Geothermal Reservoir Architecture of the Trenton-Black River Gas Fields, NY

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1. Background and Motivation

The Trenton-Black River gas fields of New York state were discovered in the early 2000s and are one of the largest-producing gas plays in the state.

Previous work (Smith, 2009; Davies and Smith, 2006) determined these fields are hydrothermally dolomitized grabens in which gas is produced from **fractures and vugs** in the Upper Ordovician Black River Formation.

Reservoir architecture of these fields has not been documented previously. Our work focuses on the Quackenbush Hill field to better understand how this play could perform as geothermal reservoirs. We tie together well logs, core data, and core descriptions to:

- Understand the **relationship between porosity and permeability**, if any
- Determine whether **vertical or horizontal permeability** dominates in the reservoir
- Determine the role of **fractures and vugs** in permeability distribution
- Quantify the **distribution** of porosity and permeability within the producing zone

2. Location, Geology, and Temperature

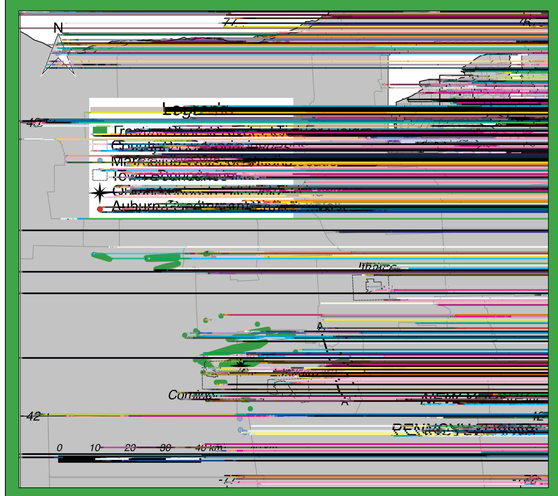

Figure 1. (left)
Map of the Trenton-Black River fields in southern NY. These fields strike WNW to west. Cross section A-A' is shown in Fig. 2. This work's research is conducted on Quackenbush Hill field, shown in this map by the black star, near Elmira and Corning.

3. Well Log Data

Well log data was collected from the gas-producing intervals of the Black River Formation in the Quackenbush Hill field. Outliers were removed, and dolomite was distinguished from limestone using the photoelectric factor log. Neutron porosity was adjusted where the matrix was dolomite. Where density porosity exceeded neutron porosity, the gas excavation effect was corrected using the iterative process described by **Bassiouni (1994)**. For the remainder of the readings, true porosity was calculated using

(1)

where $_{N}$ is neutron porosity, $_{ma}$ is matrix density, and $_{b}$ is bulk density log reading.

4. Core Data