Basin & Range Investigation for Developing Geothermal Energy

Geothermal Exploration Data and Data Products

The Basin & Range Investigation for Developing Geothermal Energy (BRIDGE) Project data deliverables include a wide variety of geophysical and geologic datasets and modeled results spread over several geothermal prospects. New geophysical data was collected by professional contractors, and modelled by the USGS and by Geologica Geothermal Group. Several legacy datasets were also used and are included here for completeness. 2-meter data was collected by the Navy Geothermal Program Office. Each dataset is unique. Please refer to additional ReadMe files found in each data directory for more details.

The BRIDGE data and data products included here were collected and are organized on a per-prospect basis, except for the regional-scale HTEM survey. The outline below reflects the file structure found in the BRIDGE Geothermal Data Repository data submission (https://gdr.openei.org/submissions/1682).

1. HTEM
    a. Data in .txt and .gdb formats
    b. Metadata
    c. Xcalibur acquisition report
    d. GALEI inversion results
    e. Aarhus Workbench inversion results and supporting files (by USGS – preferred)
2. 2-Meter Temperature Surveys (Combined)
    a. Shapefile and data table for 2-m points collected by the Navy GPO for the Bridge Project. These files contain data relevant to the following fields: East Hawthorne, Grover Point, Dead Cow Splay (Gabbs Valley), Kaiser (Gabbs Valley) and Bell Flat.
3. Leapfrog
    a. Pirouette Mtn Leapfrog model
        i. LF model
        ii. Input files for TGH
    b. Elevenmile Canyon Leapfrog model
        i. LF model
        ii. Input files for TGH and wells
4. GIS and geology
    a. Map package (MPK) for ArcGIS (ArcMap and ArcPro) containing shapefiles and symbolization of MT stations, gravity stations, geochemistry samples, all LiDAR fault picks (covering the southern half of Dixie Valley, Fairview Valley, Bell Flat, Gabbs Valley, Lee Allen, and Walker Lake Valley), and dip direction indicators for LiDAR fault picks. Note that LiDAR fault picks have only been field verified in Dixie Valley and Gabbs Valley.
    b. Shapefiles covering entire BRIDGE study area (no layer files for symbology)
        i. 2m stations
        ii. Geochemistry samples
        iii. HTEM lines
        iv. MT stations
        v. Gravity stations
        vi. LiDAR fault picks
        vii. LiDAR fault dip directions (fault balls)

viii. Airborne hyperspectral mineral classification (RS_Minerals)

5. Geochemistry
    a. All BRIDGE geochemistry data in .csv and .xlsx formats
6. Bell Flat
    a. GIS and geology (shapefiles)
        i. LiDAR fault picks
        ii. LiDAR fault dip directions (fault balls)
        iii. Gravity stations
        iv. 2m survey
        v. Remote Sensing Minerals (AVIRIS-c interpretation)
    b. 2-meter temperature survey
        i. Data in .csv format
    c. Gravity survey
        i. Data in .csv and .gdb formats
        ii. Magee Geophysical acquisition report
        iii. Maps of the complete Bouguer anomaly and derivative products
    d. Aeromagnetic data, extracted from the Geodawn dataset (Glen and Earney, 2024)
        i. Data in Oasis Montaj format (.gdb)
        ii. Maps of the magnetic data and derivative products in .png and .geotiff formats
    e. Airborne hyperspectral mineral classification
    f. An informal geophysics sketchbook presentation that shows gravity, magnetic, 2m-temperature, LiDAR fault scarps and HTEM resistivity data correlate with one another.
7. East Hawthorne
    a. GIS and geology (shapefiles)
        i. LiDAR fault picks
        ii. LiDAR fault dip directions (fault balls)
        iii. Gravity stations
        iv. MT stations
        v. 2m survey
        vi. Remote Sensing Minerals (AVIRIS-c interpretation)
    b. 2-meter temperature survey
        i. Data in .csv format
    c. Aeromagnetic data, extracted from the Geodawn dataset (Glen and Earney, 2024)
        i. Data in Oasis Montaj format (.gdb)
        ii. Maps of the magnetic data and derivative products in .png, .geotiff and as packed Geosoft maps
        iii. A brief summary report
    d. Gravity data: Three merged datasets originally published by Schoffner et al., (2010).
        i. Reprocessing project
            1. Merged, reprocessed gravity data in .csv and .gdb formats
            2. Geosoft project file
            3. A brief reprocessing report
            4. Maps of the complete Bouguer anomaly and derivative products in .png, .geotiff and as packed Geosoft maps

5. Down-sampled LiDAR digital elevation model used in terrain corrections

ii. 2D gravity modeling
1. Two 2D gravity & magnetic models in gmsys format
2. Images of the model results
3. Vertical section grids of the model results
4. A brief modeling report with comparisons to the 3D MT model

e. Magnetotellurics
i. Data
1. MT Data in processed .edi format and as raw time series. Formats differ slightly between data collected by Enthalpion and KLM Geoscience.
2. Acquisition reports for both Enthalpion and KLM geoscience MT surveys

ii. Single-domain 3D MT modeling project
1. A detailed 3D MT modeling report. Most figures in this report are available as separate .png images
2. 3D MT model as .out file, .xyzv file, UBC format and as a Geotools results packet
3. Metadata files for the inversion parameters and model performance

iii. Joint-inversion 3D MT & HTEM modeling Project
1. A detailed modeling report. Most figures in this report are available as separate .png images
2. 3D joint-inversion results model as .out file, .xyzv file and in UBC format.
3. Metadata files for the inversion parameters and model performance

f. Airborne hyperspectral mineral classification

8. Gabbs Valley
a. GIS and geology (shapefiles)
i. LiDAR fault picks
ii. LiDAR fault dip directions (fault balls)
iii. MT stations
iv. 2m survey
v. Remote Sensing Minerals (AVIRIS-c interpretation)
vi. Brief field visit summary (.docx format)

b. 2-meter temperature survey
i. Data in .csv format
ii. Two main surveys: Kaiser and Dead Cow Splay

c. Aeromagnetic data
i. Data in Oasis Montaj format (.gdb)
ii. Maps of the magnetic data and derivative products in .png, .geotiff and as packed Geosoft maps
iii. A brief summary report

d. Magnetotellurics
i. Data
1. Processed MT data in .edi format and as raw time series (Phoenix format)
2. KLM Geoscience acquisition report

ii. Preliminary 3D MT Model
    1. A brief modeling report
    2. 3D MT model as a .out file
    3. Metadata files for the inversion parameters and model performance

e. Airborne hyperspectral mineral classification

9. Grover Point
    a. GIS and geology (shapefiles)
        i. LiDAR fault picks
        ii. LiDAR fault dip directions (fault balls)
        iii. Gravity stations
        iv. MT stations
        v. 2m survey
        vi. Geochemistry samples
        vii. Remote Sensing Minerals (AVIRIS-c interpretation)
    b. 2-meter temperature survey
        i. Data in .csv format
    c. Legacy aeromagnetic data that was re-gridded by Edcon-PRJ in 2012. See Alm et al., (2016).
        i. Edcon-PRJ Acquisition and processing report
        ii. Original grid files produced by Edcon-PRJ of merged dataset
        iii. New maps produced for the BRIDGE Project over Grover Point in .geopdf, .geotiff and .png format
    d. Gravity
        i. Original contractor deliverables from Zonge International, including:
            1. Acquisition report,
            2. data in .gdb and .csv formats
            3. Maps of the CBA and select derivatives in .png, .geotiff and packed Geosoft formats
        ii. An alternate set of gridded maps of the CBA and derivative products in .geopdf, .geotiff and .png formats
    e. Magnetotellurics
        i. Processed MT data in .edi format and as raw time series (Phoenix format)
        ii. KLM Geoscience Acquisition report
        iii. 3D MT model in .out file format
        iv. 3D MT modeling report
    f. Geologic mapping
        i. Complete geologic map as PDFs in two plates
            1. “GroverPoint_GeoMap_Layout”
            2. “GroverPoint_GeoMap_TempData_GeoPDF”
        ii. ArcPro Map Package (MPKX.)
            1. “GroverPoint_GeologicMap_BRIDGE_2024”
        iii. Linework data as “GroverPoint_GeoLines.shp” includes:
            1. Contacts
            2. Faults

iv. Paleo shoreline data as “GroverPoint_LithologyPolygons.shp”
v. Point data as .shp files including
1. GroverPoint_Attitudes.shp
2. GroverPoint_FaultBallsandBars.shp
3. GroverPoint_GeoLines.shp

g. Airborne hyperspectral mineral classification

10. Lee Allen
    a. GIS and geology (shapefiles)
        i. LiDAR fault picks
        ii. LiDAR fault dip directions (fault balls)
        iii. MT stations
        iv. Remote Sensing Minerals (AVIRIS-c interpretation)
        v. Remote Sensing Field Validation
    b. Aeromagnetics, extracted from the Geodawn dataset (Glen and Earney, 2024)
        i. Data in Oasis Montaj format (.gdb)
        ii. Maps of the magnetic data and derivative products in .png and .geotiff formats
    c. Gravity
        i. Legacy gravity data, which had been merged from four different public datasets was re-gridded for analysis by the BRIDGE Project. The data has been compiled into a single .gdb file, and used to make maps the CBA and select derivatives. These are provided in .png and .geotiff formats.
    d. Magnetotellurics
        i. Data
            1. MT Data in processed .edi format and as raw time series (Phoenix format).
            2. Two KLM geoscience acquisition reports. This data was collected over the course of two mobilizations in the summer of 2024.
        ii. 3D MT modeling project
            1. A detailed 3D MT modeling report. Most figures in this report are available as separate .png images
            2. 3D MT model as .out file, .xyzv file and as UBC format.
            3. Metadata files for the inversion parameters and model performance
    e. Laboratory Infrared Spectroscopy data
        i. Raw data (text)
        ii. Interpretation spreadsheet (.csv)
    f. Airborne hyperspectral mineral classification

References

Alm, S. A. (2016). A Geological and Geophysical Investigation into the Evolution and Potential Exploitation of a Geothermal Resource at the Dixie Valley Training Range, Naval Air Station Fallon (Doctoral dissertation, University of Kansas).

Glen, J.M.G., and Earney, T.E., 2024, GeoDAWN: Airborne magnetic and radiometric surveys of the northwestern Great Basin, Nevada and California: U.S. Geological Survey data release, https://doi.org/10.5066/P93LGLVQ.

Shoffner, J. D., Li, Y., Hinz, N., Sabin, A., Lazaro, M., & Alm, S. (2010). Understanding fault characteristics and sediment depth for geothermal exploration using 3D gravity inversion in Walker Valley, Nevada. *Geothermal Resource Council*.