Upcoming and

Digital Resources for Geologic Hazards in Utah

KLEBER, Emily, BOWMAN, Steve, CASTLETON, Jessica J., HISCOCK, Adam, ERICKSON, Ben, and BEUKELMAN, Gregg S. Utah Geological Survey, Geologic Hazards Program, 1594 W North Temple, Salt Lake City, UT 84116, ekleber@utah.gov

Aerial Photographs

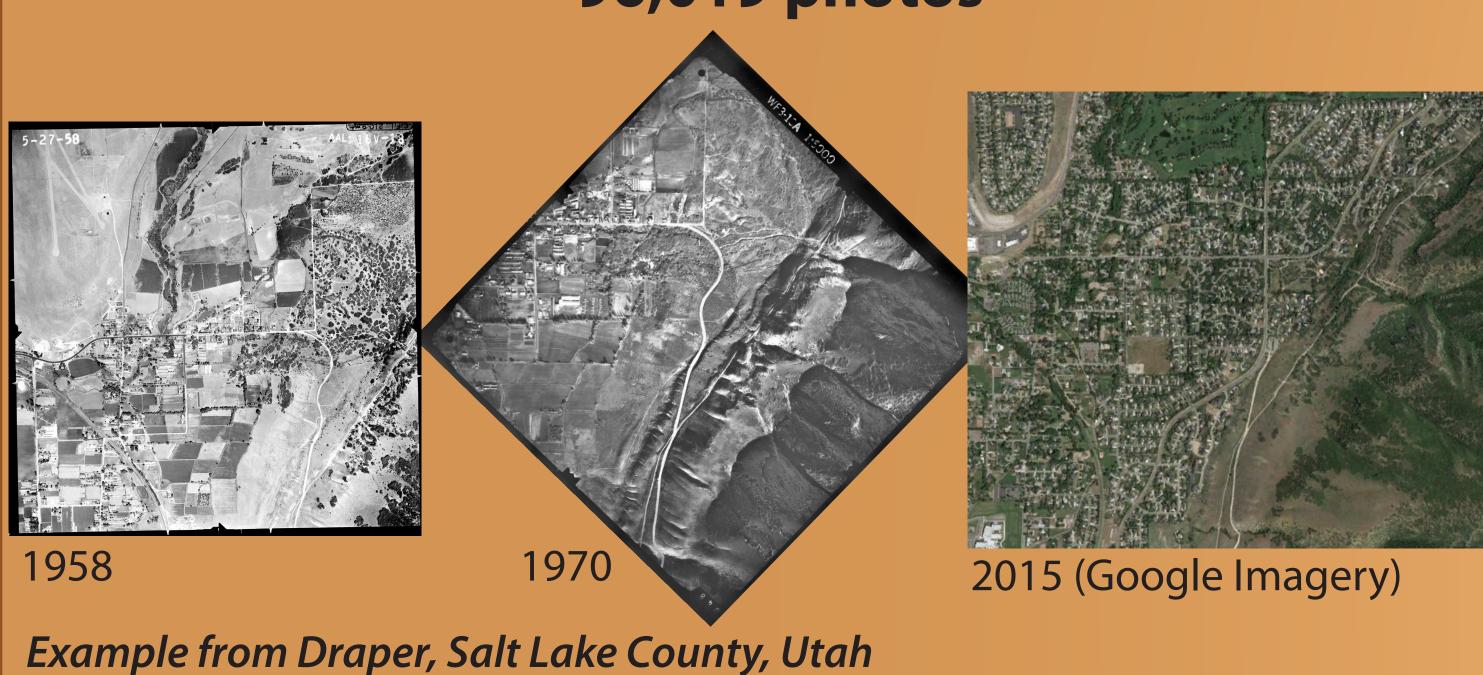
geodata.geology.utah.gov/imagery

Low-resolution JPEG images can be viewed online and high-resolution TIFF images can be downloaded.

Individual photographs show up as points on the map. Clicking on a point displays a popup containing basic metadata and a small preview image.

Photographs can be searched by a bounding box, entering latitude and longitude coordinates, or by typing in an address (street address, city, state) and region size.

Historic Photos: 1935 - 2005 96,019 photos



MOTIVATIONS

The Utah Geological Survey (UGS) Geologic Hazards Mapping Initiative is focused on mapping geologic hazards in urban and development areas along the Wasatch Front and Utah. Limited exposure and accessibility in urban areas necessitates the use of data from a wide variety of sources to assess hazards such as landslides, surface fault rupture, liquefaction, problem soils, and radon. Resources compiled and produced by the UGS including the Utah Aerial Imagery Collection, Geologic Mapping, GeoData Archive, Landslide Compilation, Landslide Inventory, Quaternary Faults and Fold database, and elevation data are sources can be directly used to reduce the risk from geologic hazards through awareness, implementing ordinances, and mitigation measures. The collection and dissemination of these resources help the UGS fulfill its mission to provide timely scientific information about Utah's geologic environment, resources, and hazards. Summary of known geologic-hazard fatalities in Utah.

Debris Flows²

Snow Avalanches

Ground Shaking

Debris Flows²

Dam and Water Conveyance

number of fatalities is unknown.

Three fatalities are classified as from a landslide and a dam and

³ Limited data is available and contains various assumptions; exact

water conveyance structure failure.

Debris flows are both a landslide and flooding hazard.

 By 2050, the population in the four largest Wasatch Front
counties (Salt Lake, Utah, Davis, and Weber) is projected to
grow to 3.7 million, an 80% increase from 2010.

- >75% of Utah's economy is concentrated in Salt Lake, Utah, Davis, and Weber Counties, along the Wasatch fault.
- Nearly 85% of Utah's population lives 15 miles of the Wasatch Fault.
- Utah has more than 20 types of geologic hazards around the state including landslides, earthquakes, flooding, problem soils, rock hazards, shallow groundwater and volcanic hazards.

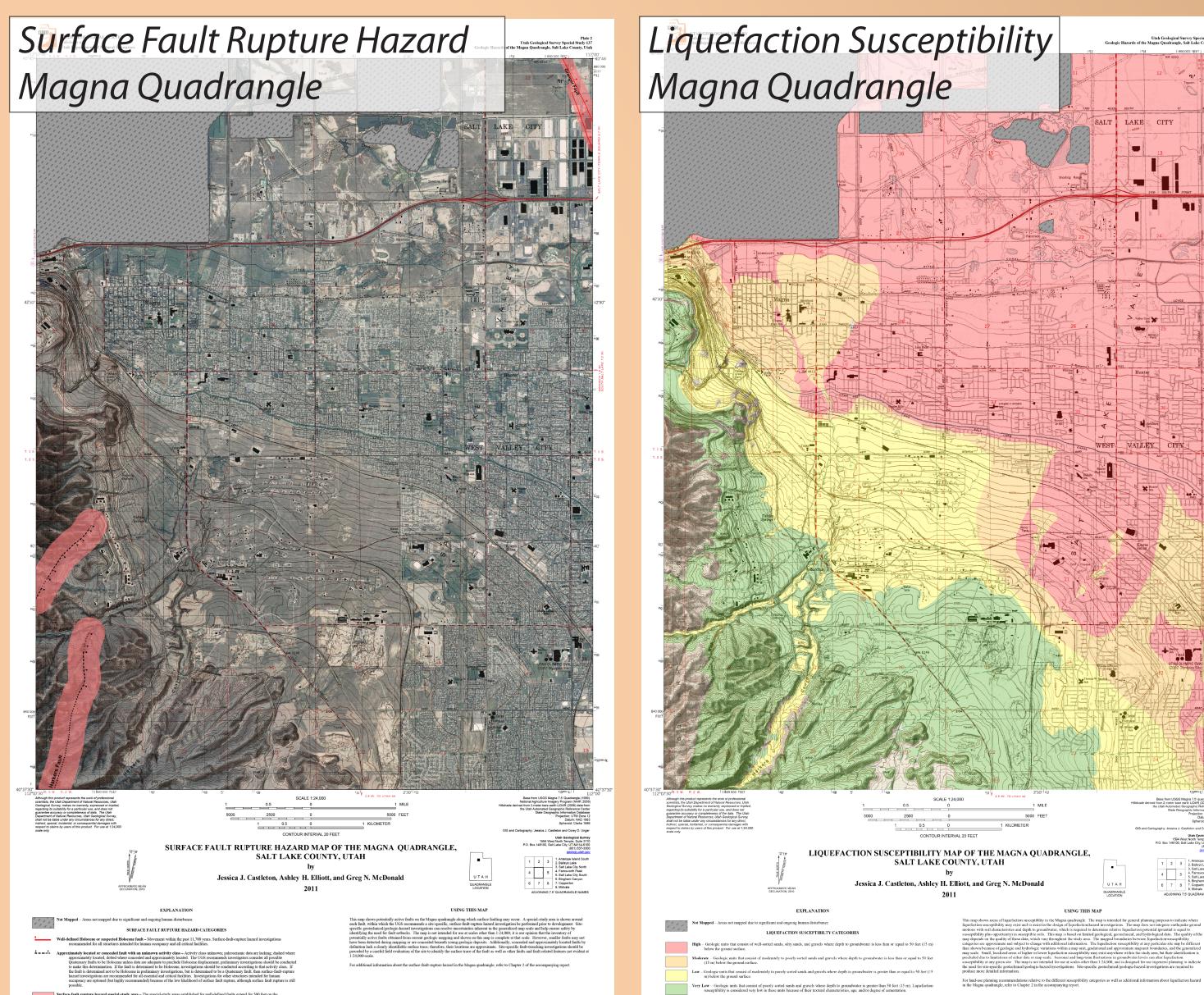
UGS Geologic Hazards Mapping Program geology.utah.gov/hazards/

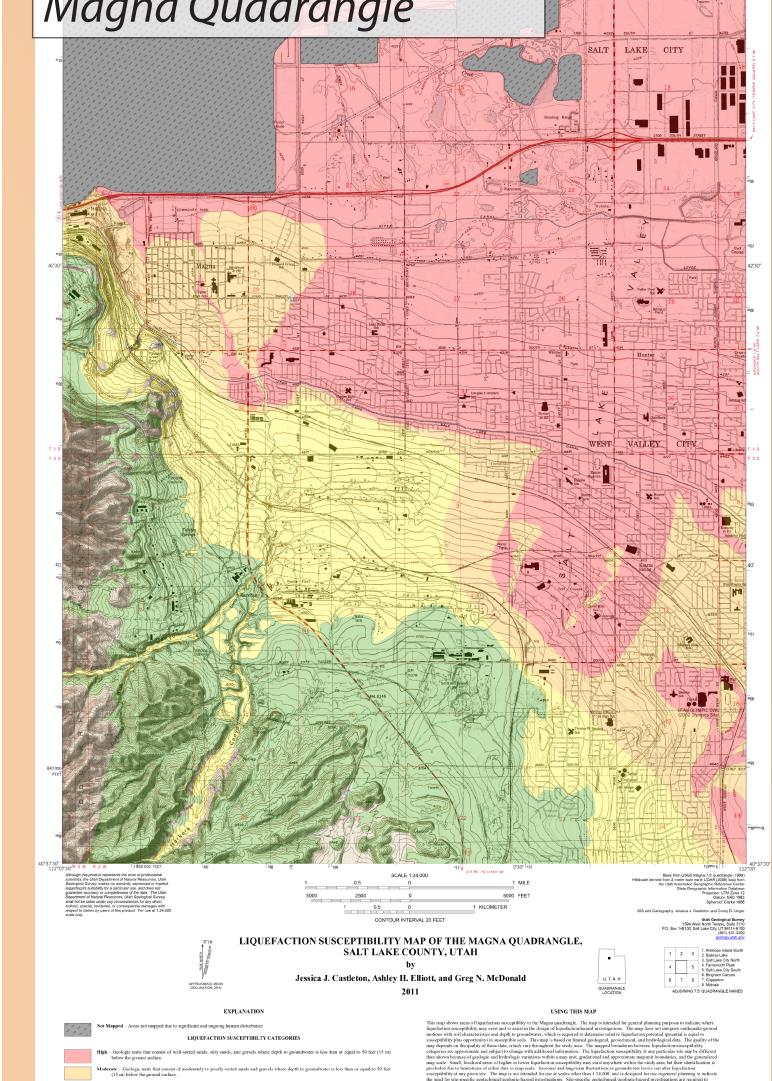
Analysis and Mapping Process GIS, Fieldwork, Research esri

Technical and Editorial Review Publication

geology.utah.gov/map-pub/publications,

Published Geologic Hazards Maps





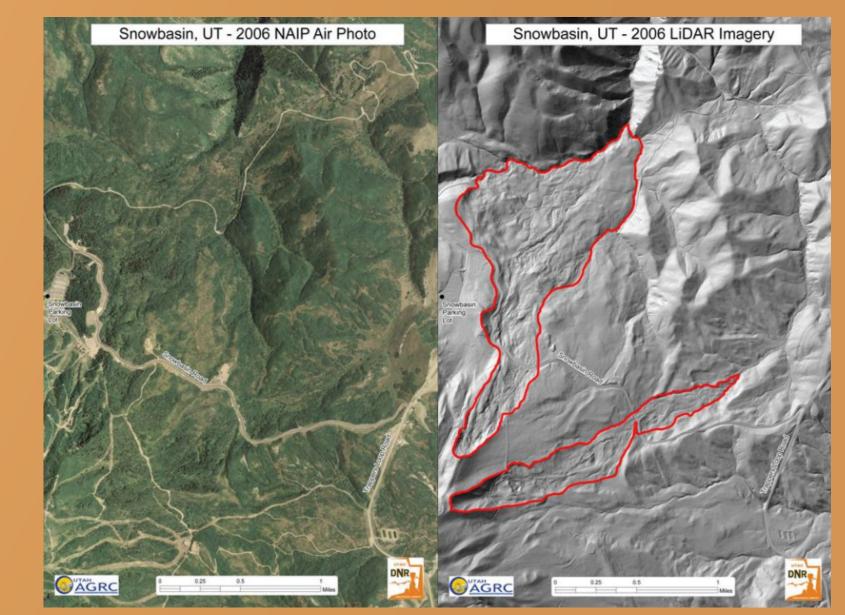
Publically Available Lidar **Number of Datasets:** Coverage Area: 9,791 km² $(3,780 \text{ miles}^2)$

Elevation

opentopo.sdsc.edu/datasets?loc=Utah

gis.utah.gov/data/elevation-terrain-data/

Since 2006, the UGS, along with local, state, and federal partners, has collected high resolution light detection and ranging (lidar) data in Utah and some neighboring states. Recent, high-resolution lidar data has seen wide



use by government agencies, engineering and other consultants, industry, educational institutions, and the public. The data has often been used to develop high quality topographic contour maps and grading plans for various development projects, along with flood analysis.

Geologic Mapping

Mapping Progress of 7.5' Quadrangles in Utah

UGS Proposed Project UGS Ongoing Project UGS Completed UGS Completed- OFR

UGS Partial USGS Partial USGS in Progress

The UGS Geologic Mapping Program creates and updates geologic mapping in the State of Utah. Recently, mapping has focused on Quaternary mapping, in addition to bedrock mapping, in order to aid the Utah Geologic Hazards Mapping Initiative. The focus has mostly been in urban areas and mapping is completed at 1:24,000 (7.5' Quadrangles). Published Geologic maps are available as print PDFs and GIS

products.

UGS GeoData Archive geodata.geology.utah.gov

Resources Uploaded Over Time 1000 Average: ~80/day 400 User Access

26,600 resources available (Sept 2016) 287 GB of resources (Sept 2016)

Contains Utah geologic hazards and wetlands related scanned documents, photographs, and other digital resources from our files and those gathered from other agencies or organizations. Geotechnical reports from geologic consulting companies are especially important to geologic hazards mapping in urban areas in Utah.

Resources available to general users are all in the public domain and may contain reports submitted to state and local governments as part of permit reviews.

Metadata (title, authors, dates, location, keywords, ect.) describing each resource is searchable, along with spatial searching for resources that are local or site-specific in nature.

Landslide Database

Utah Landslide Compilation: https://gis.utah.gov/data/sgid-index/

FATALITIES

2 100% 2 >0.1%

The Landslide Compilation shows landslide features throughout Utah. This study incorporates the original compilation and adds new (1989 to mid-2007) data gathered from geologic maps and other internal Utah Geological Survey landslide investigations. The resulting 46, 1:100,000-scale maps show landslide deposits, landslide scarps, and debris flow paths throughout the state.



Utah Landslide Inventory:

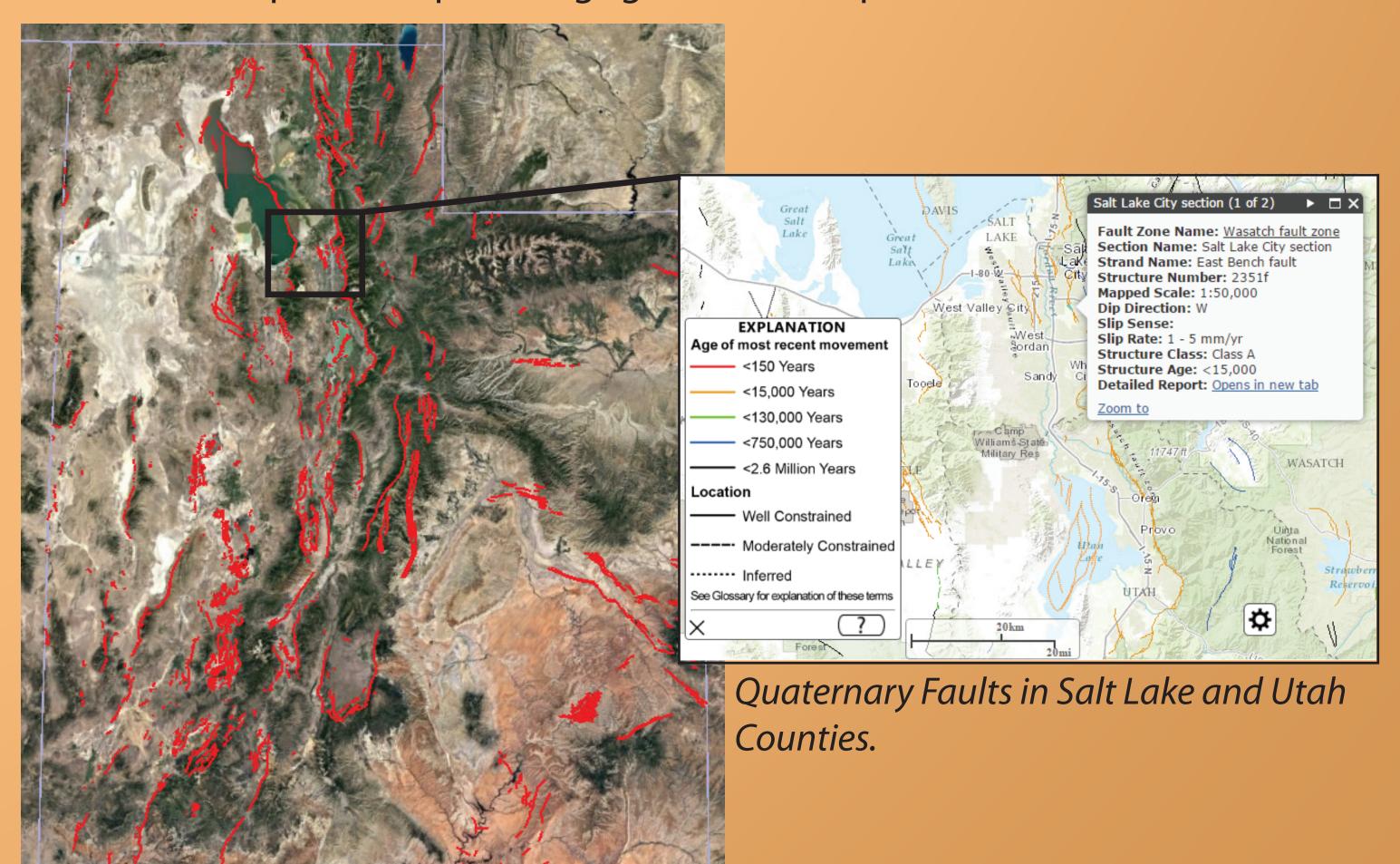
The Utah Landslide Inventory project locates and classifies landslides based on attributes including type of movement, activity, geologic unit involved, and

Slide Lake earth flow (hashed) with historical movement and surrounding Quaternary landslides in the Joes Valley area, Wasatch Plateau, Utah. Attributes for this earth flow includes a thickness < 10ft, with historical movement in 1940 and 2011 within the Tertiary/Cretaceous North Horn Formation.

Utah Quaternary Fault and Fold Database

geology.utah.gov/resources/data-databases/qfaults/

Presents the most recent Quaternary fault data and mapping available for Utah in an easily accessible web-map format. The database includes the fault name, section name, mapped scale, dip direction, slip sense, mapping constraints, fault age, and fault classification. The faults and folds in the database are considered to have been sources of large earthquakes (about magnitude 6.5 or greater) during the Quaternary Period (past 2.6 million years); these geologic structures are the most likely sources of large earthquakes in the future. Builds on USGS Quaternary Faults and Fold Database (http://earthquake.usgs.gov/hazards/qfaults/).



Future Work

Future Work: Utah Geochronology Database

We are currently developing a new geochronology database using radiocarbon and optically stimulated luminescence laboratory data, as a pilot project. This new database will be developed as an ArcGIS SDE spatial geodatabase with a web mapping application user interface. We expect to expand the database in future years to include various rock age dating data.