

**AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003**

Robert D Jacobi¹, John C. Fountain¹, Courtney Lugert¹, Travis Nelson¹, Gerald Smith¹, Thomas Mroz², John Martin³
(1) University at Buffalo, Buffalo, NY (2) US DOE/NETL, Morgantown, WV (3) NYSERDA, Albany, NY

Identifying Trenton/Black River Targets in the Northern Appalachian Basin (NYS): Demonstration of Integrated Exploration Tools

The Trenton/Black River is the hottest play in the northern Appalachian Basin in the past twenty years. Porosity in the play depends on reactivated faults and associated fractures that controlled dissolution and later dolomitization. On 2-D seismic narrow grabens with little structural relief are used to identify prospective Trenton/Black River targets. However, 2-D seismic does not facilitate off-line extrapolation of the fault trends for exploration purposes. Faults can be extended away from the seismic lines by tracing lineaments that are coincident with the faults observed on seismic. However, Landsat lineaments (EarthSat, 1997) with multiple trends intersect the seismic lines at several fault locations.

In order to determine which (if any) lineaments correspond to the faults observed on seismic, we groundtruthed topographic and Landsat (EarthSat, 1997) lineaments. Groundtruthing elements included fracture patterns in outcrops, soil gas anomalies, and aeromagnetic data. We measured 8 characteristics of over 6000 fractures in Upper Devonian units along Seneca and Cayuga lakes. We found that differentiation is possible between fracture intensification domains (FIDs) related to Trenton/Black River structures and those FIDs related to shallower Alleghanian thrusts: the former predate Alleghanian (?) cross-strike fractures, whereas the latter postdate cross-strike fractures. Aeromagnetic gradients are generally coincident with Trenton/Black River FIDs. Soil gas measured at 10m spacings confirms the FID origin (and trend) of lineaments in regions of no outcrop. Integration of these methods allows discrimination of Trenton/Black River-related lineaments, and thus promotes extrapolation of Trenton/Black River structures away from seismic lines along selected lineaments.