

## Favorable Structural Settings for Geothermal Systems in the Great Basin Region, Western USA: A Critical Regional Dataset and Harbinger for Hidden Geothermal Resources

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### ABSTRACT

Favorable structural settings (FSS) along Quaternary faults control the location of many higher temperature geothermal systems in the Great Basin region (GBR) of the western USA, which includes most of NV, western UT, southern ID, southeast OR, and eastern CA. They include various fault interaction zones, such as terminations, intersections, step-overs (or relay ramps), and accommodation zones in normal fault systems, as well as pull-aparts and displacement transfer zones in the transtensional western part of the GBR. FSS are commonly critically stressed and characterized by structural complexity, closely-spaced faults, and greater proportions of fault breccia vs. fault gouge, all of which can enhance permeability and thus result in long-term, deeply rooted fluid flow. FSS are critical for vectoring into areas of greater permeability in known geothermal systems (KGS) and for identifying potential locations of hidden geothermal systems.

A major objective of the INGENIOUS project (INnovative Geothermal Exploration through Novel Investigations of Undiscovered Systems) is to generate new geothermal favorability maps for the GBR through compilation and integration of 16 regional geological and geophysical datasets, including FSS. Using available imagery (NAIP, Lidar), geological maps, and geophysical data (mainly gravity), we have identified >1,430 FSS in the GBR. Each FSS was outlined with geologically grounded polygons, which collectively occupy ~7.7% of the study area. Step-overs were the most common accounting for ~40% of FSS followed by fault intersections (26.1%), fault terminations (16.7%), accommodation zones (6.8%), pull-aparts (2.3%), and displacement transfer zones (1.4%). For the 403 KGS in the GBR, with temperatures  $\geq 37^\circ\text{C}$ , step-overs are again the most common FSS (~27.5%) followed by fault intersections (22.1%), fault terminations (16.6%), accommodation zones (5.7%), displacement transfer zones (3.2%), pull-aparts (2.7%), and major normal faults (2.2%). For 120 systems with documented temperatures  $\geq 120^\circ\text{C}$ , which have been used as training sites for geothermal play fairway analyses, FSS include step-overs (34.2%), fault intersections (26.7%), fault terminations (14.2%), displacement transfer zones (6.7%), accommodation zones (5.8%), pull-aparts (5.0%), and major normal faults (1.7%).

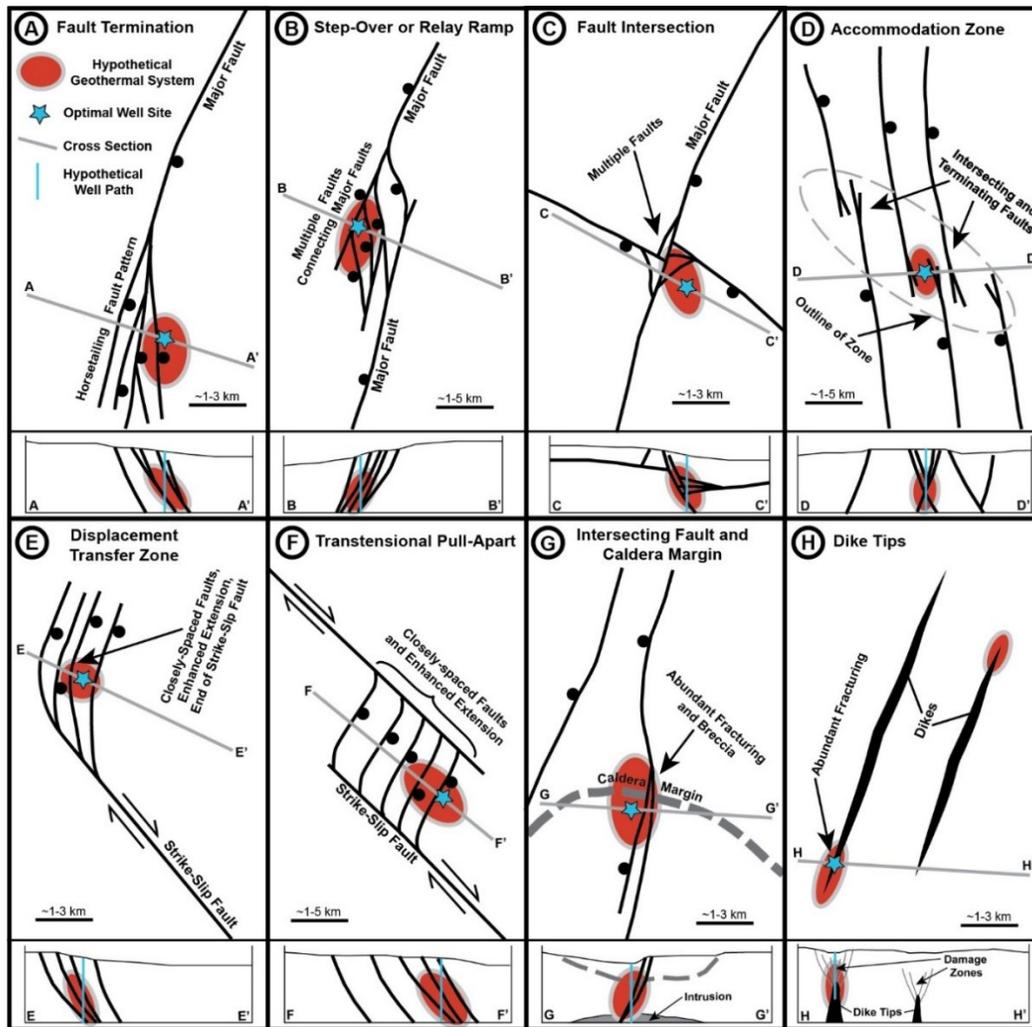
The >1,430 FSS, 403 KGS, and 120 training sites in the INGENIOUS study area are all minimums. The number of KGS and training sites does not account the unknown number of hidden geothermal systems, which likely comprise the majority of geothermal resources in the GBR. Further, the lack of detailed geological and geophysical datasets (e.g., geological maps and gravity surveys) greatly limits identification of FSS, especially in the many basins. Notably, many FSS (e.g., fault tips and accommodation zones) are characterized by closely-spaced, relatively minor faults with minimal recent surface ruptures. Further, much of the GBR was inundated by late Pleistocene lakes, and thus faults that have not ruptured in the Holocene are obscured by lake sediments and shoreline features. Detailed gravity surveys are particularly crucial for delineating FSS within and along the margins of basins. Most basins contain multiple FSS, raising the question as to how many independent geothermal systems such basins can host. If such basins contain multiple systems, the geothermal potential of the GBR may be underestimated, especially considering that conductive heat envelopes conducive to EGS development may accompany convective systems. Regional assessments of FSS are therefore imperative for assessing and ultimately recognizing the full geothermal potential of the GBR.

### 1. INTRODUCTION

Favorable structural settings (FSS) within Quaternary fault zones control the location of many geothermal systems in active tectonic settings. They include various fault interaction zones, such as terminations (or tips), intersections, step-overs (or relay ramps), and accommodation zones (cf., Faulds and Varga, 1998) in normal fault systems, as well as pull-aparts and displacement transfer zones (cf., Faulds and Hinz, 2015) in transtensional regions (Figure 1). Curewitz and Karson (1997) provided an early global perspective of FSS in both continental rifts and mid-ocean ridges. FSS have since been described in greater detail in many geothermal provinces, including the Great Basin region of the western USA (Faulds et al., 2006, 2011, 2021a; Faulds and Hinz, 2015), western Turkey (Faulds et al., 2009), the Taupo volcanic zone in New Zealand (Rowland and Simmons, 2012), East African rift (Hinz et al., 2016, 2018), and magmatic arcs (Hinz et al., 2016). Relatively high-temperature geothermal systems (e.g.,  $>100^\circ\text{C}$ ) are nearly always associated with Quaternary faults (e.g., Bell and Ramelli, 2007). FSS are critically stressed areas (e.g., Micklethwaite and Cox, 2005; Siler et al., 2018) characterized by structural complexity, closely-spaced faults, and greater proportions of fault breccia versus fault gouge, which collectively enhance permeability. FSS are therefore critical for vectoring into areas of greater permeability in known geothermal systems and for identifying

potential locations of hidden systems (e.g., Richards and Blackwell, 2002), which lack surface hot springs or steam vents. Because hidden geothermal systems may constitute most geothermal resources in the Great Basin region (e.g., Coolbaugh et al., 2006), FSS can be used as an important tool in geothermal exploration.

INGENIOUS (INnovative Geothermal Exploration through Novel Investigations of Undiscovered Systems) is a major project funded by the U.S. Department of Energy aimed at improving techniques for discovering hidden conventional (or hydrothermal) geothermal resources and reducing risks in geothermal exploration. A major objective of INGENIOUS is to generate new geothermal favorability maps for much of the Great Basin region (GBR, see INGENIOUS study area-Figure 2) through compilation/integration of 16 regional geological and geophysical datasets, including FSS. This paper briefly describes the method of compiling FSS in the GBR and reports the results of this analysis. These results are broken down in terms of the relative proportions of the different types of FSS for all known geothermal systems in the region, with established temperatures  $\geq 37^{\circ}\text{C}$ , and then a subset of these known systems with temperatures  $\geq 120^{\circ}\text{C}$ , which have been used as training sites for geothermal play fairway analysis and machine learning applications for parts (Faulds et al., 2021b,c; Smith et al., 2023) or nearly all of the GBR (Hart-Wagoner et al., 2024a,b). In addition, FSS were compiled for the entire INGENIOUS study area (Figure 2), which comprises most of the GBR, as a proxy for identifying hidden geothermal systems. The implications of these results with respect to geothermal exploration and regional resources assessments are also addressed.

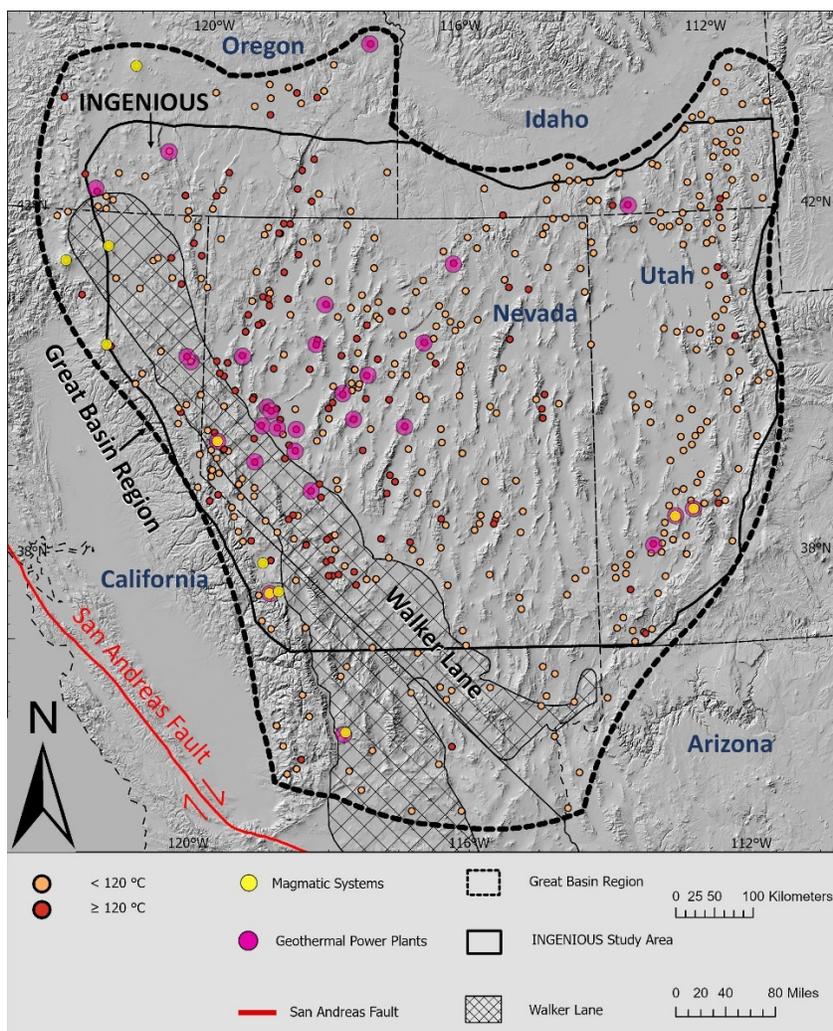


**Figure 1:** Favorable structural settings for geothermal systems (from Faulds et al., 2021a; Jolie et al., 2021). Most common permeable structures reside in extensional or transtensional settings. Red shaded areas mark approximate locations of hypothetical geothermal upwellings in map view and in cross section. Blue stars and lines illustrate hypothetical optimal well sites and well paths, respectively. a) Fault tip showing horse-tailing pattern of closely spaced faults at the termination of a major normal fault. b) Step-over or breached relay ramp showing abundant minor faults connecting overlapping strands of a major normal fault zone. c) Fault intersection with abundant minor faults proximal to the intersection. d) Accommodation zone (outlined by gray ellipse) encompassing a belt of terminating, overlapping and intersecting normal faults. e) Displacement transfer zone whereby a major strike-slip fault terminates in an array of normal faults. f) Transtensional pull-apart incorporating multiple closely spaced normal faults connecting a releasing step in a major strike-slip fault. g) Intersecting normal fault and caldera margin (thick dashed gray line). h) Dike tip or termination, whereby abundant fracturing characterizes the damage zone proximal to the tip of a dike.

## 2. REGIONAL SETTING

Western North America contains a diffuse plate boundary, characterized by dextral motion between the Pacific and North American plates (e.g., Atwater and Stock, 1998) and west- to northwest-directed extension within the Basin and Range province (e.g., Wernicke, 1992). In the western USA, the San Andreas fault system accommodates most of the dextral plate motion (~75%). The other ~25% is distributed across the western GBR in a system of dextral faults known as the Walker Lane in the north and eastern California shear zone in the south (e.g., Faulds and Henry, 2008; Kreemer et al., 2009). A broad zone of active extension that initiated ~30 Ma and has continued into the Quaternary stretches eastward across the GBR from the Sierra Nevada and Walker Lane in eastern California to the Wasatch Front in Utah (Figure 2). Strain rates are generally <1 mm/yr across much of the region but increase to as much as 10 mm/yr within the Walker Lane (Kreemer et al., 2009). The study area for the INGENIOUS project encompasses most of the GBR (Figure 2), including the bulk of Nevada, western Utah, eastern California, southern Idaho (south of the Snake River Plain), and southeastern Oregon. This region has been one of most tectonically active parts of the Basin and Range province during the Quaternary owing to the diffusion of dextral shear from the northern end of the Walker Lane into regional west-northwest directed extension (Faulds et al., 2004; Faulds and Henry, 2008). This has resulted in relatively high extensional to transensional strain rates, particularly in the western and northwestern parts of the study area (Kreemer et al., 2009; Faulds et al., 2012).

With the exception of a few geothermal fields along its margins (e.g., Coso and Long Valley), geothermal systems in the GBR are amagmatic and thus lack a middle to upper crustal magmatic heat source (Blackwell et al., 1999; Faulds et al., 2004, 2006, 2011). Heat in the Great Basin region is provided instead by high geothermal gradients (Blackwell et al., 2011) induced by regional crustal extension and thinning (Blewitt et al., 2005; Faulds et al., 2012). Geothermal systems in this region are generally <225°C. The GBR currently produces ~1 GWe from ~28 geothermal power plants, but estimates suggest far greater geothermal potential (e.g., Williams et al., 2009). Coolbaugh et al. (2006) estimated that ~75% of geothermal resources in the GBR are hidden or blind. Faulds et al. (2021a) found that nearly 40% of the known geothermal systems in Nevada are hidden.



**Figure 2: Geothermal systems in the Great Basin region (dashed black outline) shown on digital elevation model, with the INGENIOUS study area delineated by light black solid line. Red circles – higher-temperature systems ( $\geq 120^\circ\text{C}$ ); orange circles – lower-temperature systems ( $< 120^\circ\text{C}$ ); yellow circles represent known or inferred magmatic systems; lavender circles are sites for operating geothermal power plants.**

### 3. METHODS

Delineating FSS is labor-intensive and ideally involves integration of multiple geological and geophysical datasets on both a regional and local scale. If and where available, crucial geological datasets include geological maps, Quaternary fault maps, Lidar (high-resolution topographic imaging), and digital elevation models, with gravity, magnetics, and magnetotelluric (MT) representing the most important geophysical datasets.

Digital elevation models paired with regional geological and Quaternary fault maps (e.g., 1:100,000 scale) may be used to define the larger and/or more conspicuous FSS (e.g., step-overs, accommodation zones, and pull-aparts). For example, the lateral terminations of mountain ranges may roughly define the terminations of normal faults. Topographic steps along the fronts of mountain ranges/fault blocks may delineate step-overs or relay ramps. Interbasinal highs commonly correspond to accommodation zones between oppositely dipping Quaternary fault systems. Quaternary fault maps provide key insights into the location, geometry, age, and kinematics of active faults, thus facilitating delineation of FSS. However, such maps are typically of varying quality and commonly do not adequately define key types of FSS (e.g., fault terminations and accommodation zones), where fault displacement may be dying out, and thus associated Quaternary fault scarps are commonly very low relief or possibly absent. Where available, high-resolution Lidar (~1 m resolution) and detailed geological maps (e.g., 1:24,000 to 1:50,000) are thus most useful in defining FSS. Publicly available high-resolution Lidar now covers much of the GBR, but detailed geological maps include less than 25% of the region.

FSS typically range from a scale of hundreds of square meters in area for individual step-overs or fault intersections to tens of square kilometers for larger more complex structures, such as accommodation zones, displacement transfer zones, and pull-aparts. For the larger FSS, initial assessments commonly define relatively large areas, which can subsequently be broken down upon more detailed studies into smaller individual FSS (e.g., step-overs or fault intersections) within the broader, more complex structure. The structurally most complex parts of these larger FSS commonly correspond to the locations of geothermal activity (e.g., Dering and Faulds, 2012; Craig et al., 2021).

For the INGENIOUS project, geologically feasible polygons were used to define the FSS and reflect the surface projection of the favorable setting that may host a geothermal system. The polygons were canted toward the down-dip projection of the FSS if obvious from the associated fault geometries, such as fault terminations, intersections, and step-overs (Figure 1A-C).

To sufficiently distinguish the type and location of FSS, the geological data was supplemented with geophysical data. Isostatic residual and horizontal gradient gravity data were the most useful. For example, terminating and intersecting gravity gradients respectively defined many of the fault terminations and fault intersections. This was especially important in defining FSS in the many basins of the region, where basin-fill sediments obscure the subsurface architecture and primary basin-bounding and/or intrabasinal faults. Magnetic and MT data were also useful in some areas in defining subsurface fault geometries and FSS, but these datasets are generally more impactful for prospect-scale analysis and selection of drilling sites, as magnetic lows and low resistivity anomalies may respectively indicate altered rocks and clay caps at depth induced by geothermal activity. Ultimately, delineation of FSS is best accomplished through integration of multiple geological and geophysical datasets utilizing software such as ArcGIS that allows for simultaneous review of multiple data layers.

Considering the rapidly increasing coverage of high-resolution Lidar in the GBR, an important question is whether the time-consuming process of identifying FSS can be automated employing machine learning and/or image processing techniques. Lidar and other geological datasets have limitations in much of the GBR due to recent basin-fill deposits, especially late Pleistocene lacustrine deposits (e.g., Lake Lahontan and Lake Bonneville). Glacial deposits can also locally obscure fault zones, primarily at higher elevations (e.g., Sierra Nevada and Wasatch Mountains). In most areas, this process is difficult to fully automate due to lack of one or more of the key datasets, such as high-resolution lidar, detailed geological maps, and/or gravity data. Further, some FSS (e.g., fault tips) are characterized by minor faults with minimal surface ruptures, making them difficult to recognize even with high-resolution lidar. Expert-driven oversight is therefore needed to define FSS in most areas, distinguish actual faults from other features (e.g., paleo-shorelines of Quaternary lakes), define Quaternary faults in bedrock areas, and estimate the age of offset surfaces. Although expert oversight remains essential for now, these integrated datasets are laying the necessary groundwork for future semi-automated workflows.

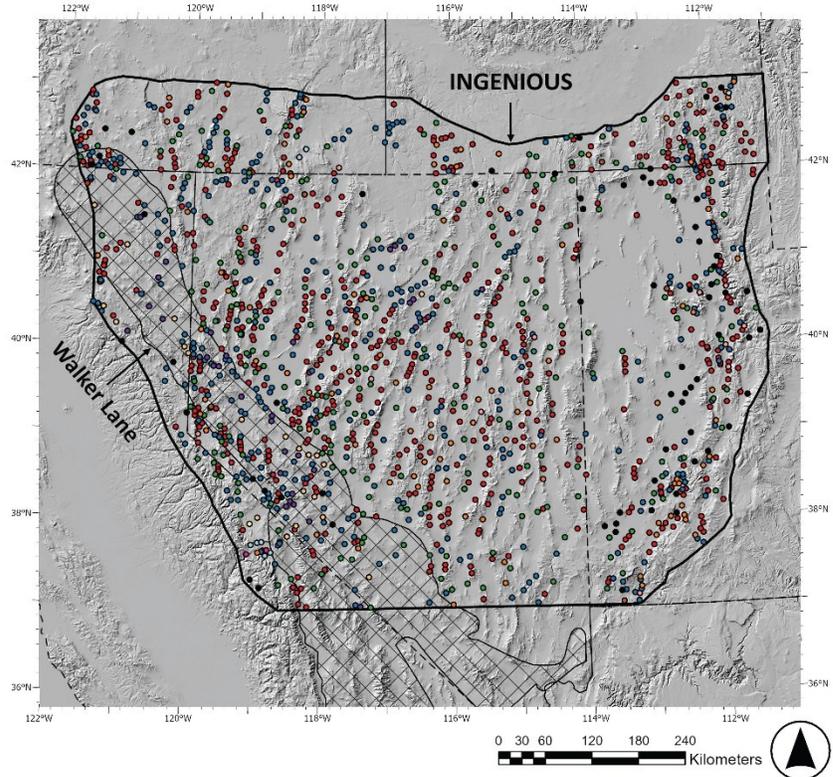
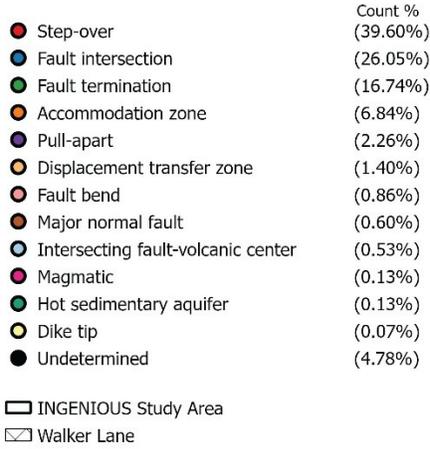
## 4. DATA AND RESULTS

### 4.1 Favorable Structural Settings

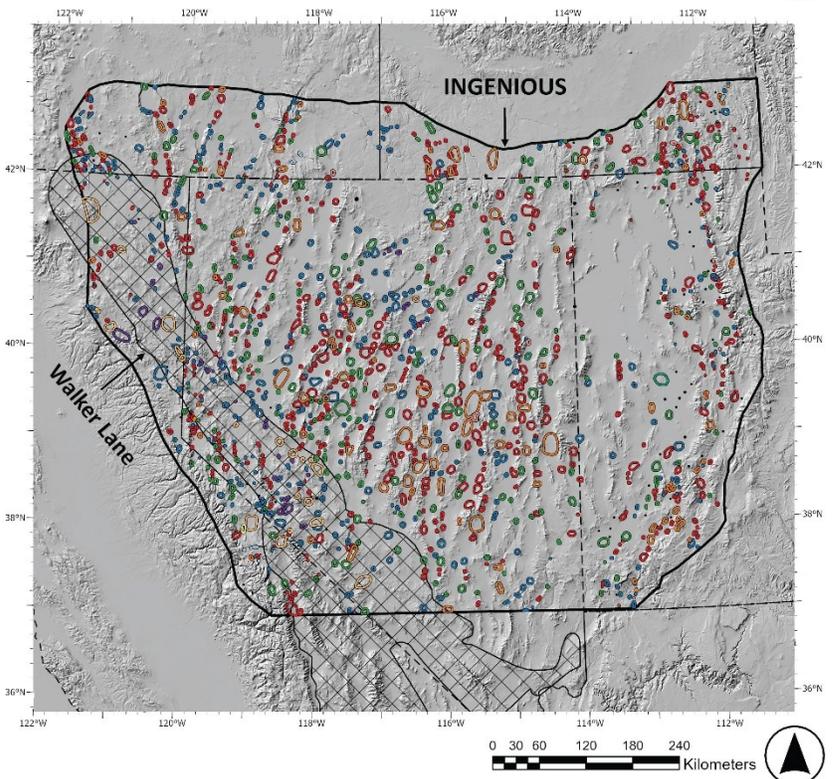
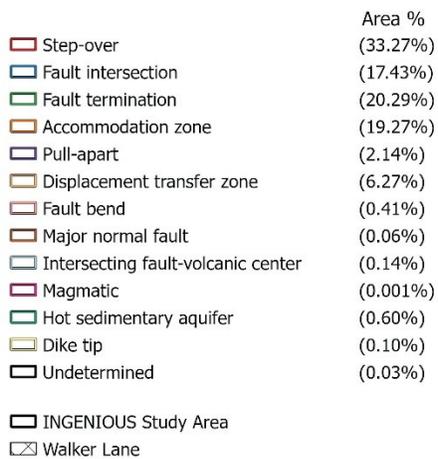
Using available imagery (e.g., NAIP, lidar), geological maps, and geophysical data (gravity, magnetics, and MT), we identified >1,430 FSS in the INGENIOUS study area (Figure 3A). Each FSS was outlined with geologically based polygons, which collectively account for ~7.7% of the area (Figure 3B). This FSS dataset includes all 403 known geothermal systems in the study area, with temperatures  $\geq 37^{\circ}\text{C}$ , as well as 120 training sites, with temperatures  $\geq 120^{\circ}\text{C}$ . The training sites were recently refined (Hart-Wagoner et al., 2025) and have been utilized for regional play fairway analyses and workflows (e.g., Hart-Wagoner et al., 2024a).

Step-overs are most common accounting for ~39.6% of FSS (Figure 3A) followed by fault intersections (26.1%), fault terminations (16.7%), accommodation zones (6.8%), pull-aparts (2.3%), displacement transfer zones (1.4%), fault bends (0.9%), major normal faults (0.6%), intersecting faults and volcanic centers (0.5%), magmatic (0.3%), hot sedimentary aquifers (0.1%), and dike tips (0.1%). Displacement transfer zones and pull-aparts are more common in the transtensional western part of the GBR. Systems with a magmatic component are largely confined to the margins of the GBR. Areal coverage for individual types of FSS differs somewhat from the relative percentages of the number of FSS, reflecting the larger sizes of some of the more complex FSS (e.g., accommodation zones), with step-overs incorporating 33.3% of the total area encompassed by FSS (Figure 3B), fault terminations 20.3%, accommodation zones 19.3%, fault intersections 17.4%, displacement transfer zones 6.3%, pull-aparts 2.1%, and hot sedimentary aquifers, fault bends, major normal faults, intersecting faults-volcanic centers, magmatic, and dike tips all less than 1%. The median area of the FSS polygons is ~13.4 km<sup>2</sup>.

**A**



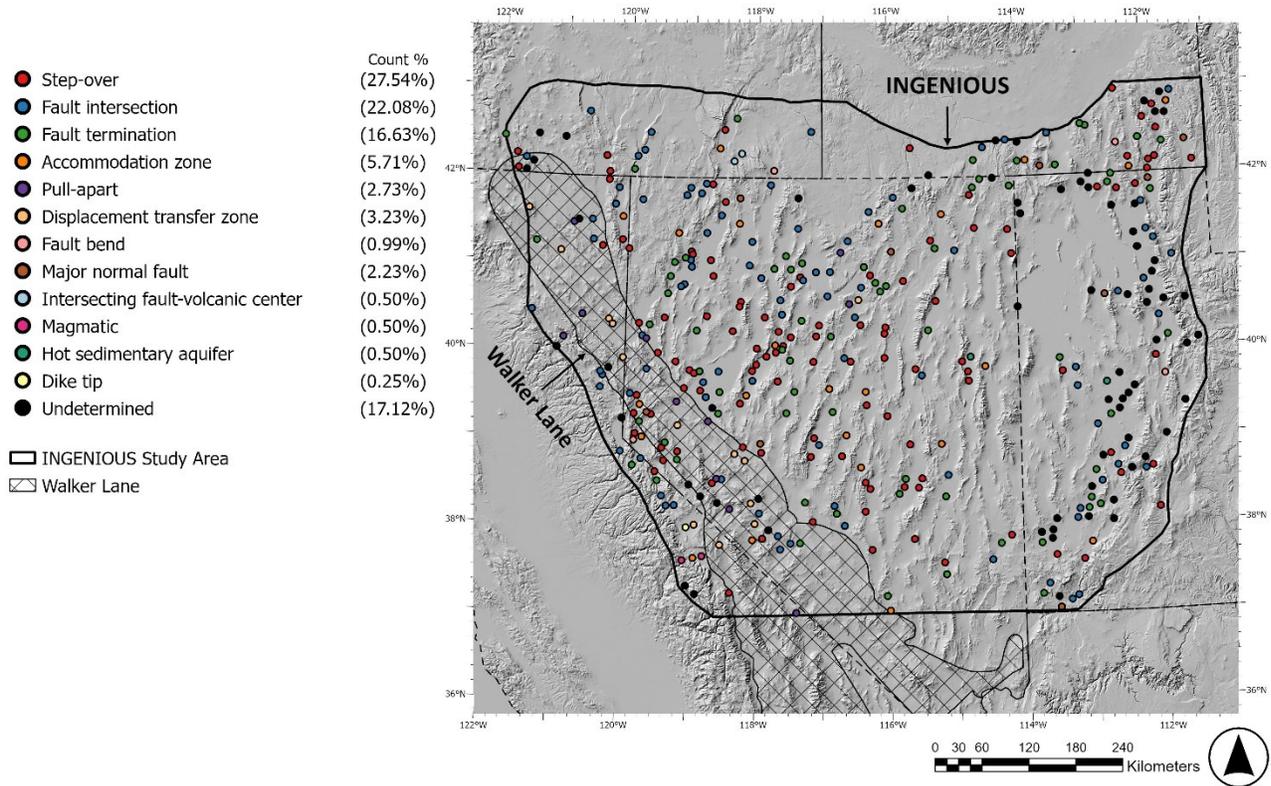
**B**



**Figure 3: FSS identified in the INGENIOUS study area. A. FSS shown as points and color coded according to type, with percentages calculated based on total number of sites. B. FSS shown as polygons and color coded according to type, with percentages reflecting proportion for each FSS type of total FSS areal coverage.**

### 4.2 Known Geothermal Systems

This FSS dataset includes all 403 known geothermal systems (KGS) in the study area, with temperatures  $\geq 37^{\circ}\text{C}$ . This threshold was chosen by Coolbaugh (2003) in an initial database for the GBR, because it is generally perceived as hot to the touch. The KGS dataset is an important subset of the FSS dataset, because geothermal activity has been documented at each of these sites. Step-overs are again the most common FSS accounting for  $\sim 27.5\%$  of KGS (Figure 4) followed by fault intersections (22.1%), fault terminations (16.6%), accommodation zones (5.7%), displacement transfer zones (3.2%), pull-aparts (2.7%), major normal faults (2.2%), fault bends (1.0%), intersecting faults and volcanic centers (0.5%), magmatic (0.5%), hot sedimentary aquifers (0.5%), and dike tips (0.3%). Notably, the FSS of 17.1% of the KGS could not be determined. Most of these consisted of isolated hot or warm wells in basins, where geophysical and geological data were ambiguous for interpreting the structural setting. In many of these cases, detailed geophysical data are not available. Displacement transfer zones and pull-aparts are more common in the transtensional western part of the GBR. Systems with a magmatic component are largely confined to the margins of the GBR. Area coverage for the individual types of FSS for the KGS is 26.3% for step-overs, 20.4% for fault terminations 20.3%, 15.93% for fault intersections, 15.6% for displacement transfer zones, 15.0% for accommodation zones, 3.8% for pull-aparts, 1.9% for hot sedimentary aquifers, and less than 1% for fault bends, major normal faults, intersecting faults-volcanic centers, magmatic, and dike tips.

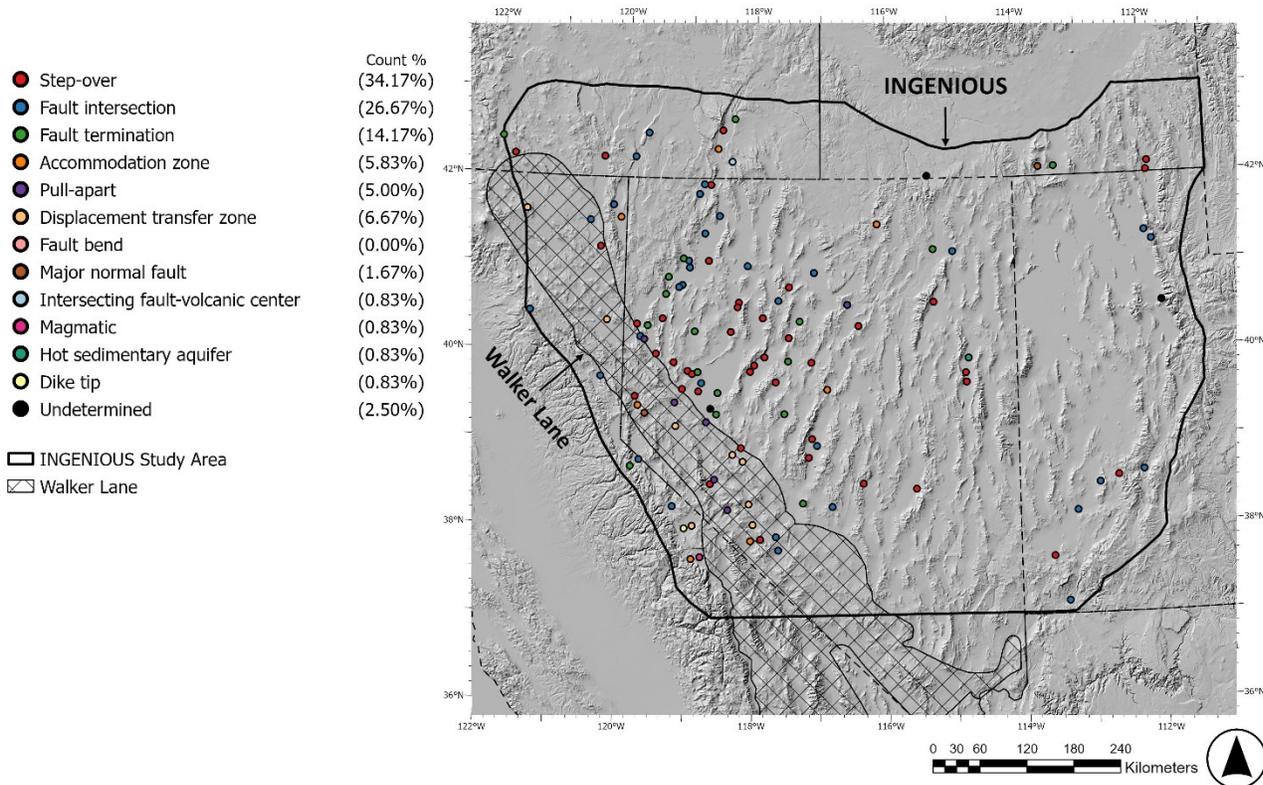


**Figure 4: FSS points identified for 403 KGS ( $\geq 37^{\circ}\text{C}$ ) in the INGENIOUS study area color coded according to type, with percentages calculated based on total number of sites. Note that the FSS of  $\sim 17.1\%$  of the KGS are undetermined, primarily due to a lack of detailed geophysical data associated with warm wells in basins.**

### 4.3 Training Sites

FSS were assessed for all 120 training sites, with measured or calculated temperatures  $\geq 120^{\circ}\text{C}$ , within the INGENIOUS study area. Training sites were recently refined by Hart-Wagoner et al. (2025). This is an important subset of the FSS dataset, because relatively high-temperatures have been documented at each of these sites. Thus, the sites have been used for assessing the characteristics of multiple datasets associated with known geothermal activity in regional workflows, geostatistical analyses, machine learning applications, and play fairway analyses (e.g., Hart-Wagoner et al., 2024a,b).

Step-overs are the most common FSS accounting for  $\sim 34.2\%$  of training sites (Figure 5) followed by fault intersections (26.7%), fault terminations (14.2%), displacement transfer zones (6.7%), accommodation zones (5.8%), pull-aparts (5.0%), major normal faults (1.7%), intersecting faults and volcanic centers (0.8%), magmatic (0.8%), hot sedimentary aquifers (0.8%), and dike tips (0.8%). The FSS of 2.5% of the training sites (3 systems) could not be determined. Area coverage for the individual types of FSS for the training sites is 33.3% for displacement transfer zones, 24.5% for step-overs, 14.9% for fault terminations, 13.2% for fault intersections, 9.1% for accommodation zones, 3.1% for pull-aparts, and less than 1% for hot sedimentary aquifers, major normal faults, intersecting faults-volcanic centers, magmatic, and dike tips.



**Figure 5: FSS points identified for 120 training sites ( $\geq 120^\circ$ ) in the INGENIOUS study area color coded according to type, with percentages calculated based on total number of sites. The FSS of three training sites (2.5% of total) could not be determined.**

## 5. DISCUSSION

A relatively small suite of fault interaction zones or FSS (Figure 1) controls most of the known geothermal systems in the GBR. These include fault terminations, fault intersections, step-overs, and accommodation zones in areas undergoing extension, whereas displacement transfer zones and pull-aparts are more prominent in the transtensional western part of the GBR within and proximal to the Walker Lane. Step-overs (or relay ramps) are the most common FSS for the training sites, with documented temperatures  $\geq 120^\circ\text{C}$  (~34%), and KGS with temperatures  $\geq 37^\circ\text{C}$  (~28%). They are also the most abundant FSS (nearly 40%) observed throughout the entire INGENIOUS study area. Fault intersections and terminations comprise from 14 to 27% of the KGS and training sites. Accommodation zones, displacement transfer zones, and pull-aparts vary from ~2 to 7% of the FSS for training sites, KGS, and the collective FSS dataset. Major normal faults represent a small fraction of the KGS (2.2%) and training sites (1.7%).

Fault interaction zones are more favorable for geothermal activity compared to major normal faults due to multiple factors. Such zones tend to be critically stressed (e.g., Micklethwaite and Cox, 2004; Siler et al., 2018) due to the lack of major earthquakes. Faults are therefore less likely to be sealed, and stress is more likely to be concentrated in such zones, which can collectively facilitate relatively long-term hydrothermal activity (Micklethwaite and Cox, 2004). Further, fault gouge is likely to be less prominent and fault breccia more dominant on the relatively minor faults typical of FSS, as compared to that along major faults. In addition, structural complexity in terms of density of faults and density of fault intersections is probably greater in such zones.

Because FSS may number in the hundreds for individual regions, it is important to develop methods for relative ranking of such features. Although generally subjective, the relative quality and certainty of individual FSS can be estimated. Higher structural complexity is also more conducive to geothermal activity, and thus FSS can be ranked, at least qualitatively, based on overall structural complexity, with fault terminations the least complex and accommodation zones, displacement transfer zones, and pull-aparts at the more complex end of the spectrum. Because higher extensional strain rates and higher rates of seismicity generally correlate positively with geothermal systems (e.g., Faulds et al., 2012; Hart-Wagoner et al., 2024a, b), it also follows that more recently active Quaternary faults would favor geothermal activity within FSS. Summation of slip and dilation tendency values based on the orientation of faults with respect to the regional stress field (cf., Morris et al., 1996; Ferrill et al., 1999) are also critical for evaluating individual FSS. In summary, the quality, certainty, slip rates, recency, and slip and dilation tendency can all be utilized to assess and rank individual FSS within the GBR.

More work is needed on FSS to better define their role in controlling geothermal systems. For example, many FSS have a variety of geometric and kinematic characteristics. In particular, step-overs are characterized by many evolutionary stages (e.g., Peacock and Sanderson, 1994) and accommodation zones have multiple geometries (e.g., Faulds and Varga, 1998). Certain geometries may be more conducive than others (e.g., Giddens and Faulds, 2025), and significant research is still needed to establish which characteristics of each FSS are most conducive to geothermal activity. More comprehensive stress modeling is also needed for FSS to more fully define critically

stressed areas and stress perturbations. Such studies will ultimately reduce the risks in geothermal development of such zones and enhance the probability of discovering many additional hidden geothermal systems

It is also important to note that the >1,430 FSS, 403 KGS, and 120 training sites in the INGENIOUS study area are all minimums. For example, the number of KGS's and training sites does not account for an unknown amount of hidden geothermal systems, which probably comprise the bulk of geothermal resources in the GBR. Furthermore, the lack of detailed geological (e.g., detailed geological maps) and geophysical (e.g., detailed gravity surveys) datasets greatly limits identification of FSS throughout much of the region, especially in the many basins, which constitute more than half of the GBR. In addition, many FSS (e.g., fault tips and accommodation zones) are characterized by closely-spaced, relatively minor faults with minimal recent surface ruptures. Finally, much of the GBR was inundated by late Pleistocene lakes, and thus faults that have not ruptured in the Holocene are obscured by lake sediments and shoreline features. Detailed gravity surveys are clearly crucial for delineating FSS within basins but cover only a small fraction of the GBR. Where detailed geophysical data are available, most basins appear to contain multiple FSS, raising an important question about the number of independent geothermal systems that a single basin may contain. If such basins host multiple systems, the geothermal potential of the GBR may be underestimated, especially considering that conductive heat envelopes conducive to EGS development may accompany convective systems. Moreover, the total number of FSS in the GBR is probably much greater than the ~1,430 that we identified. The 28 developed geothermal systems in the region with a nameplate capacity of ~1 GW represent <2% of the identified FSS. Considering that the identified FSS's are a bare minimum, we speculate that the geothermal potential of the region is much greater than 10 GWe. Regional assessments of FSS coupled with systematic acquisitions of detailed geological and geophysical datasets are therefore imperative for assessing and ultimately unleashing the full geothermal potential of the GBR.

## 6. ACKNOWLEDGMENTS

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