

NAME

DREW SILER

POSITION

SENIOR GEOLOGIST



EXPERTISE SUMMARY

TECHNICAL EXPERTISE

- Structural Geology and Assessment of Permeability Pathways
- Geothermal Resource Evaluation
- Geological and Geophysical Data Integration
- 3D Geologic Mapping/Modeling

CONTACT INFORMATION

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EDUCATION AND OTHER TRAINING

EDUCATION

Ph.D., Syracuse University, Syracuse, NY, USA, 2011

B.S., University of Washington, Seattle, WA, USA, 2005

OTHER TRAINING

- University of Arizona, Lowell Program on Economic Geology
 - Porphyry Short Course, Porphyry Cu and IOCG deposits, 2019
- Stanford University
 - Reservoir Geomechanics, 2013
- Geothermal Resource Council
 - Geothermal Exploration, 2013

LANGUAGE SKILLS

Native | English

PROFILE



Dr. Drew Siler is a Senior Geologist specializing in 3D structural and geologic characterization of geothermal areas. He joined Geologica in 2023. Drew earned a Ph.D. in Geology from Syracuse University with a focus on the structural geology and tectonics of mid-ocean ridges and Iceland in 2011. He has 12+ years of experience conducting and managing geothermal projects during Post-Doctoral Fellowships at University of Nevada, Reno/Great Basin Center for Geothermal Energy and Lawrence Berkeley National Lab, and as a Research Scientist at the U.S. Geological Survey. His experience ranges from regional geothermal assessments to evaluations of individual geothermal systems in a variety of tectonic settings. Drew's expertise is integration of geological (e.g., geologic map, downhole geologic data) and geophysical (e.g., gravity, magnetics, MT, seismic reflection) data and construction of 3D geologic maps and models, as well as static and dynamic stress modeling. Drew has authored or co-authored 60+ peer-reviewed articles and conference papers on geothermal systems, geothermal processes, structural geology, and tectonics that have been cited 1000+ times

REPRESENTATIVE PROJECT EXPERIENCE

PROJECT MANAGER/GEOSCIENTIST

US Dept of Energy /University of Nevada, Reno/USGS | INnovative Geothermal Exploration through Novel Investigations Of Undiscovered Systems (INGENIOUS). Regional to local scale geothermal exploration, and development of best practices workflows. **Great Basin, USA** (2020-2022)

PROJECT MANAGER/GEOSCIENTIST

US Dept of Energy/Sandia National Laboratory | Understanding a Stratigraphic Hydrothermal Resource: Geophysical Imaging at Steptoe Valley, Nevada. Geophysical characterization and 3D geological analysis of stratigraphic/sedimentary hosted geothermal resources. **Steptoe Valley, NV, USA** (2020-present)

CO-PRINCIPAL INVESTIGATOR

USGS | Bottom-Up Resource Characterization: Paired 3D Magnetotelluric and 3D geologic characterization of the deep heat sources of mineral and geothermal systems. Regional 3D magnetelluric and 3D geologic exploration for hydrothermal and epithermal mineral resources. **Gabbs Valley, NV, USA** (2019-2021)

PROJECT MANAGER/GEOSCIENTIST

US Dept of Energy/National Renewable Energy Laboratory | Insightful Subsurface Characterizations and Predictions: Machine Learning approach to optimizing geothermal reservoir performance. A Supervised machine learning to optimize geothermal reservoir models. **Brady Geothermal Area, NV, USA** (2019-2021)

PRINCIPAL INVESTIGATOR

USGS | 3D geologic controls on hydrothermal fluid flow. Geological and geophysical data synthesis, 3D geologic modeling, static and dynamic stress modeling, and validation. **Dixie Valley, Brady, Salt Wells, southern Gabbs Valley, northern Granite Springs Valley, NV, Neal Hot Springs, OR, Camas Prairie, ID, USA** (2016-2022)

GEOSCIENTIST

US Dept of Energy/Univeristy of Nevada, Reno/Lawrence Berkeley National Lab/USGS | Discovering Blind Geothermal Systems in the Great Basin Region: Geothermal play-fairway exploration. **Great Basin, NV, USA** (2014-2019)

GEOSCIENTIST

US Dept of Energy/Univeristy of Nevada, Reno/Pyramid Lake Paiute Tribe | 3D analysis of the geothermal system at Astor Pass : seismic reflection interpretation, image log, stress, and structural analyes, 3D geological mapping **Astor Pass, NV, USA** (2014-2019)

**MEMBERSHIP IN
PROFESSIONAL
ASSOCIATIONS
AND
PUBLICATIONS**

PROFESSIONAL ASSOCIATIONS

- Member Geothermal Resource Council, 2012 to present. Best Presentation Award 2012, 2014, 2016.
- Member Women in Geothermal (WING), 2016 to present.

PUBLICATIONS

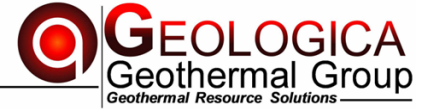
- Vesselinov, V.V., Ahmmed, B., Mudunuru, M.K., Pepin, J.D., Burns, E.R., **Siler, D.L.**, Karra, S. and Middleton, R.S., 2022. Discovering hidden geothermal signatures using non-negative matrix factorization with customized k-means clustering. *Geothermics*, 106, p.102576.
- Schwering, P., Winn, C., Jaysaval, P., Knox, H., **Siler, D.L.**, Hardwick, C., Ayling, B., Faulds, J., Mlawsky, E., McConville, E. and Norbeck, J., 2022. Advancing geophysical techniques to image a stratigraphic hydrothermal resource. *Geothermal Resources Council Transactions*, 46, pp.976-991.
- Duplyakin, D., Beckers, K.F., **Siler, D.L.**, Martin, M.J. and Johnston, H.E., 2022. Modeling subsurface performance of a geothermal reservoir using machine learning. *Energies*, 15(3), p.967.
- **Siler, D.L.**, Faulds, J.E., Hinz, N.H., and Queen, J.H., 2021, Three-dimensional geologic map of the Brady geothermal area, Nevada: *U.S. Geological Survey Scientific Investigations Map 3469*, 2 sheets, pamphlet 20 pp., <https://doi.org/10.3133/sim3469>
- **Siler, D.L.**, Pepin, J.D., Vesselinov, V.V., Mudunuru, M.K., and Ahmmed, B., 2021, Machine learning to identify geologic factors associated with production in geothermal fields: a case-study using 3D geologic data, Brady geothermal field, Nevada: *Geothermal Energy*, v. 9, p. 1-17, <https://doi.org/10.1186/s40517-021-00199-8>
- **Siler, D.L.** and Pepin, J.D., 2021, 3-D geologic controls of hydrothermal fluid flow at Brady geothermal field, Nevada, USA: *Geothermics*, 94, p. 102-112, <https://doi.org/10.1016/j.geothermics.2021.102112>
- Pollack, A., Cladouhos, T.T., Swyer, M.W., **Siler, D.L.**, Mukerji, T. and Horne, R.N., 2021. Stochastic inversion of gravity, magnetic, tracer, lithology, and fault data for geologically realistic structural models: Patua Geothermal Field case study. *Geothermics*, 95, p.102129.
- Peacock, J.R. and **Siler, D.L.**, 2021. Bottom-Up and Top-Down Control on Hydrothermal Resources in the Great Basin: An Example From Gabbs Valley, Nevada. *Geophysical Research Letters*, 48(23), p.e2021GL095009.
- Beckers, K.F., Duplyakin, D., Martin, M.J., Johnston, H.E. and **Siler, D.L.**, 2021. Subsurface Characterization and Machine Learning Predictions at Brady Hot Springs Results (No. 1346). USDOE Geothermal Data Repository (United States); National Renewable Energy Lab.



- Faulds, J.E., Hinz, N.H., Coolbaugh, M., Ayling, B., Glen, J., Craig, J.W., McConville, E., **Siler, D.L.**, Queen, J., Witter, J. and Hardwick, C., 2021. Discovering Blind Geothermal Systems in the Great Basin Region: An Integrated Geologic and Geophysical Approach for Establishing Geothermal Play Fairways: All Phases (No. DOE-UNR-06731-01).
- Faulds, J.E., Sadowski, A.J., Coolbaugh, M.F. and **Siler, D.L.**, 2020. Geothermal Play Fairway Analysis of the Sou Hills, Northern Nevada: A Major Quaternary Accommodation Zone in the Great Basin Region. *Geothermal Resources Council Transactions*, 44, pp.542-556.
- Shervais, J.W., Glen, J.M., **Siler, D.L.**, Liberty, L.M., Nielson, D., Garg, S., Dobson, P., Gasperikova, E., Sonnenthal, E., Newell, D. and Evans, J., 2020. Play Fairway Analysis in Geothermal Exploration: The Snake River Plain Volcanic Province. In *Proceedings, 45st Workshop on Geothermal Reservoir Engineering*.
- **Siler, D.L.**, Burns, E.R. and Faulds, J.E., 2019. Can Geologic Factors be Predictive for Distinguishing between Productive and Non-productive Geothermal Wells?. *Geothermal Resources Council Transactions*, 43, pp.884-901.
- **Siler, D.L.**, Faulds, J.E., Glen, J.M.G., Hinz, N.H., Witter, J.B., Blake, K., Queen, J., and Fortuna, M., 2019, Three-dimensional Geologic Map of the Southern Carson Sink, Nevada, Including the Fallon FORGE area: *U.S. Geological Survey Scientific Investigations Map 3437*, pamphlet 22 pp., <https://doi.org/10.3133/sim3437>
- **Siler, D.L.**, Faulds, J.E., Hinz, N.H., Dering, G.M., Edwards, J.H., and Mayhew, B., 2019. Three- dimensional geologic mapping to assess geothermal potential: examples from Nevada and Oregon: *Geothermal Energy*, 7:2, 32 pp., <https://doi.org/10.1186/s40517-018-0117-0>
- Witter, J.B., Trainor-Guitton, W.J. and **Siler, D.L.**, 2019. Uncertainty and risk evaluation during the exploration stage of geothermal development: A review. *Geothermics*, 78, pp.233-242.
- **Siler, D.L.**, Hinz, N.H., and Faulds, J.E., 2018, Stress concentrations at structural discontinuities in active fault zones in the western United States: Implications for permeability and fluid flow in geothermal fields: *GSA Bulletin*, 130(7-8), p. 1273-1288, <https://doi.org/10.1130/B31729.1>
- **Siler, D.L.**, Faulds, J.E., Glen, J.M., Hinz, N.H. and Witter, J.B., 2018. New data yield new geologic insights at the Fallon FORGE site, Carson Sink Region, Nevada. *Geothermal Resources Council Transactions*, 42.
- **Siler, D.L.** and Glen, J.M., 2018. Which Geologic Factors Control Permeability Development in Geothermal Systems? The Geologic Structure of Dixie Valley. *Geothermal Resources Council Transactions*, 42.
- Witter, J.B., Glen, J.M., **Siler, D.L.**, and Fournier, D., 2018. 2D and 3D potential field mapping and modelling at the Fallon FORGE site, Nevada, USA. *Trans Geothermal Resources Council Transactions*, 42.
- Faulds, J., Craig, J., Hinz, N., Coolbaugh, M., Glen, J., Earnery, T., Schermerhorn, W., Peacock, J., Deoreo, S. and **Siler, D.L.**, 2018. Discovery of a blind geothermal system in Southern Gabbs Valley, western Nevada, through application of the play fairway analysis at multiple scales. *Geothermal Resources Council Transactions*, 42.
- **Siler, D.L.**, and Karson, J.A., 2017. Along-Axis Structure and Crustal Construction Processes of Spreading Segments in Iceland: Implications for Magmatic Rifts. *Tectonics*.
- **Siler, D.L.**, Yingqi Zhang, Nicolas F. Spycher, Patrick F. Dobson, James S. McClain, Erika Gasperikova, Robert A. Zierenberg, Peter Schiffman, Colin Ferguson,

Curriculum Vitae (CV)

Drew Siler



Andrew Fowler, Carolyn Cantwell, 2017. Play-fairway analysis for geothermal resources and exploration risk in the Modoc Plateau region, Geothermics. 69, 15-33.

- **Siler, D.L.**, and Kennedy, B.M., 2016. Regional crustal-scale structures as conduits for deep geothermal upflow, Geothermics, 59A, 27-37.
- Witter, J.B., **Siler, D.L.**, Faulds, J.E., and Hinz, N.H. 3D geophysical inversion modeling of gravity data to test the 3D geologic model of the Bradys geothermal area, Nevada, USA.
- **Siler, D.L.**, Faulds, J.E. Mayhew, B., and McNamara, D., 2016. Analysis of the favorability for geothermal fluid flow in 3D: Astor Pass geothermal prospect, Great Basin, northwestern Nevada, USA, Geothermics, 60, 1-12.
- **Siler, D.L.**, and J.A. Karson, 2012. Sub-volcanic subsidence and caldera formation during sub aerial seafloor spreading in Iceland, Geological Society of America Bulletin, v. 124, no. 7-8, p. 1310-1323.
- **Siler, D.L.**, and J.A. Karson, 2009. Three-dimensional structure of inclined sheet swarms: Implications for crustal thickening and subsidence in the volcanic rift zones of Iceland, Journal of Volcanology and Geothermal Research, 188, 333–346

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself and my qualifications.

Drew Siler

11/01/2023

Name

Signature

Date (dd/mm/yyyy)

