

Quaternary Fault Database and Earthquake Geology Parameters for Jefferson County, Southwest Montana

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SUMMARY

This MBMG Data Release (DR) contains the Quaternary Fault Database for Jefferson County. The database is a current inventory of published Quaternary faults and their geologic parameters for Jefferson County that can be used for earthquake hazard assessments and future updates to the National Seismic Hazards Model (NSHM). Quaternary faults in this database demonstrate evidence of earthquake surface ruptures based on lidar data, geomorphic and topographic analyses, field checks, and, when available, published geologic maps (see Gavillot, 2022, and references therein). Faults are considered potentially active and hazardous if fault displacement occurred during the Quaternary period (past 2.6 million years) and produced surface deformation during an earthquake, typically expressed as fault scarps.

The MBMG Quaternary Fault Database is only appropriate according to the mapped scale. This dataset is provided as geospatial data (GDB, Shapefiles, KML) and tables (csv format).

Latest Quaternary faults are those that have evidence of fault displacement within the past 15,000 years. Faults in this category have well-constrained locations and fault scarps that cut Holocene or late Pinedale age sediments.

Late Quaternary faults are those that have evidence of fault displacement within the past 130,000 years. Faults in this category have well-constrained locations and fault scarps that cut late Pleistocene or Bull Lake age sediments.

Middle to Late Quaternary faults are those that have evidence of fault displacement within the past 750,000 years. Faults in this category have well- to moderately constrained locations and bedrock fault scarps or fault-controlled topographic lineaments that deform Quaternary sediments.

Quaternary–Undifferentiated faults are those suspected to have fault displacement within the past 2.6 million years. Faults in this category have well- to moderately constrained locations or may be concealed but inferred to deform Quaternary sediments.

Companion MBMG Geologic Map Publication:

Gavillot, Y.G., 2025, Quaternary fault map of Deer Lodge County, southwest Montana: Montana Bureau of Mines and Geology Geologic Map 102, 1 sheet, scale 1:75,000, <https://doi.org/10.59691/CQIB1687>

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Maps and geodatabases are designed for use as general planning tools and are appropriate for use only at the published scales. This interactive map displays multiple data layers for countywide (where available) to statewide geohazards information associated with earthquakes, faults, and landslides. This web application provides tool options using buttons to turn layers on and off, view data tables of information, filter data based on attributes, access the related publication, and download GIS data.

Quaternary faults shown for specific counties or statewide are from either published sources or preliminary unpublished datasets. The MBMG Quaternary Fault Database is a current inventory of published Quaternary faults and their geologic parameters for counties that can be used for earthquake hazard assessments and future updates to the National Seismic Hazards Model (NSHM). Quaternary faults in this database demonstrate evidence of earthquake surface ruptures based on lidar data, geomorphic and topographic analyses, field checks, and, when available, published geologic maps. Faults are considered potentially active and hazardous if fault displacement occurred during the Quaternary period (past 2.6 million years) and produced surface deformation during an earthquake, typically expressed as fault scarps. Site-specific investigations and more detailed geotechnical information are required for earthquake hazard assessments.

About the MBMG

Established in 1919, the Montana Bureau of Mines and Geology (MBMG) continues to fulfill its mandate to collect and publish information on Montana's geology to promote orderly and responsible development of the energy, groundwater, and mineral resources of the State. A non-regulatory state agency, the MBMG provides extensive advisory, technical, and informational services on the State's geologic, mineral, energy, and water resources. The MBMG is increasingly involved in studies of the environmental impacts to land and water caused either by past practices in hard-rock mining or by current activities in agriculture and industry. The Montana Bureau of Mines and Geology is the principal source of Earth science information for the citizens of Montana. More information is available at mbmg.mtech.edu.