geoconvention
Calgary • Canada • May 12-14 2025

The Geothermal Atlas of Alberta

Nevenka Nakevska, Arif Rabbani, Alex Onojeghuo, Hugo Geng, Matthias Grobe, Dan Palombi
Alberta Geological Survey, Alberta Energy Regulator

Summary

Geothermal energy in the Alberta portion of the Western Canada Sedimentary Basin (WCSB) remains largely untapped despite its potential. The basin, known for its vast hydrocarbon resources, also features subsurface geological conditions conducive to hosting geothermal energy resources. Recent efforts by the Alberta Geological Survey (AGS) focus on identifying and characterizing geothermal reservoirs at the formation scale. The study involves creating new geothermal favourability maps for several geological units, integrating regional temperature data with geological, petrophysical, and hydrogeological information. These input variables were analyzed, classified, and used to create three spatial data layers, namely: temperature, porosity thickness, and aquifer indication. The layers were subsequently utilized in a geographic information system (GIS) weighted overlay analysis to create formation-scale geothermal favourability maps showing areas with different favourability classes. A key outcome of this work is the development of a comprehensive Geothermal Atlas of Alberta, which features relevant geoscience data and information, including geothermal favourability maps and estimates of heat-in-place and power generation potential (Figure 1). Using data-driven mapping approaches, the platform interacts with a rich repository of geological data and offers users interactive access to geothermal energy-related spatial data. It facilitates the identification of potential areas for geothermal exploration, assists in selecting geologically favourable subsurface targets, and provides tools for cartographic visualization and data analysis.

Acknowledgements

Our appreciation extends to our AGS colleagues Mahshid Babakhani, Jesse Peterson, Nelson Bernal, Tyler Hauck, and Levi Knapp for their invaluable assistance in characterizing the geological and geochemical aspects.

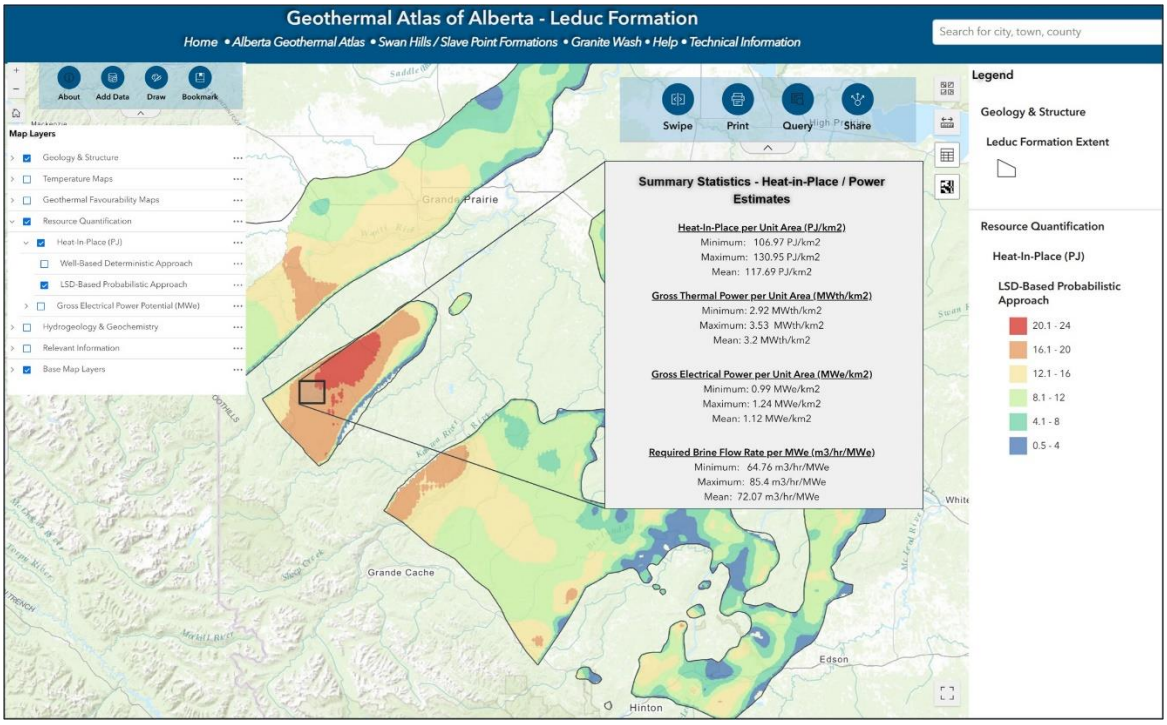

Figure 1. Detailed view of the resource quantification layer for the Leduc Formation in the Geothermal Atlas of Alberta, showcasing geothermal resource summary statistics with colour-coded heat-in-place (HIP) values using an LSD-based probabilistic approach for a user-specified area.