temple, Salt Lake City, Utah

The 2018 Utah Earthquake Working Groups, hosted by the Utah Geological Survey (UGS), defined priorities for earthquake-related research in Utah in 2019. The priorities will be incorporated into the upcoming U.S. Geological Survey Earthquake Hazards Program, External Research Support, Request for Proposals (<http://earthquake.usgs.gov/research/external/>) for the Intermountain West.

QUATERNARY FAULTS

The Utah Quaternary Fault Parameters Working Group (UQFPWG) identified the following highest priority faults for additional investigation in 2019 (not in priority order):

- Acquire new paleoseismic information to address data gaps for (a) the five central segments of the Wasatch fault zone (WFZ; including focusing on the youngest earthquakes [3-5 ka]; large, early Holocene–latest Pleistocene scarps; and West Valley fault zone secondary faulting), (b) the WFZ end segments, (c) the Oquirrh fault zone, (d) refining the latest Quaternary earthquake chronology for the Topliff Hills fault, and (e) the East and West Cache fault zones. Examples of paleoseismic data to be acquired include surface rupture extent, earthquake timing, displacement, and fault geometry.
- Acquire earthquake timing information for the Great Salt Lake and Utah Lake fault zones to investigate the relation of earthquakes on that fault system to large earthquakes on the adjacent segments of the Wasatch fault zone (coseismic or independent rupture, fault pairs?).
- Acquire high-resolution aerial imagery (lidar, Structure from Motion, etc.), and use existing and recently acquired data to map high-risk (chiefly urban) Utah hazardous faults (including the East and West Bear Lake, Great Salt Lake, Hansel Valley, Hurricane, and Oquirrh fault zones) and identify new paleoseismic trench sites.
- Acquire and analyze information on salt tectonics and its relation to the Main Canyon fault, Sevier detachment/Drum Mountains fault zone, Bear River fault zone, Spanish Valley (Moab area) faults, Joes Valley fault zone, Levan and Fayette segments of the Wasatch fault zone, Scipio Valley faults, and the Gunnison fault.

and the following other priority faults for investigation in 2019 (not in priority order):

- Paragonah fault
- Enoch graben
- Clarkston fault, West Cache fault zone
- Gunnison fault

- Scipio Valley faults
- Faults beneath Bear Lake
- Eastern Bear Lake fault zone
- Carrington fault, Great Salt Lake fault zone
- Rozelle section, Great Salt Lake fault zone

Additional information about the UQFPWG is available at <https://geology.utah.gov/hazards/earthquakes-faults/utah-earthquake-working-groups/quaternaly-fault-parameters/>.

LIQUEFACTION

The Utah Liquefaction Advisory Group (ULAG) identified the following priorities for investigation in 2019:

- Additional Cone Penetration Testing (CPT) and Dynamic Cone Penetration Testing (DPT) in downtown Salt Lake City. Locations of testing would be tied to Dr. Lee Liberty's seismic profiling work to constrain physical properties of fault-offset layers and identify previously liquefied and potentially liquefiable layers. Testing along North Temple was also recommended.
- Assess paleo-liquefaction susceptibility in urban areas. Identify potential investigation sites for trenching, sampling, and description to more fully understand the surface and subsurface extent of liquefaction and lateral spread hazards.

Additional information about the ULAG is available at <https://geology.utah.gov/hazards/earthquakes-faults/utah-earthquake-working-groups/liquefaction-advisory-group/>.

EARTHQUAKE GROUND SHAKING

The Utah Ground Shaking Working Group (UGSWG) identified the following priorities for investigation in 2019:

- Collect and compile existing shear-wave velocity (V_s) data for the Wasatch Front region since 2008 when the database was last updated.
- Update the Wasatch Front Community Velocity Model (CVM) with V_s data collected since 2008. The CVM is needed for future ground-motion modeling.
- Update the Salt Lake City segment of the Wasatch fault zone source model extent and location to incorporate the result of recent geophysical investigations.
- Collect additional geophysical data to characterize V_s and potential intra-valley faults for basins adjacent to the Salt Lake basin.

- Expand and improve the CVM shallow or deep Vs in basins outside the Salt Lake basin along the central Wasatch Front to help characterize shallow site response and/or basin effects on ground motions. The heavily populated Weber-Davis and Utah basins are the highest priority.
- Perform ground motion modeling of earthquake scenarios along major faults, such as the Wasatch, Great Salt Lake, and Oquirrh fault zones, to characterize ground shaking along the Wasatch Front. Example investigations may include modeling of coseismic rupture of the Salt Lake City segment of the Wasatch fault zone and West Valley fault zone to characterize ground shaking in the urban center of Salt Lake basin. Modeling should aim to characterize rupture effects such as directionality, basin effects, and shallow site response, including non-linear soil behavior to the extent possible.

Additional information about the UGSWG is available at <https://geology.utah.gov/hazards/earthquakes-faults/utah-earthquake-working-groups/ground-shaking-working-group/>.

BASIN AND RANGE PROVINCE EARTHQUAKE WORKING GROUP

The Basin and Range Province Earthquake Working Group (BRPEWG) identified the following priorities for future meetings and geologic investigation in 2019:

- Meet in February with the Utah Earthquake Working Groups, but possibly have a spring or fall field trip to fault scarps and/or active paleoseismic trenching. A poster session was also recommended during the next meeting.
- Possibly use a list-serve email to improve communication between the states.
- Seismic source models in the USGS National Seismic Hazard Maps need improvement and updating; the year 2020 is the next scheduled update.
- Work collaboratively on state cross-border fault issues as funding and resources are available.
- Technical training in paleoseismic trenching and analysis is needed by many of the states and could be incorporated into the spring or fall field trip. A short course could be offered in the future, along with field time in active trenches.

Additional information about the BRPEWG is available at <https://geology.utah.gov/hazards/earthquakes-faults/utah-earthquake-working-groups/basin-and-range-province-earthquake-working-group/>.