

Developing CCS in the Midwest Regional Carbon Initiative with CCS Research, Datasets, and Legacy Seismic



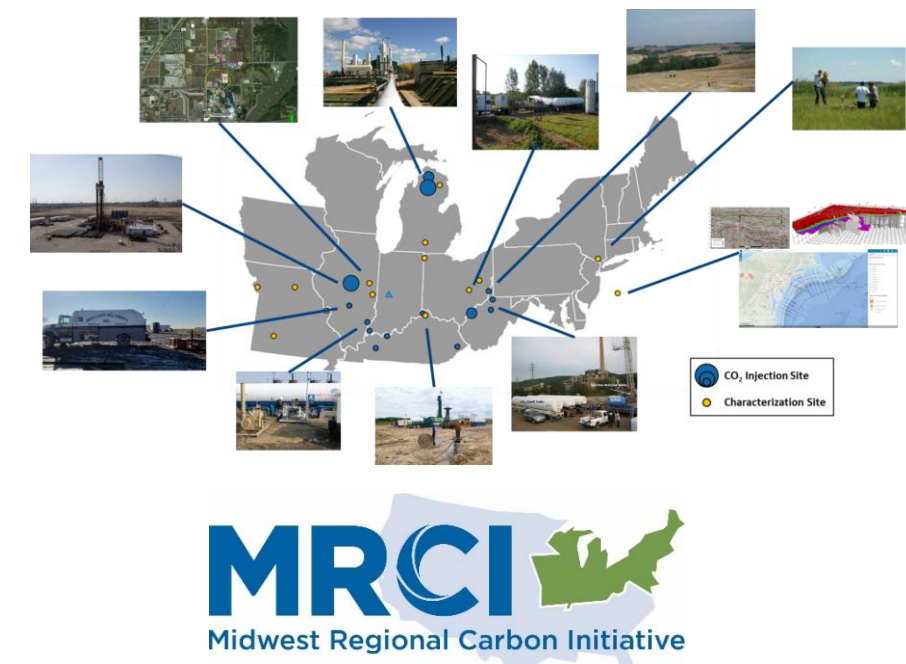
Joel Sminchak, Chris Korose¹, Amy Lang, Stuart Skopec, and Jaelen Lewis
Battelle Memorial Institute | ¹Illinois State Geological Survey

DEVELOPING CCS IN THE MRCI

- Development of CCS applications was facilitated in the 20-state Midwest Regional Carbon Initiative (MRCI) through the collection and sharing of existing and new technical data.
- Datasets were shared with many industry, regulators, and state agencies in support of CCS.

CO₂ Storage Projects in MRCI
(not including CO₂-EOR)

State	County	Permitted/Current Status	Proposed CO ₂ Injection Rate	Maximum Total CO ₂ Injection Potential	Current Status	Current Project Phase
IL	Christian	Heartland Energy	N/A	N/A	Pending (IP permit)	Pre-construction
IL	Ford	One Earth Separation, LLC	N/A	N/A	Pending (IP permit)	Pre-construction
IL	Sangamon	CO ₂ Works, USF, & Tower	N/A	N/A	(FEED)	(CarbonSAFE)
IL	Macon	ADM (BCFP)	1.8-1.2 Mtpa	6.8 Mt	Active	Injection
IL	Mason	ADM (ICSP)	N/A	N/A	Pending	Pre-construction
IL	Mason	ADM (Mason)	N/A	N/A	Pending	Pre-construction
IL	Mason	Heartland Energy	N/A	N/A	Pending (IP permit)	Pre-construction
IL	Putnam	Heartland Energy	N/A	N/A	Pending	Pre-construction
IL	St. Clair	CarbonSAFE IL	N/A	N/A	Class VI permit	Pre-construction
IN	Randolph	One Carbon	N/A	N/A	Pending	Pre-construction
IN	Vigo	Wabash Carbon	0.854 Mtpa	10 Mt	Pending	Pre-construction
IN	Laurens	Heartland Energy	0.854 Mtpa	10 Mt	(FEED)	(CarbonSAFE)
OH	Loan	Zen Carbon	N/A	N/A	Pending	Pre-construction
IA	Boone	Duke East Bend	0.001 Mtpa	0.001 Mt	Class V	Closed
IL	Mason	ADM	0.3 Mt	1.0 Mt	Class V	Post-injection
MI	Chicago	Core Energy	0.5 Mtpa	0.06 Mt	Class V	Closed
WV	Mason	ADP Mountaineer	0.12 million m ³ (0.002 million m ³ per year)	0.002 Mt	Class V	Closed



MRCI
Midwest Regional Carbon Initiative

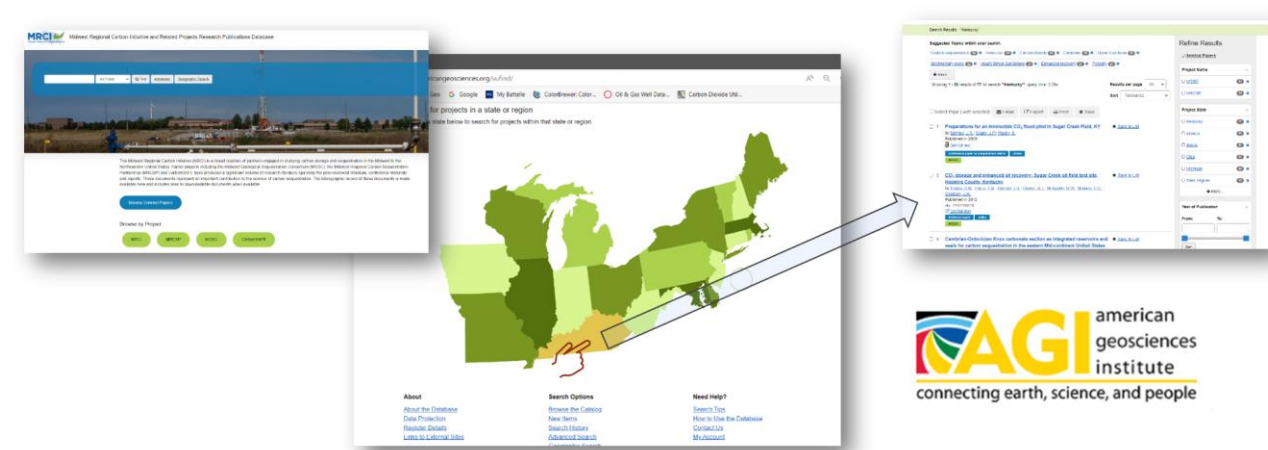
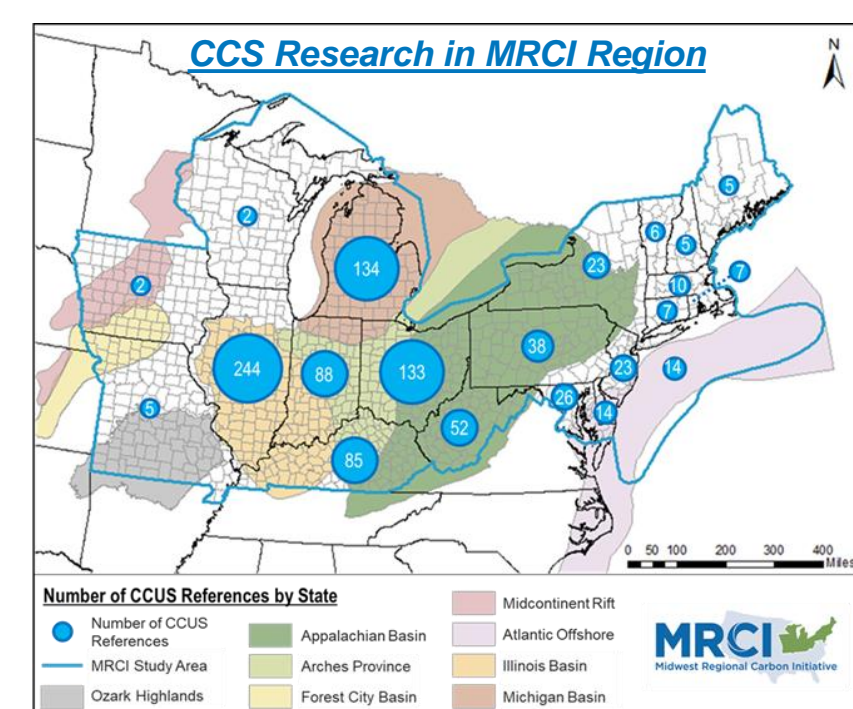
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- Previous research results were used to evaluate key topics: CCS feasibility at natural gas power plants, legacy seismic, and exploration of additional CO₂ storage options in the region.
- The data collection, sharing and analysis facilitates distribution of existing information on carbon storage for the MRCI region and support for accelerating CCS projects in the MRCI region.

LEVERAGING MRCI RESEARCH AND DATASETS

- Geological studies on CO₂ storage resources, pilot-scale CO₂ injection tests, industrial scale CO₂ storage projects, monitoring data from CO₂ storage, and policy and regulations in the MRCI region provide a foundation for CCS development.
- An inventory of this information was organized into a database of more than 1,000 items that provide a foundation for developing CCS in the region.



Key Research on CCS in the MRCI is available to everyone on the MRCI Website

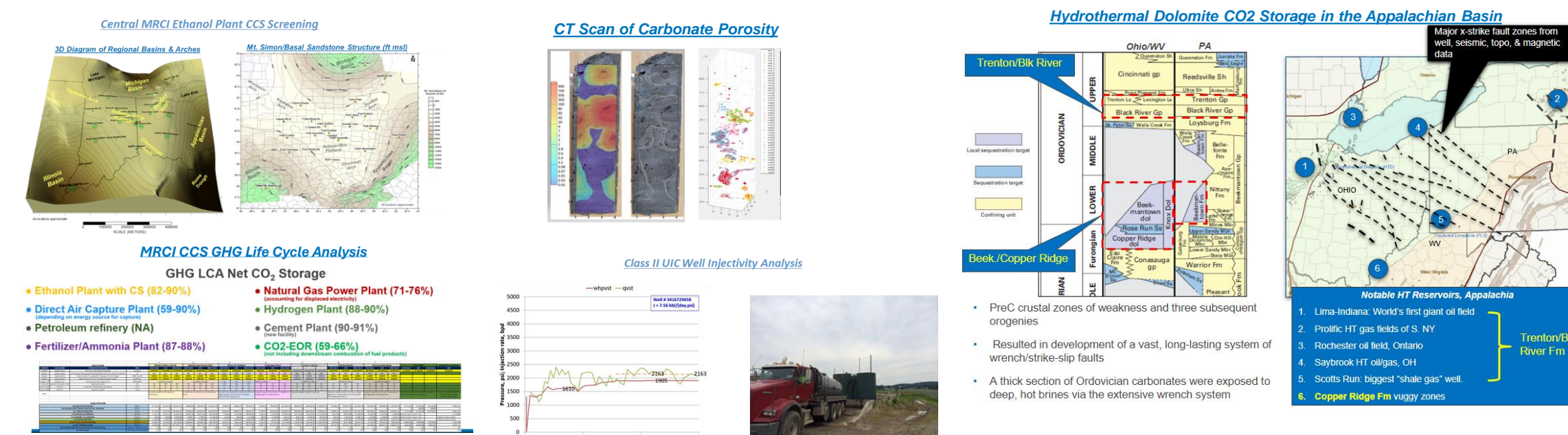
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ACKNOWLEDGEMENTS

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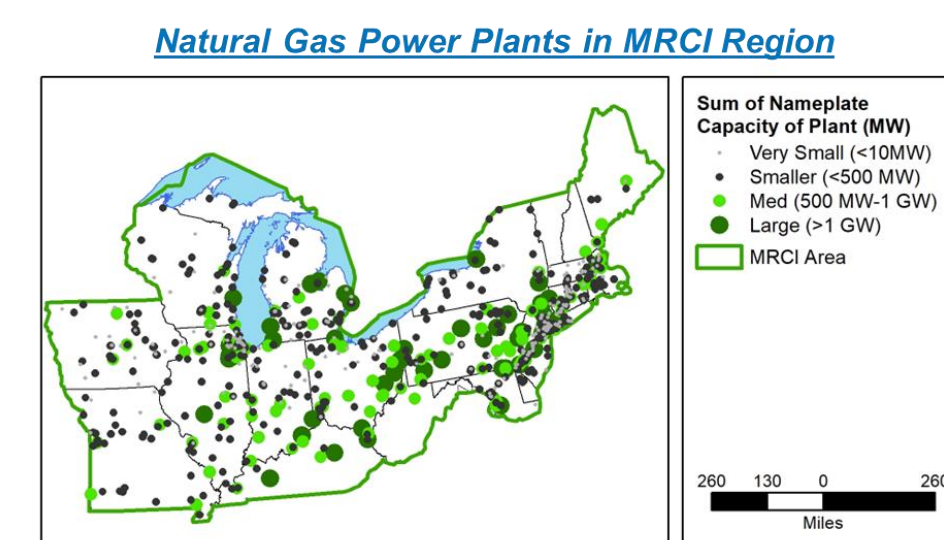
ANALYZING KEY CHALLENGES FOR CCS IN THE MRCI

- Key topics are being addressed based on existing data and analyses from previous efforts under the Midwest Geologic Sequestration Consortium, Midwest Regional Carbon Sequestration Partnership, state funded CCS projects, and DOE-funded efforts.
- Geological studies on CO₂ storage resources, pilot-scale CO₂ injection tests, industrial scale CO₂ storage projects, monitoring data from CO₂ storage, and policy and regulations in the MRCI region help ensure safe, environmentally responsible CCS project development in the MRCI region.

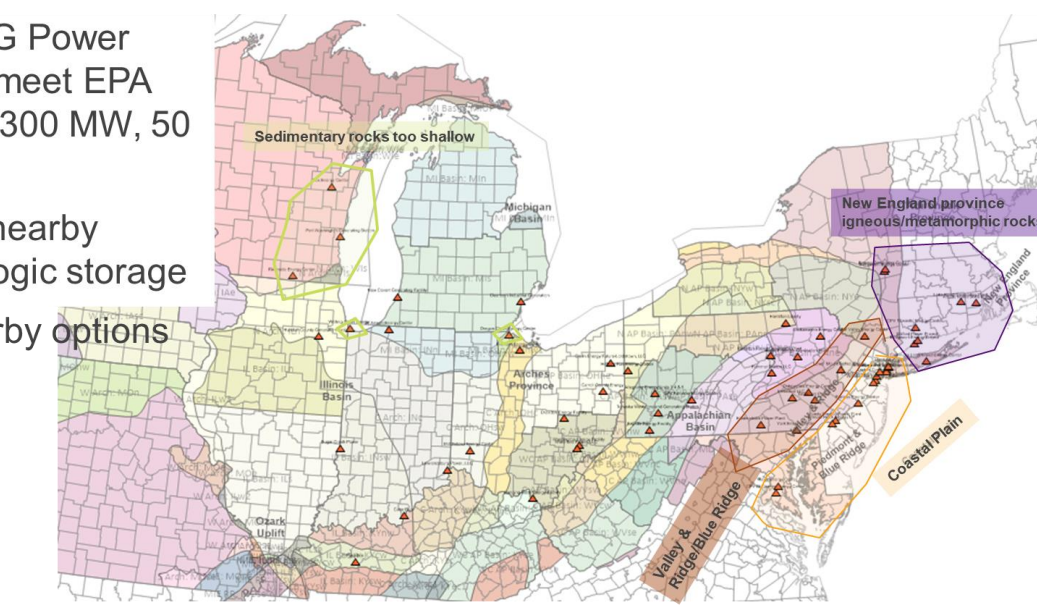


Additional analysis completed with existing CCS datasets for MRCI:

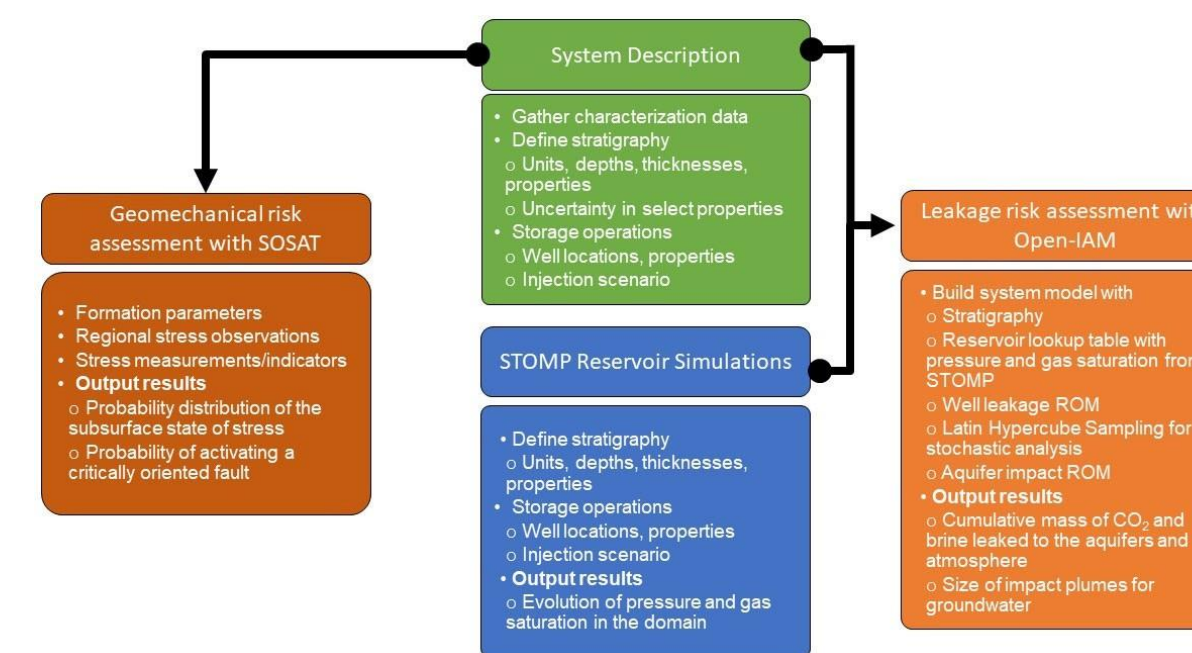
- Class I & II Underground Injection Control well injectivity analysis
- Central MRCI Ethanol Plant CCS Screening Study
- Greenhouse Gas Emissions Life Cycle Analysis for MRCI Sources
- ACT-ENSURE collaboration for micro-seismicity
- Machine learning for downhole pressure/temperature prediction
- CT scan for carbonate porosity zones
- NRAP tool validation with field data in MRCI
- CCS Screening for Natural Gas Plants in MRCI



- 59 of the 781 NG Power Plants in MRCI meet EPA Rule for CCS (>300 MW, 50 Capacity factor)
- 23 plants have nearby options for geologic storage
- 26 have no nearby options



- The Illinois State Geological Survey worked with PNNL in support of the Wabash CarbonSAFE project, including STOMP reservoir simulations for the Potosi Dolomite, and assessments of well leakage risk and subsurface stresses using the NRAP-Open-IAM and SOSAT.
- The CarbonSAFE Illinois Storage Corridor used NRAP tools (SOSAT, NRAP-Open-IAM and DREAM) for site characterization and to support UIC Class VI permit.

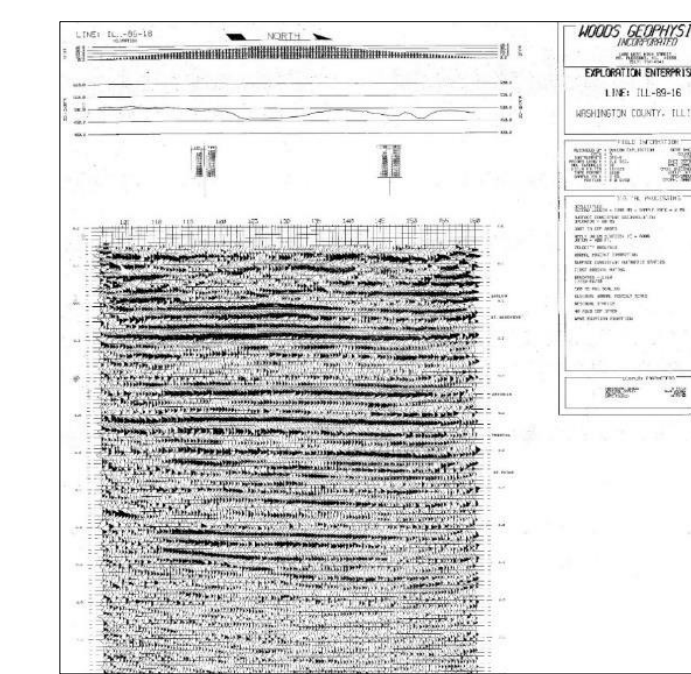


LEVERAGING LEGACY SEISMIC SURVEY DATA

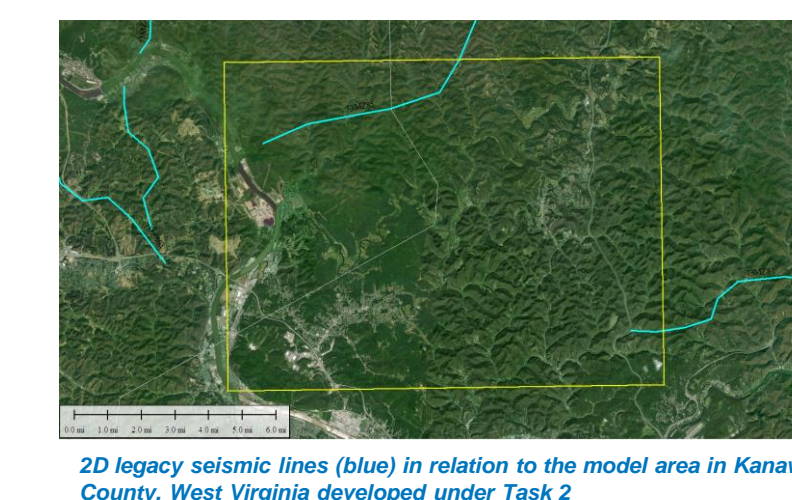
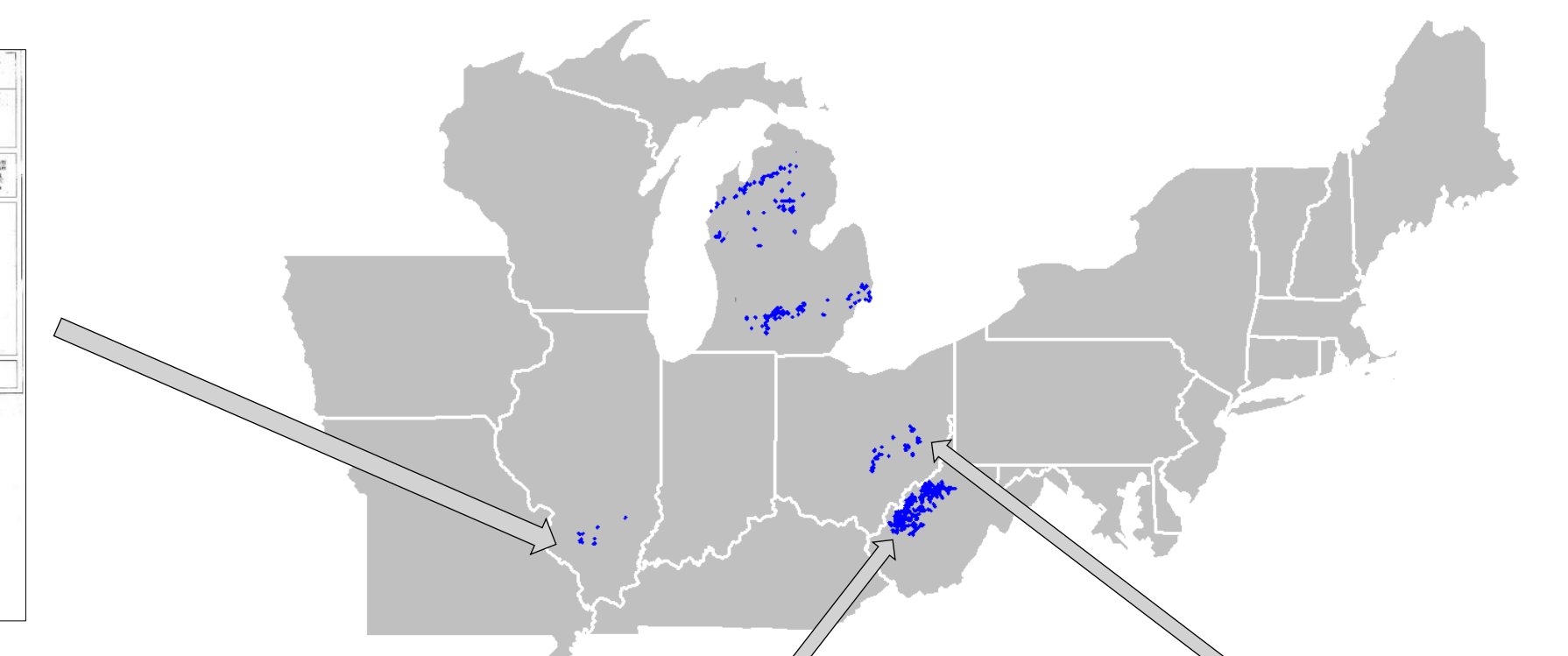
The legacy seismic data was organized, summarized, and digitized so that it may support CCS in the MRCI region:

- 986 seismic surveys
- 1,892 linear miles of 2D seismic data
- 43 square miles of 3D seismic data
- 61 boxes containing CD's, DVD's, tape cartridges, floppy disks, reels, mylars, and paper plots
- 8 oil and gas operating companies with data from Illinois, Michigan, Ohio, and West Virginia

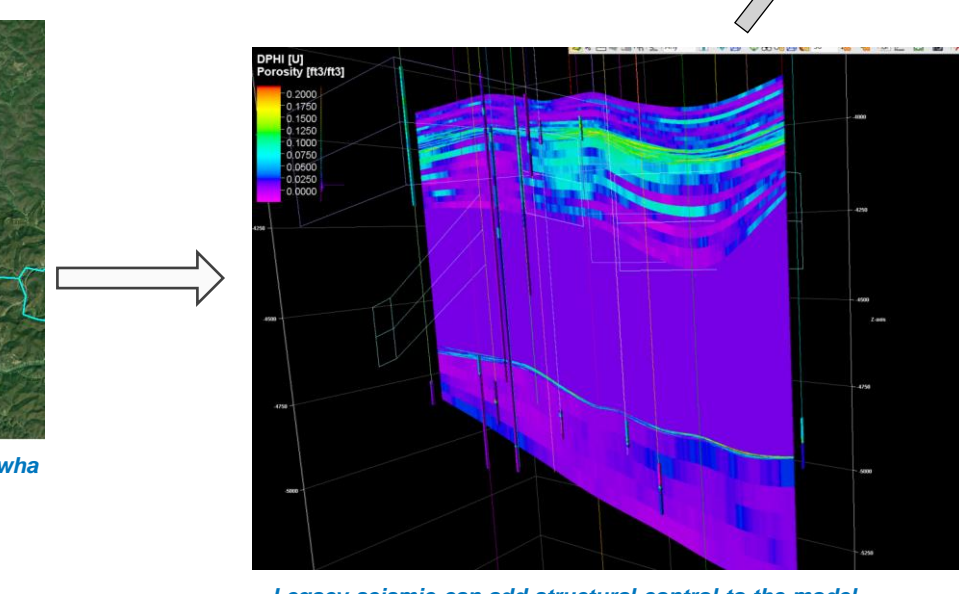
The seismic surveys were cataloged in terms of location, acquisition parameters, data type, and format.



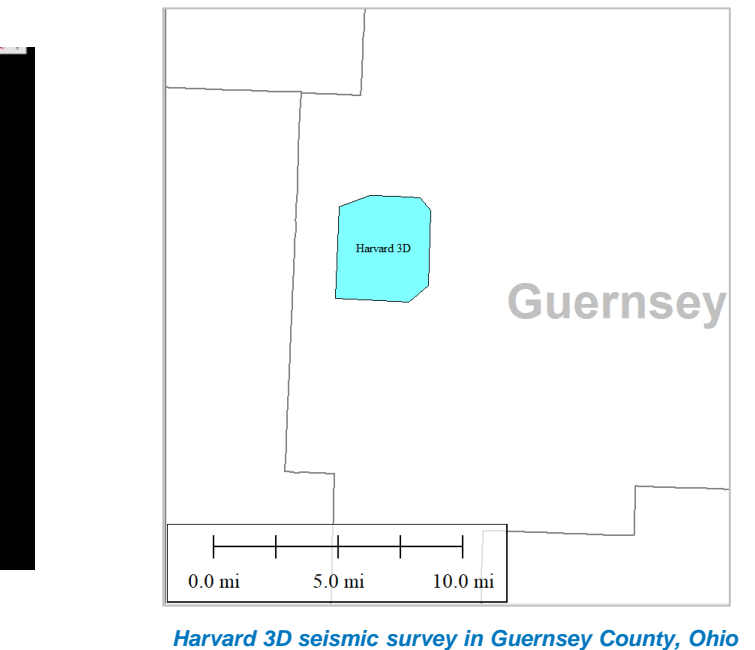
2D seismic line in southern Illinois scanned from mylar to digital format



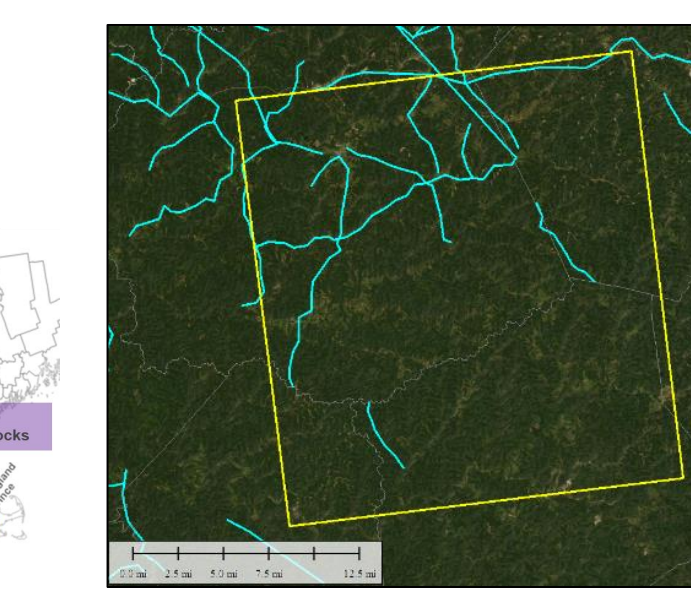
2D legacy seismic lines (blue) in relation to the model area in Kanawha County, West Virginia developed under Task 2



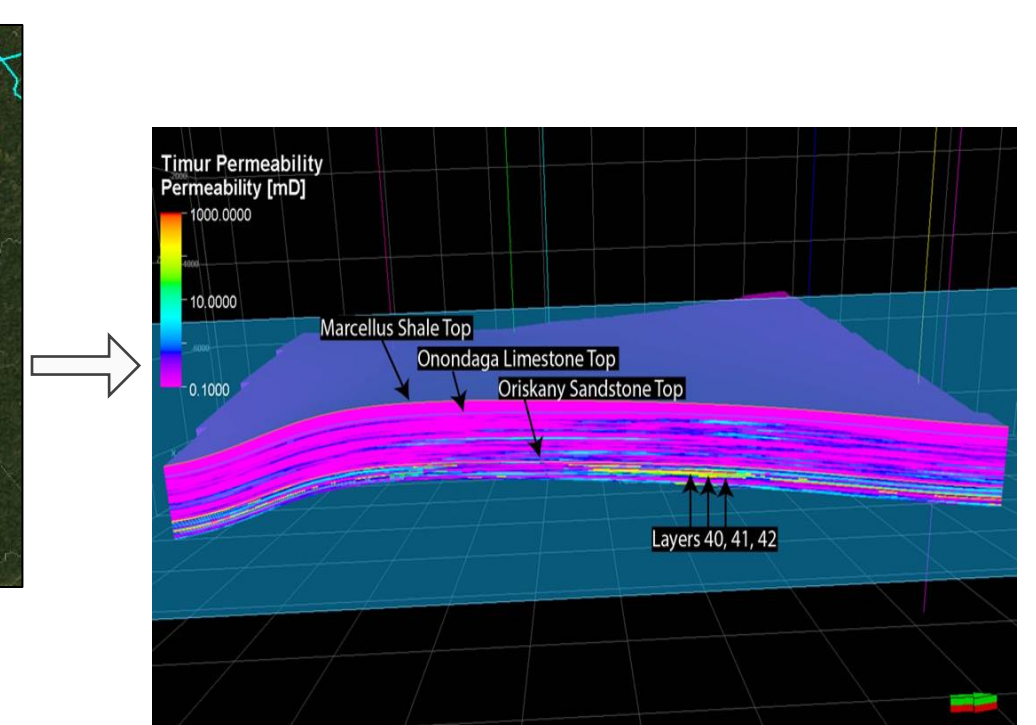
Legacy seismic can add structural control to the model



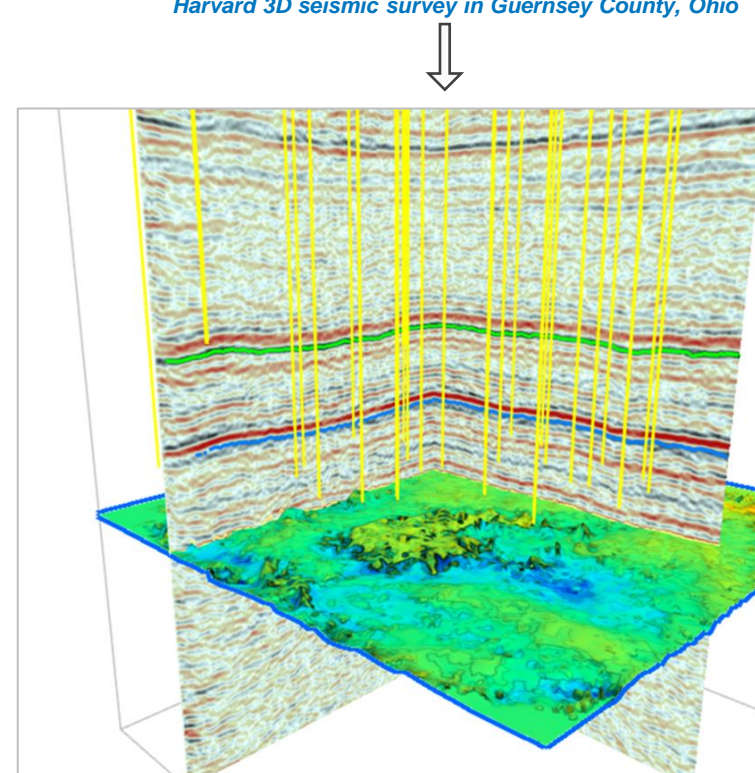
Harvard 3D seismic survey in Guernsey County, Ohio



Legacy seismic lines (blue) in relation to the model area in Ritchie County, West Virginia developed under Task 2



Next step is to incorporate seismic into the model



Mt. Simon Sandstone horizon on the Harvard 3D seismic survey

DEVELOPING CCS IN THE MRCI REGION

Supporting CCS Projects:

Field project data, legacy seismic, monitoring datasets, and geotechnical data are supporting development of CCS projects in the MRCI region.

Sharing Information:

Data available on www.midwestccus.org!

