

A circular path of geologic adventures  
through  
consulting, state service, and academia



Rich D. Koehler, Ph.D., P.G  
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# Education and Professional Experience

University of California, Santa Cruz: *B.A.*, Earth Science, 1992

- Gary Griggs Consulting, 1991-1992
- USDA Forest Service, Cave Exploration Team, Prince of Wales and Dall Islands, Alaska, 1993

Humboldt State University, Humboldt, CA: *M.S.*, Environmental Systems (Geology), 1997

- US Geological Survey, paleoseismology field assistant, Puget Sound, Wa, 1998-2003
- Natural Resources Management Corporation, Eureka, CA, Staff Geologist, 1998-1999
- Louisiana-Pacific Corporation, Calpella, CA, Watershed Geomorphologist, 1997
- Research Assistant, Cascadia tsunami studies 1994-1997

William Lettis & Associates, Inc. (WLA), Walnut Creek, CA, Staff-Project Geologist, 1999-2004



# Education and Professional Experience

University of Nevada Reno, NV, Center for Neotectonic Studies Ph.D. 2004- 2009

State of Alaska, Dept. of Geological and Geophysical Surveys, Earthquake  
Geologist 2009-2015

University of Nevada, Reno, Nevada Bureau of Mines and Geology, Mackay School of  
Earth Sciences and Engineering, Assistant Professor, 2015-present



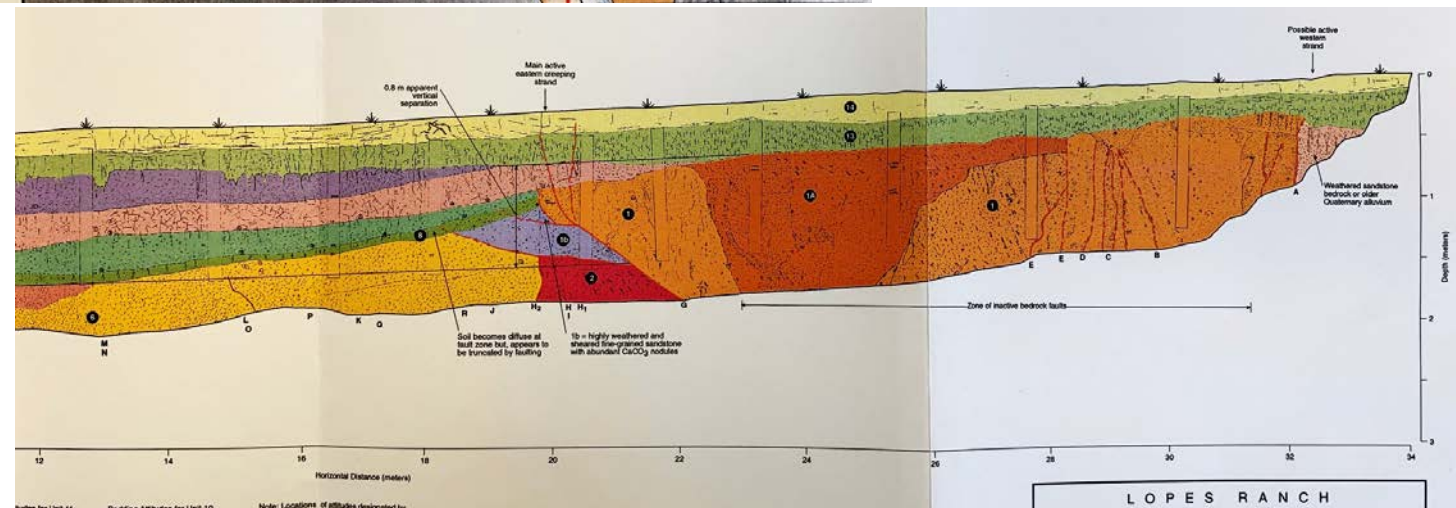
# Consulting: Working at WLA





# Green Valley fault

- Field geology: mapping, drilling, logistics
- Office analysis: cross sections, literature reviews
- Proposal and report writing
- Presentations to clients and peers
- Marketing
- Project/budget management





# Consulting: Working at WLA



San Andreas fault



Calaveras fault



Hayward fault





## Consulting: Working at WLA



Geotechnical investigation of Ralston Penstock American River, CA  
Rock fall hazards, slope stability





American Canyon  
Vallejo, California



Landslide Investigations  
and construction monitoring





## Landslide removal monitoring







Baku-Tilibishi pipeline project,  
Turkey, 2004



Consulting: Working at WLA



Chi Chi earthquake, Taiwan,  
1999





# Alaska Division of Geological & Geophysical Surveys

## Hazards Geologist, Engineering Geology Division.



- Hazards studies for infrastructure projects
- Tsunami inundation
- Quaternary fault database
- Quaternary mapping
- Collaborative work with USGS
- Technical review of PSHA
  - Susitna dam
  - Pebble Mine
  - Oil and gas pipelines



# Alaska Division of Geological & Geophysical Surveys Hazards Geologist, Engineering Geology Division.

## Infrastructure corridor Reports and maps

### ASSESSMENT OF GEOMORPHOLOGY AND GEOLOGIC HAZARDS IN THE PARKS HIGHWAY-MINTO FLATS-DALTON HIGHWAY INFRASTRUCTURE CORRIDOR: COOK INLET TO PRUDHOE BAY, ALASKA

Rich D. Koehler, Richard D. Reger, Eleanor R. Spangler, and Trent D. Hubbard

Report of Investigation 2019-8



### Report of Investigations 2015-4 INVESTIGATION OF POTENTIALLY ACTIVE TECTONIC FAULTS ALONG THE ROUTE OF THE PROPOSED ALASKA STAND ALONE PIPELINE, LIVENGOOD TO COOK INLET, ALASKA

Rich D. Koehler, Richard D. Reger, Eleanor R. Spangler, and Alexander I. Gould



Aerial photograph of Panorama Mountain and the Nenana River, looking south along the proposed ASAP pipeline route.  
Photo by Rich Koehler.

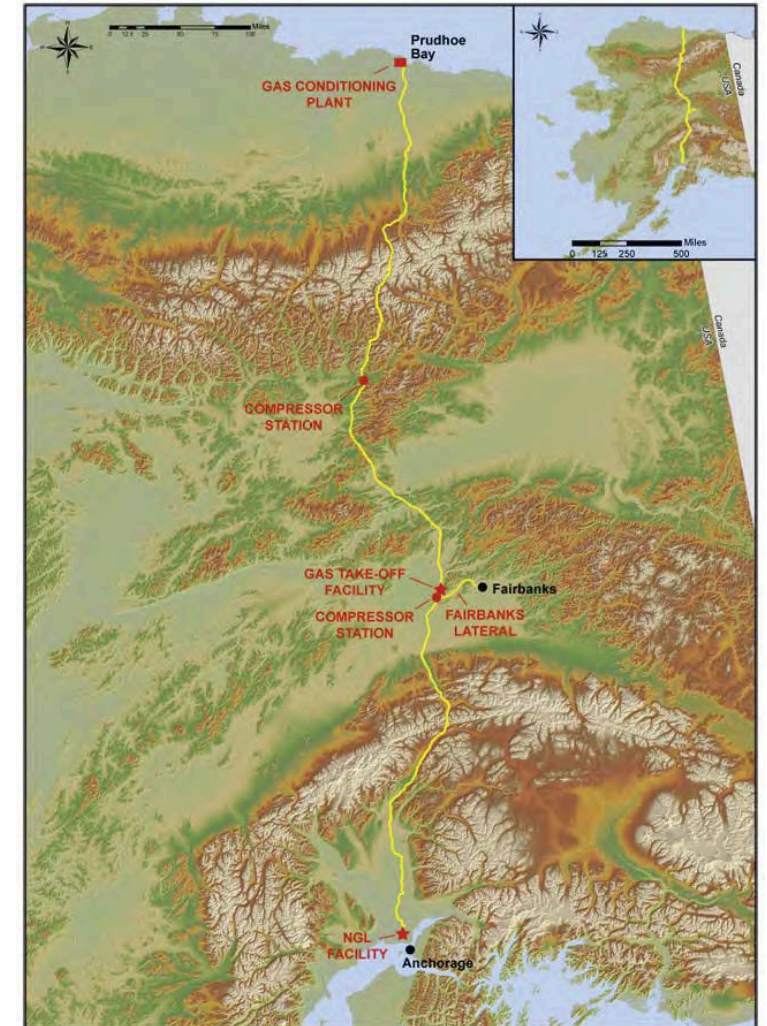
April 2015

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DEPARTMENT OF NATURAL RESOURCES  
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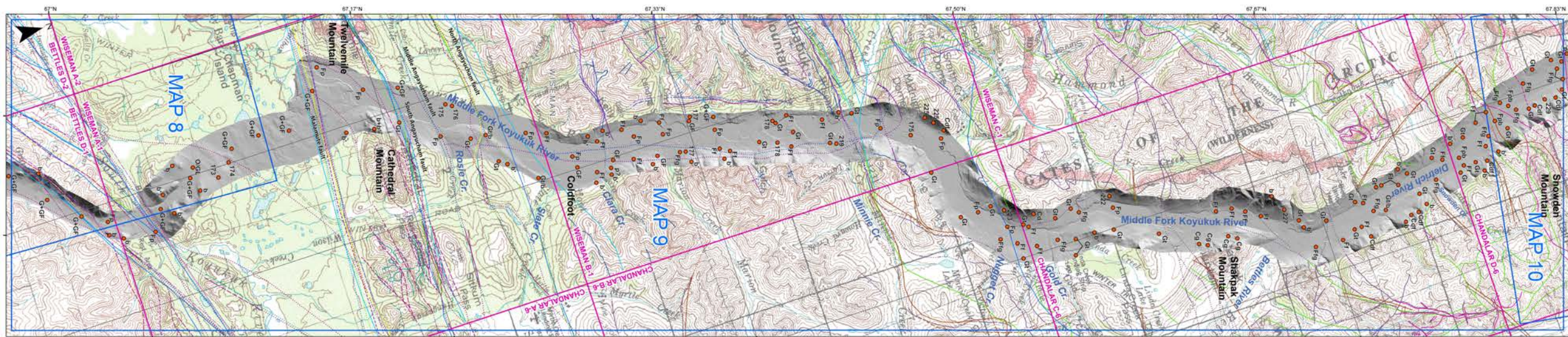
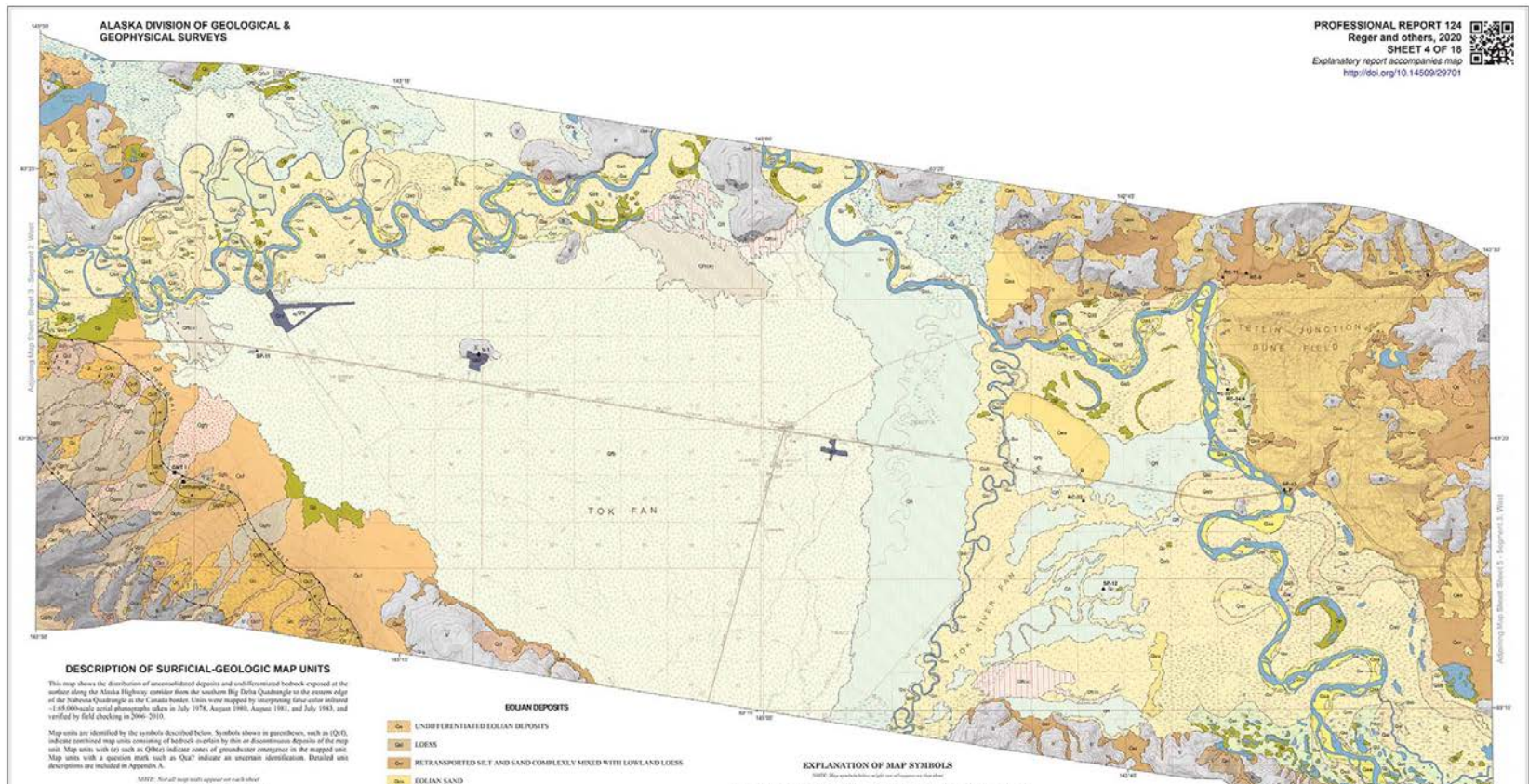


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2019





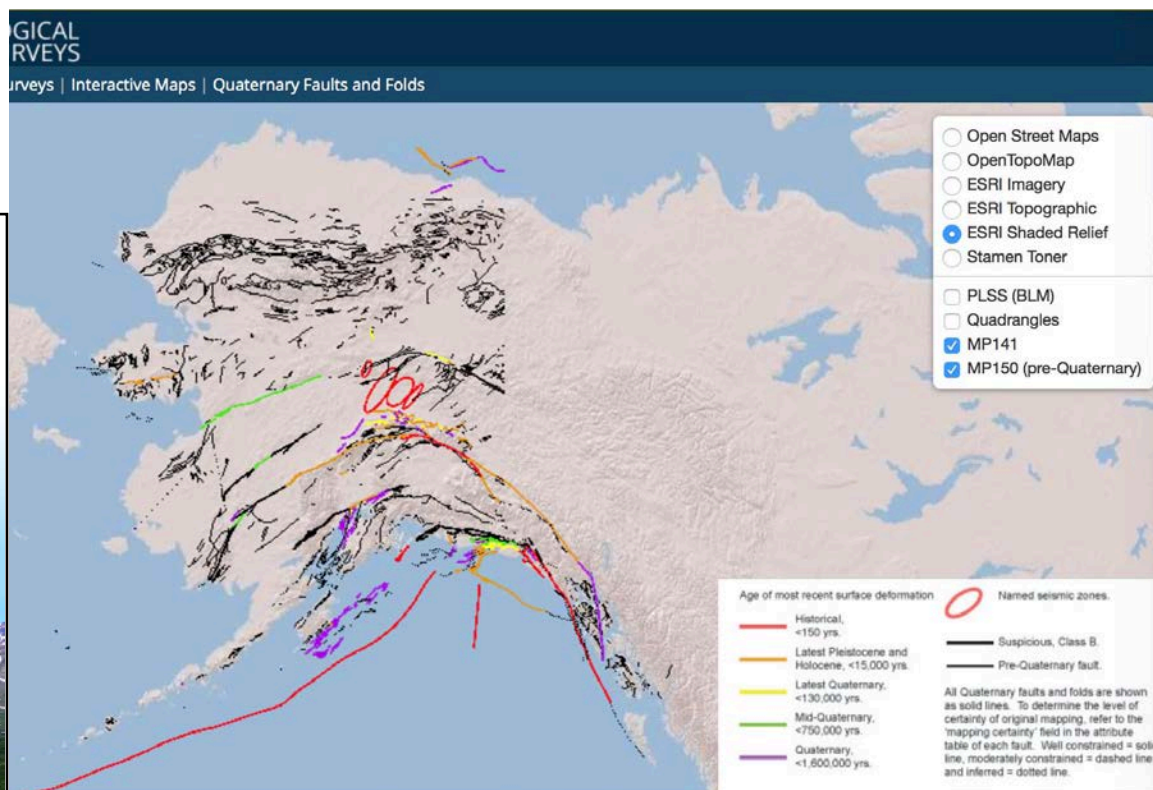
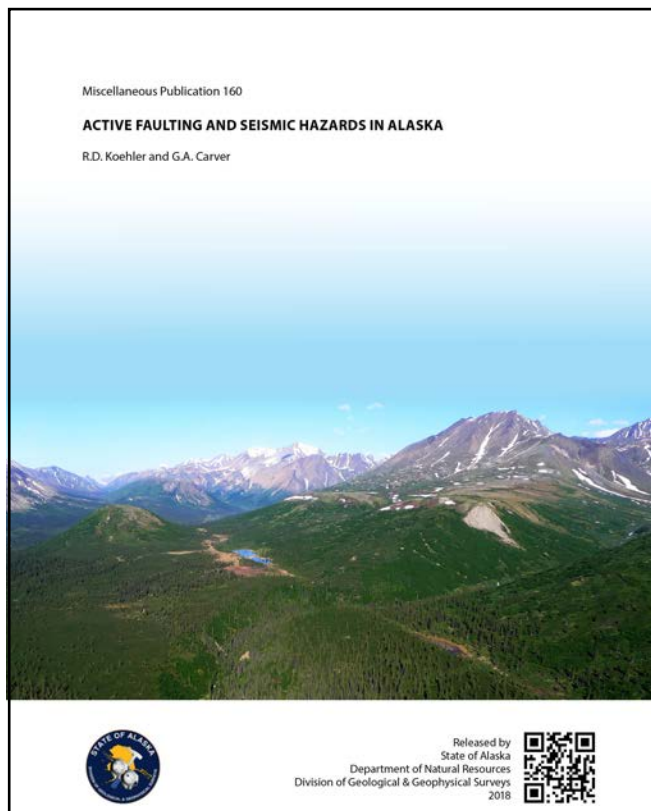
- Quaternary geologic maps
- Geologic hazard point observations



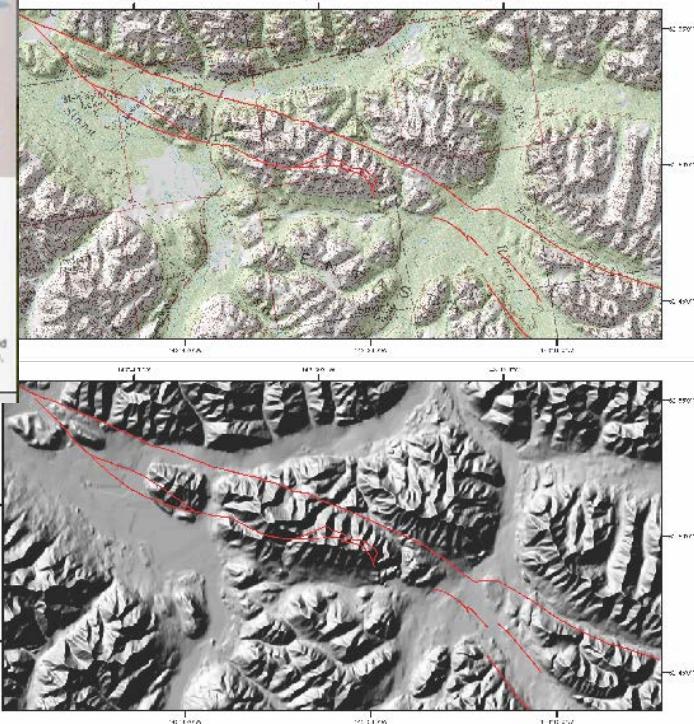




# Alaska Division of Geological & Geophysical Surveys Hazards Geologist, Engineering Geology Division.



Quaternary fault and fold database













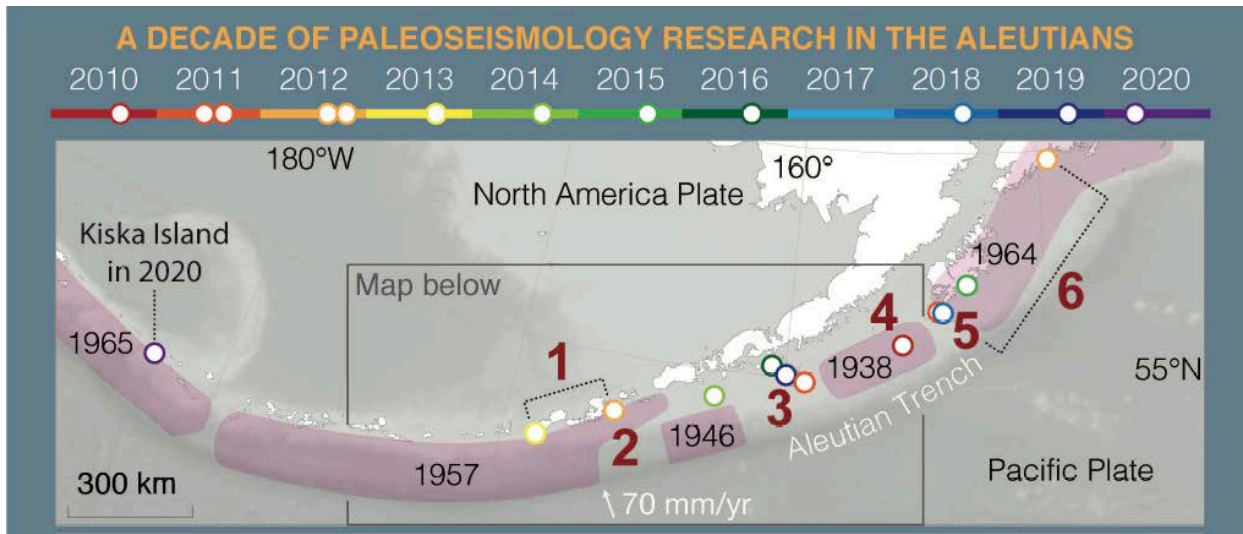


Fig credit: Rob Witter



## Ongoing tsunami research Aleutian Islands







# University of Nevada, Reno



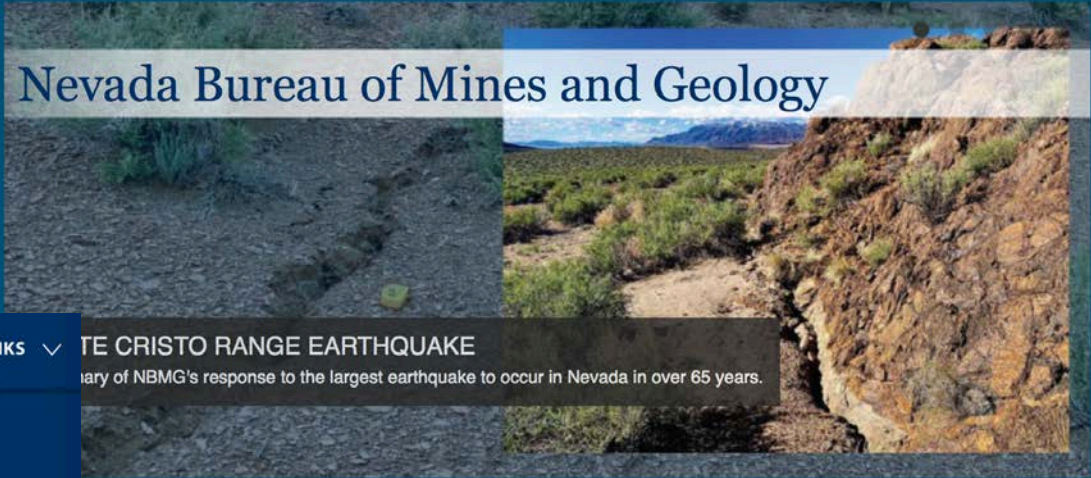
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## Nevada Bureau of Mines and Geology



**TE CRISTO RANGE EARTHQUAKE**  
Library of NBMG's response to the largest earthquake to occur in Nevada in over 65 years.



University of Nevada, Reno

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**TE CRISTO RANGE EARTHQUAKE**

Library of NBMG's response to the largest earthquake to occur in Nevada in over 65 years.

## Department of Geological Sciences and Engineering

College of Science - The Mackay School of Earth Sciences and Engineering

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**her notice:** As part of the University of Nevada's effort to prevent the spread of the Coronavirus (COVID-19), Gov. Sisolak's "Stay at Home" order, our Nevada Bureau of Mines and Geology [Publication Sales and Basins Science Sample and Records Library \(GBSSRL\)](#) at 2175 Raggio Parkway in Reno will be **closed to walk-in** geological Society of Nevada Office in our building will also be closed. NBMG offices on the main UNR campus are [regarding NBMG services and access to GBSSRL](#).

## Academic expertise. Research prowess. Student success.

There's a whole world of discovery in the ground beneath your feet. From the shifting of tectonic plates to the eruption of volcanoes, learn about the Earth and all of the natural processes that have shaped it over time.

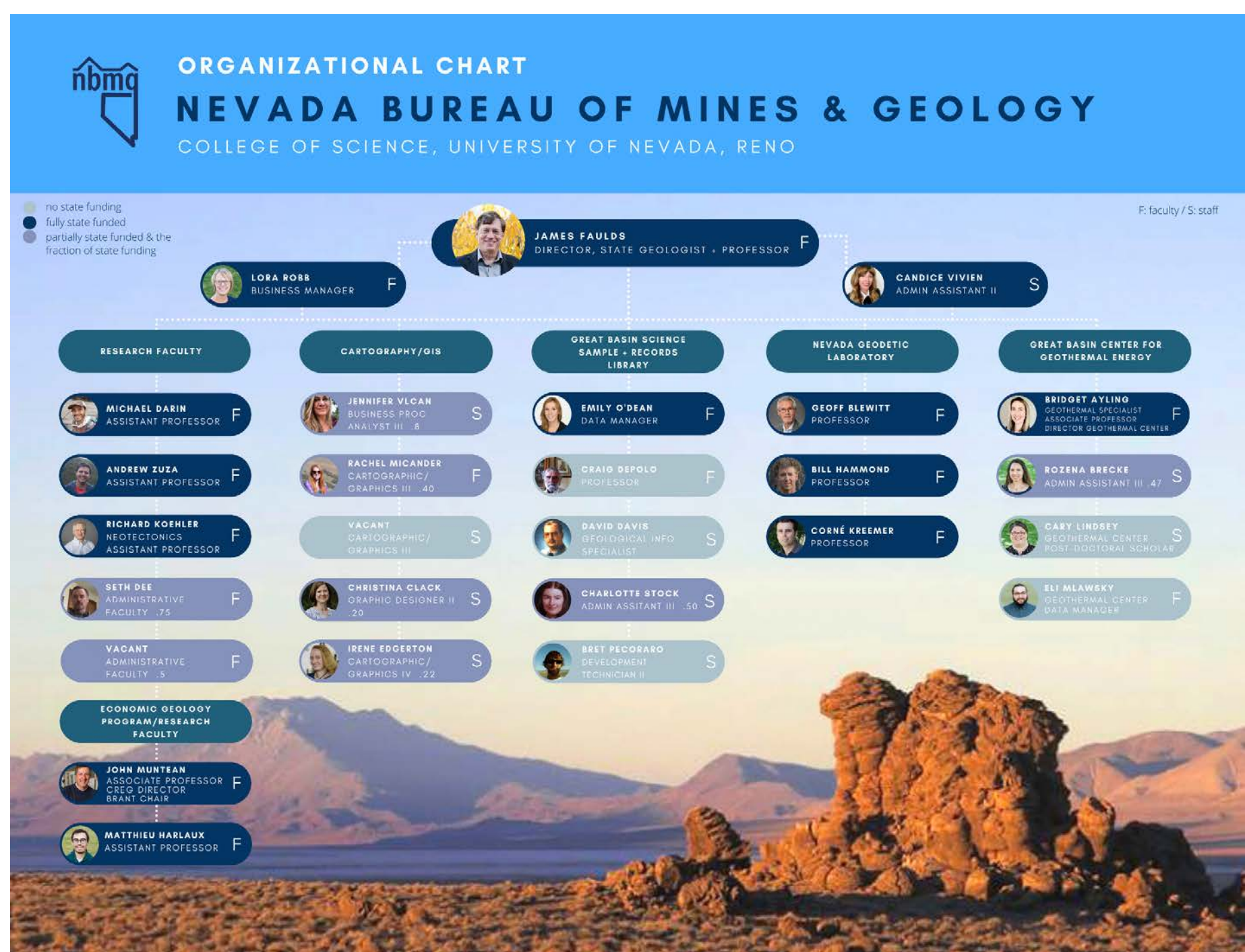
## Nevada Bureau of Mines and Geology

- Teaching
- Research
- Public service
- StateMap



## NBMG Applied Research Programs

- **Geologic Framework Studies – Geologic mapping program**
- **Geologic Hazards Program**
- **Economic geology – CREG**
- **Geothermal energy – GBCGE**
- **Nevada Geodetic Laboratory**
- **Basic and applied research at multiple scales**
- **Cartographic/GIS group**
- **GBSSRL**
- **Data sharing and management**
- **Teaching activities**
- **Advisement duties to State agencies.**





# Natural Hazards Program

```
graph LR; A[Natural Hazards Program] --> B[Situational response and rapid recon for major events  
FEMA, WSSPC, Clearinghouses]; A --> C[Geologic/Quaternary mapping  
StateMAP]; A --> D[Teaching Field methods/camp  
DGSE]; A --> E[Research  
Earthquake studies  
NEHRP]; A --> F[Interaction with local engineering Geology firms]; A --> G[Quaternary Geology & Geohazards Laboratory  
Equipment and student facilities];
```

Situational response and rapid recon  
for major events  
FEMA, WSSPC, Clearinghouses

Geologic/Quaternary mapping  
StateMAP

Teaching Field  
methods/camp  
DGSE

Research  
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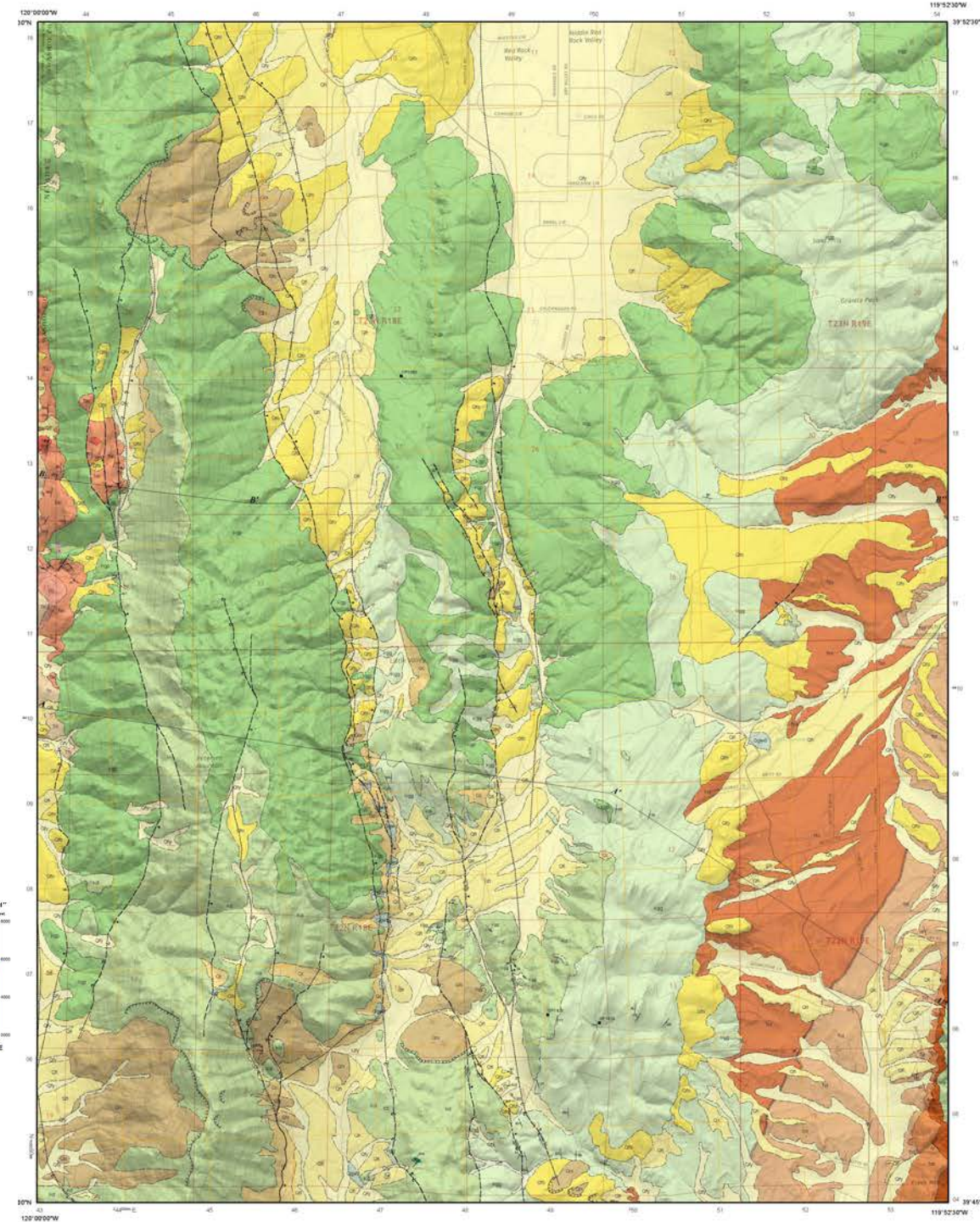
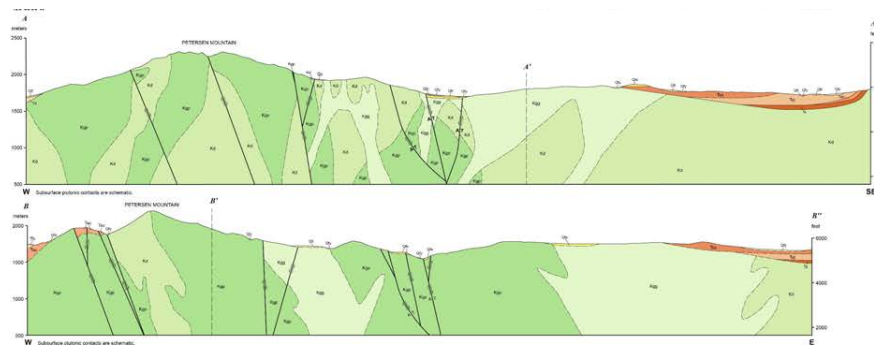
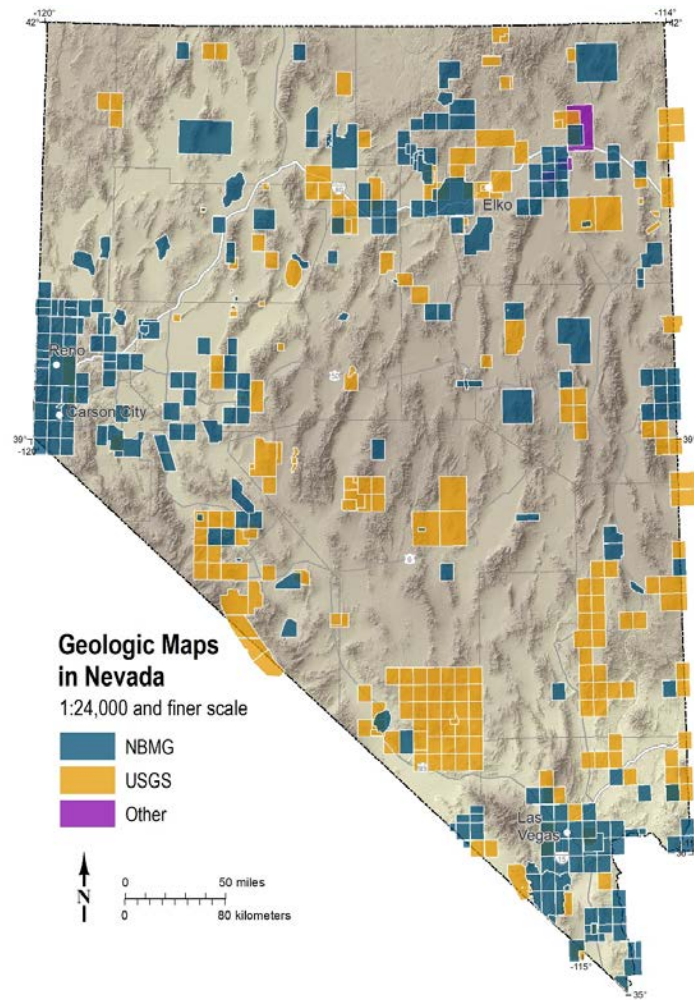
Interaction with local  
engineering Geology firms

Quaternary Geology &  
Geohazards Laboratory  
Equipment and student  
facilities

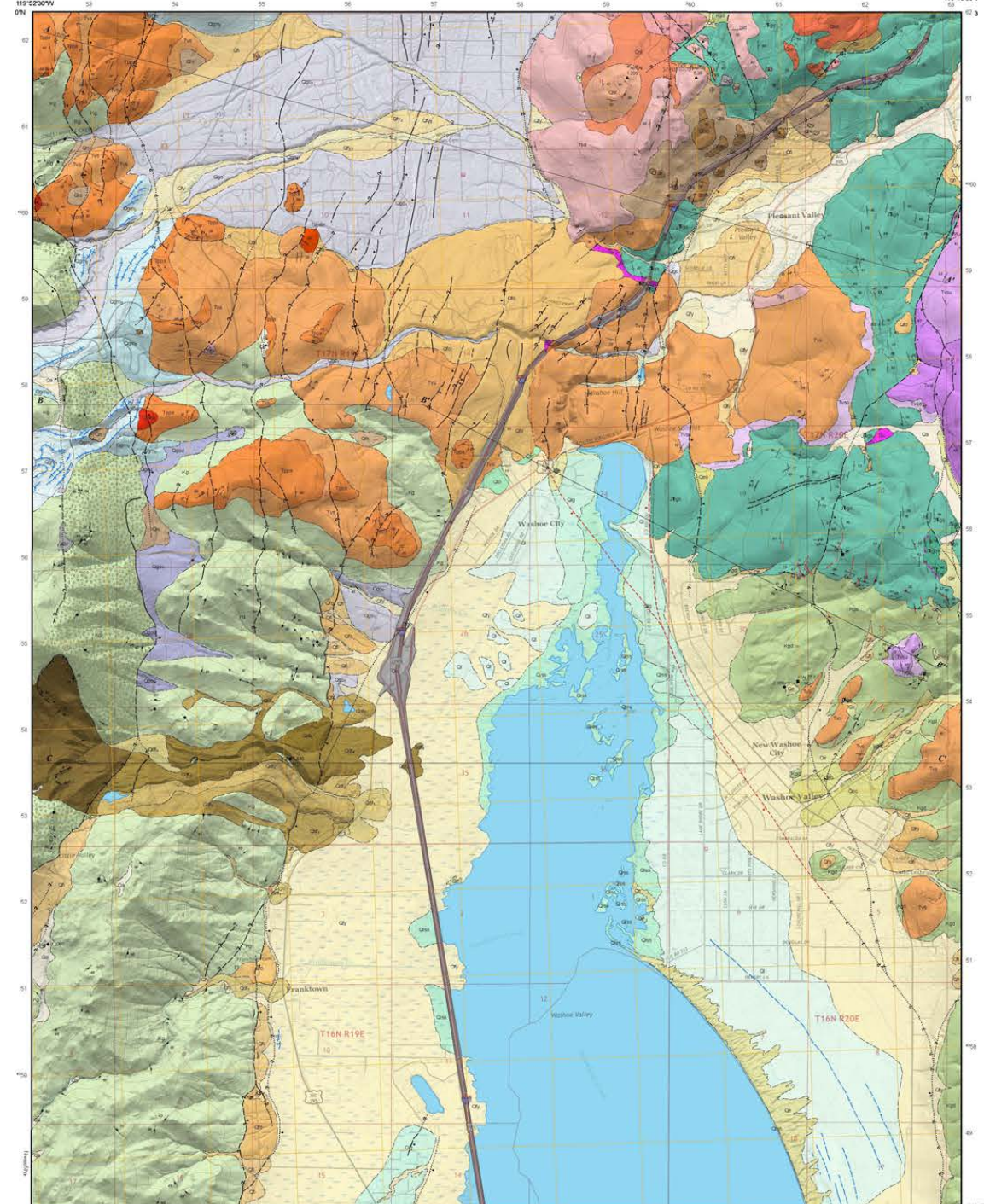
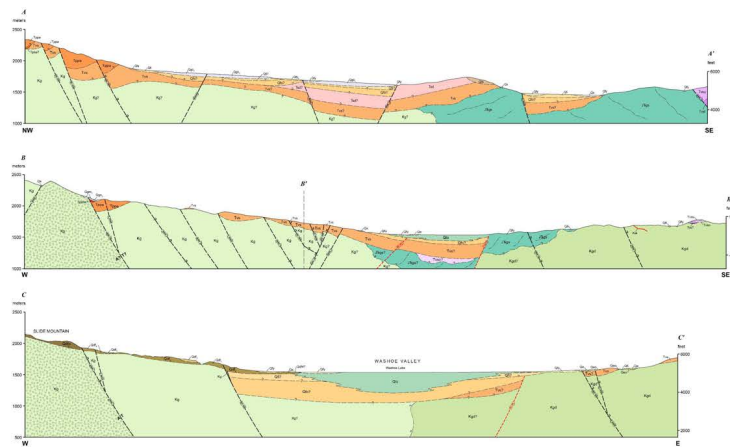


# GEOLOGIC MAP OF THE GRANITE PEAK QUADRANGLE, WASHOE COUNTY, NEVADA

Seth Dee  
Nevada Bureau of Mines and Geology,  
University of Nevada, Reno  
2019







# GEOLOGIC MAP OF THE WASHOE CITY QUADRANGLE, WASHOE COUNTY, NEVADA

Chad W. Carlson, Richard D. Koehler, and Christopher D. Henry  
Nevada Bureau of Mines and Geology, University of Nevada, Reno  
2019

**QUATERNARY DEPOSITS**

- Q<sub>1</sub> Disturbed areas and fill (late Holocene)
- Q<sub>2</sub> Active alluvium (Holocene)
- Q<sub>3</sub> Colluvium (Holocene to Pleistocene?)
- Q<sub>4</sub> Eolian deposits (Holocene)
- Q<sub>5</sub> Eolian deposits, older (late Pleistocene)
- Q<sub>6</sub> Sinter deposits (Holocene?)
- Q<sub>7</sub> Young alluvial-fan deposits (late Holocene)
- Q<sub>8</sub> Young alluvial-fan deposits (early Holocene)
- Q<sub>9</sub> Intermediate-aged alluvial-fan deposits (late Pleistocene)
- Q<sub>10</sub> Older alluvial-fan deposits (middle Pleistocene?)
- Q<sub>11</sub> Landslide deposits, undivided (Holocene to Pleistocene?)
- Q<sub>12</sub> Landslide blocks, undivided (Holocene to Pleistocene?)
- Q<sub>13</sub> Lacustrine deposits, silt and sand (late Pleistocene)
- Q<sub>14</sub> Lacustrine deposits, sand (late Pleistocene)
- Q<sub>15</sub> Lacustrine deposits, gravel (late Pleistocene)
- Q<sub>16</sub> Lacustrine deposits, older (late Pleistocene)
- Q<sub>17</sub> Lacustrine deposits, undivided (late Pleistocene) (in cross section only)
- Q<sub>18</sub> Debris-flow deposits (historical)
- Q<sub>19</sub> Debris-flow deposits (Holocene)
- Q<sub>20</sub> Debris-flow deposits (late Pleistocene)
- Q<sub>21</sub> Debris-flow deposits (late Pleistocene)
- Q<sub>22</sub> Debris-flow deposits (middle Pleistocene?)
- Q<sub>23</sub> Debris-flow deposits, undivided (Holocene to middle Pleistocene?)
- Q<sub>24</sub> Glacial moraine deposits (late Pleistocene)
- Q<sub>25</sub> Glacial moraine deposits (late to middle Pleistocene)
- Q<sub>26</sub> Glacial moraine deposits (middle Pleistocene)
- Q<sub>27</sub> Glacial outwash deposits (late Pleistocene)
- Q<sub>28</sub> Glacial outwash deposits (late to middle Pleistocene)
- Q<sub>29</sub> Glacial outwash deposits, undivided (late to middle Pleistocene)

**QUATERNARY ROCKS**

- Q<sub>30</sub> Rhyolite of Steamboat Hills (late Pleistocene)
- Q<sub>31</sub> Tuff of Steamboat Hills (late Pleistocene)
- Q<sub>32</sub> Basaltic andesite of Steamboat Hills (early Pleistocene)

**TERTIARY ROCKS**

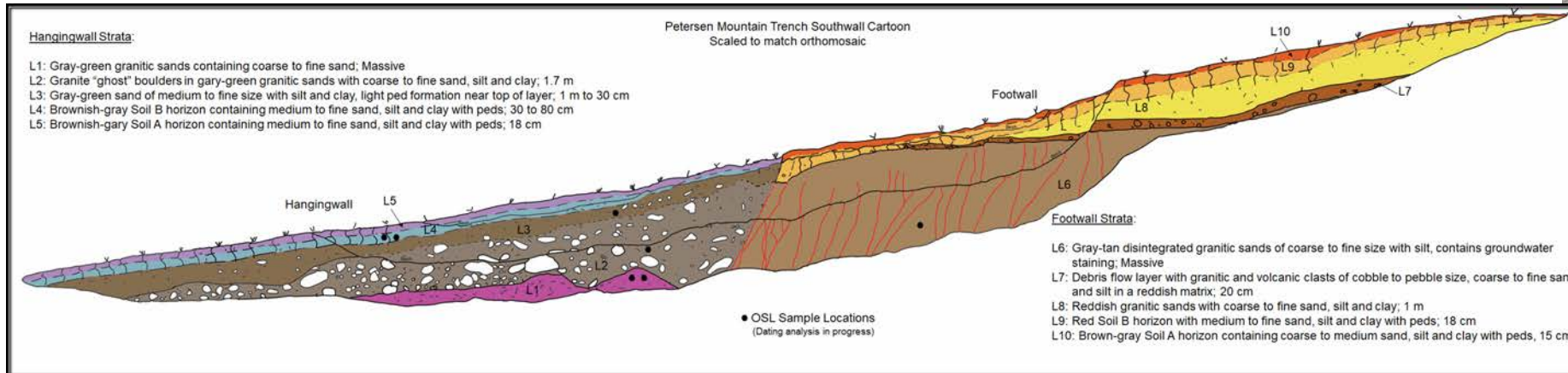
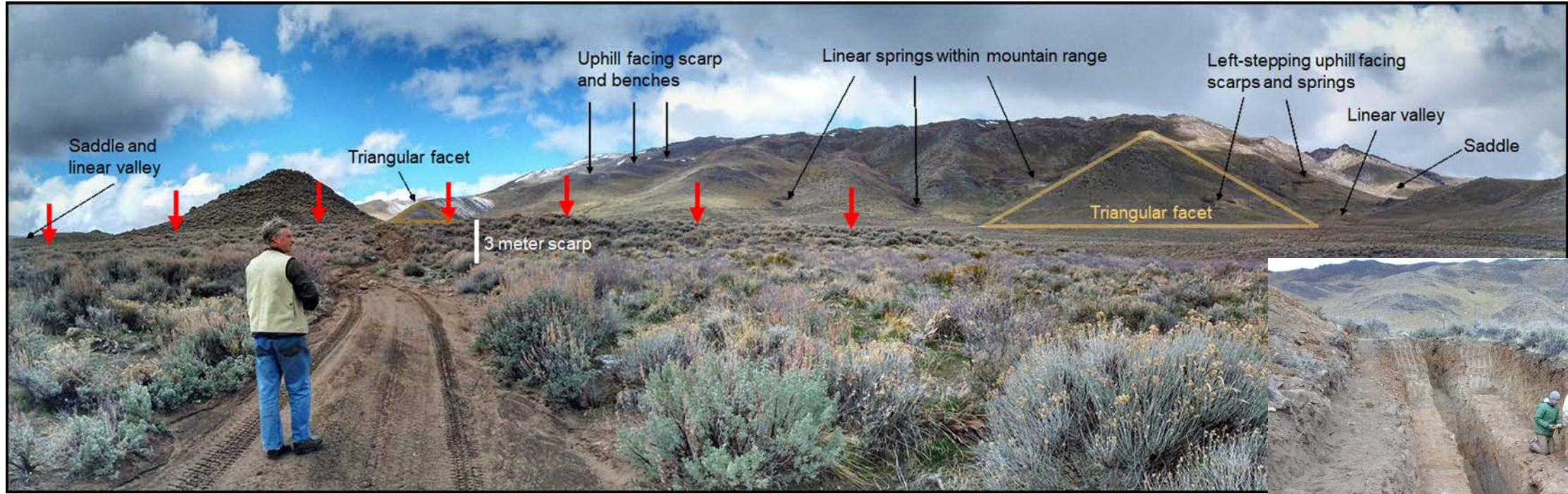
- T<sub>1</sub> Pyroxene-plagioclase porphyritic basaltic andesite (Miocene)
- T<sub>2</sub> Plagioclase-pyroxene porphyritic andesite (Miocene)
- T<sub>3</sub> Dacite of Steamboat Hills (Miocene)
- T<sub>4</sub> Andesite of Steamboat Hills (Miocene)
- T<sub>5</sub> Volcaniclastic sedimentary rocks (Miocene)
- T<sub>6</sub> Plagioclase-hornblende-pyroxene porphyritic andesite breccia (Miocene)
- T<sub>7</sub> Sparsely porphyritic basaltic andesite (Miocene)
- T<sub>8</sub> Platy plagioclase porphyritic basaltic andesite (Miocene)
- T<sub>9</sub> Virginia City magmatic suite, Steamboat Valley sequence
- T<sub>10</sub> Volcaniclastic sedimentary rocks of Steamboat Valley (Miocene)
- T<sub>11</sub> Lavas of Steamboat Valley, upper (Miocene)
- T<sub>12</sub> Lavas of Steamboat Valley, lower (Miocene)
- T<sub>13</sub> Volcaniclastic sedimentary rocks, older (Miocene)
- T<sub>14</sub> Andesite and dacite intrusions, undivided (Miocene)
- Oligocene ash-flow tuffs
- T<sub>15</sub> Tuff of Chimney Springs (Oligocene)
- T<sub>16</sub> New Hill Tuff (Oligocene)

**MESOZOIC ROCKS**

- M<sub>1</sub> Quartz veins (Cretaceous)
- M<sub>2</sub> Apatite-pegmatite dikes (Cretaceous)
- M<sub>3</sub> Granite (Cretaceous)
- M<sub>4</sub> Biotite-hornblende granodiorite of Steamboat Valley (Cretaceous)
- M<sub>5</sub> Metasedimentary rocks, Gardnerville Formation (Jurassic to Triassic)
- M<sub>6</sub> Gardnerville Formation, metasedimentary and metavolcanic rock (Jurassic to Triassic)

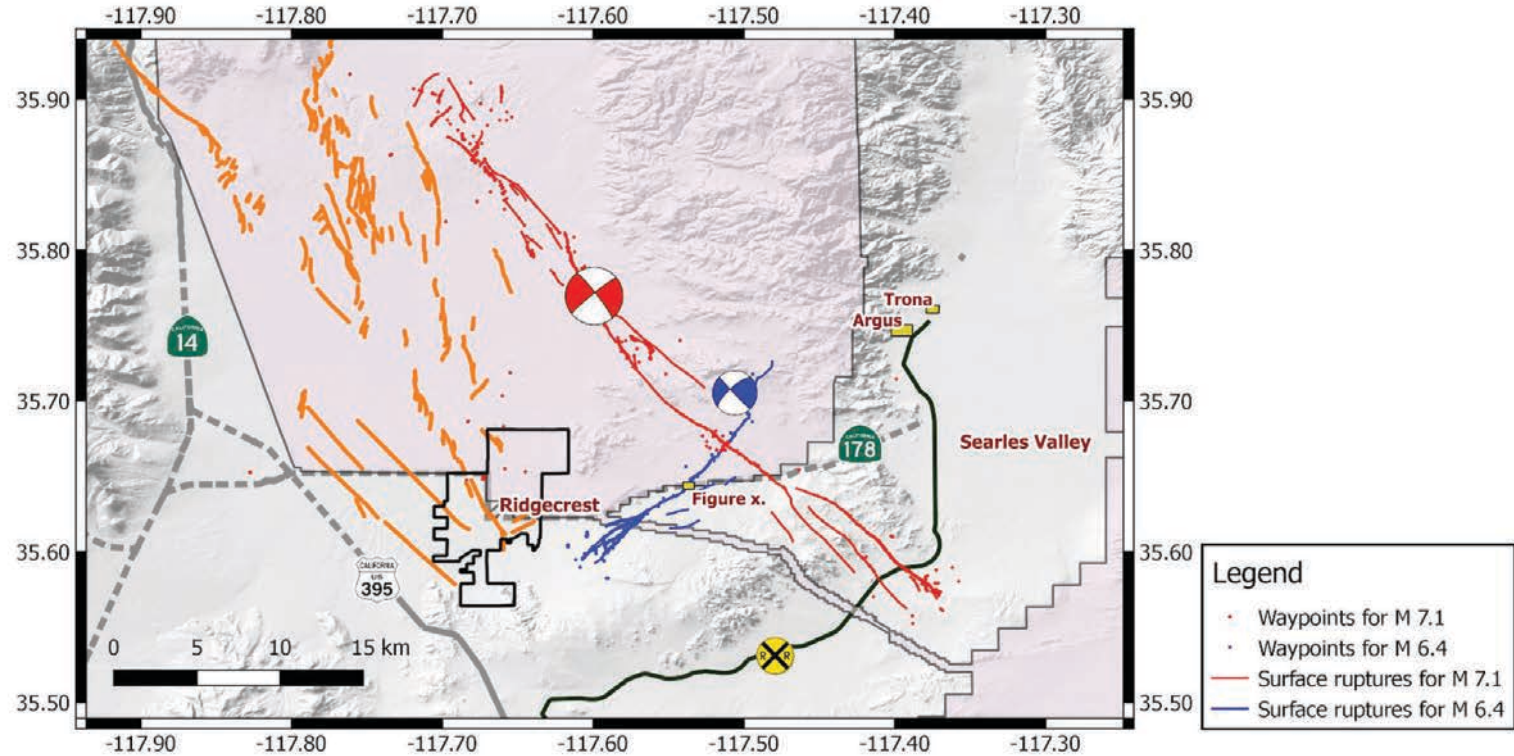


# Petersen Mountain fault





## Earthquake Response: July 4 and 5, 2019 Ridgecrest earthquake sequence



NBMG team collaborated with USGS, CGS, and others to evaluate slip distribution, kinematics, and behavior of the fault zone.



# NBMG Outreach

Nevada Bureau of Mines and Geology | University of Nevada, Reno

## Mineral Resources and Economic Geology in Nevada



### GOLD

Nevada produces more gold than any other state. Nevada consistently ranks in the top 5 gold producers worldwide.



### LITHIUM

Nevada produces large amounts of many other minerals, including copper, silver, and lithium. Lithium is critical for the rapidly growing electrical automotive and energy storage industries. Nevada hosts the only operating lithium mine in the country.




NBMG geoscientists continue to be instrumental in understanding the processes that control the formation and location of mineral resources such as gold and lithium.

To learn more, visit  
[www.nbmj.unr.edu](http://www.nbmj.unr.edu)  
State Geological Survey of Nevada




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## Geothermal Energy in Nevada



Blue Mountain geothermal plant, Humboldt County, NV




Natural steam vent, which are common in some geothermal systems.



Don A. Campbell geothermal plant, Mineral County, NV


### RESOURCES

Nevada has more geothermal resources than any other state, and is currently 2nd in the nation in production of geothermal energy.



### ELECTRICITY

Nevada currently has ~720 MWe of installed electricity generation capacity, but all studies indicate vast untapped geothermal potential in the region. One MWe provides enough electricity for ~700–1,000 homes.



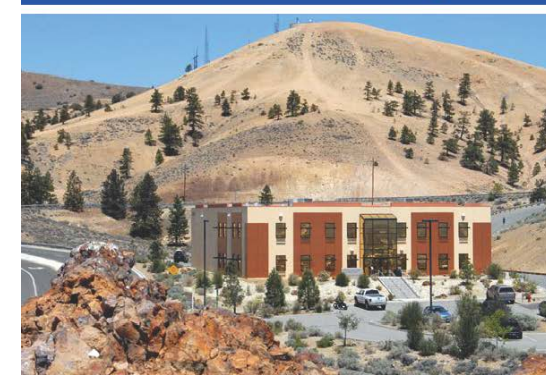
NBMG geoscientists continue to develop new methodologies for geothermal exploration that reduce risks in geothermal drilling and facilitate development of new geothermal power plants.

To learn more, visit  
[www.nbmj.unr.edu](http://www.nbmj.unr.edu)  
State Geological Survey of Nevada




Nevada Bureau of Mines and Geology | University of Nevada, Reno

## Great Basin Science Sample and Records Library




### GEOLOGIC REPOSITORY

Hundreds of millions of dollars of Nevada geologic information preserved at the GBSSL for public access, both physically and online.



### RESEARCH FACILITY

Endless amounts of data are available for research including historical records, publications, maps, mineral exploration reports, aerial imagery, as well as cuttings, core, well records for oil, gas, geothermal, and mineral-exploration drill holes.



Gain access to Nevada's geoscience information and samples at  
2175 Paggio Parkway, Reno, NV.

To learn more, visit  
[www.nbmj.unr.edu](http://www.nbmj.unr.edu)  
State Geological Survey of Nevada





## Some Career advice

Although the job market is competitive, rest assured there are plenty of opportunities out there.

Try to surround yourself with expertise to learn from. Volunteer, internships, field trips, etc. This will broaden your experience and open new doors.

Take jobs that interest you but don't shy away from challenges and/or unforeseen opportunities.

It won't always be easy, but careers in the geosciences are fascinating and rewarding.



A photograph of a sunset over a mountain range. The sky is filled with clouds, and the sun is low on the horizon, creating a warm orange and yellow glow. The mountains in the foreground are silhouetted against the bright sky.

Thanks!

Geoscience is challenging, rewarding, relevant,  
**and FUN!**

Questions: [rkoehler@unr.edu](mailto:rkoehler@unr.edu)