



Cross Sections From The Midwest Regional Carbon Sequestration Partnership: Visualizng Subsurface Carbon Storage Opportunities Across The Central And Eastern United States RUTGERS Philip A. Dinterman¹, Jessica Pierson Moore¹, J. Eric Lewis¹, Stephen F. Greb², Kenneth G. Miller³, William J. Schmelz³ ¹West Virginia Geological & Economic Survey, 1 Mont Chateau Rd, Morgantown, West Virginia 26508, pdinterman@geosrv.wvnet.edu, ²University of Kentucky, ³Rutgers University

ABSTRACT

arbon storage in deep saline aquifers as well as enhanced recovery oil and natural gas via CO₂ floods.

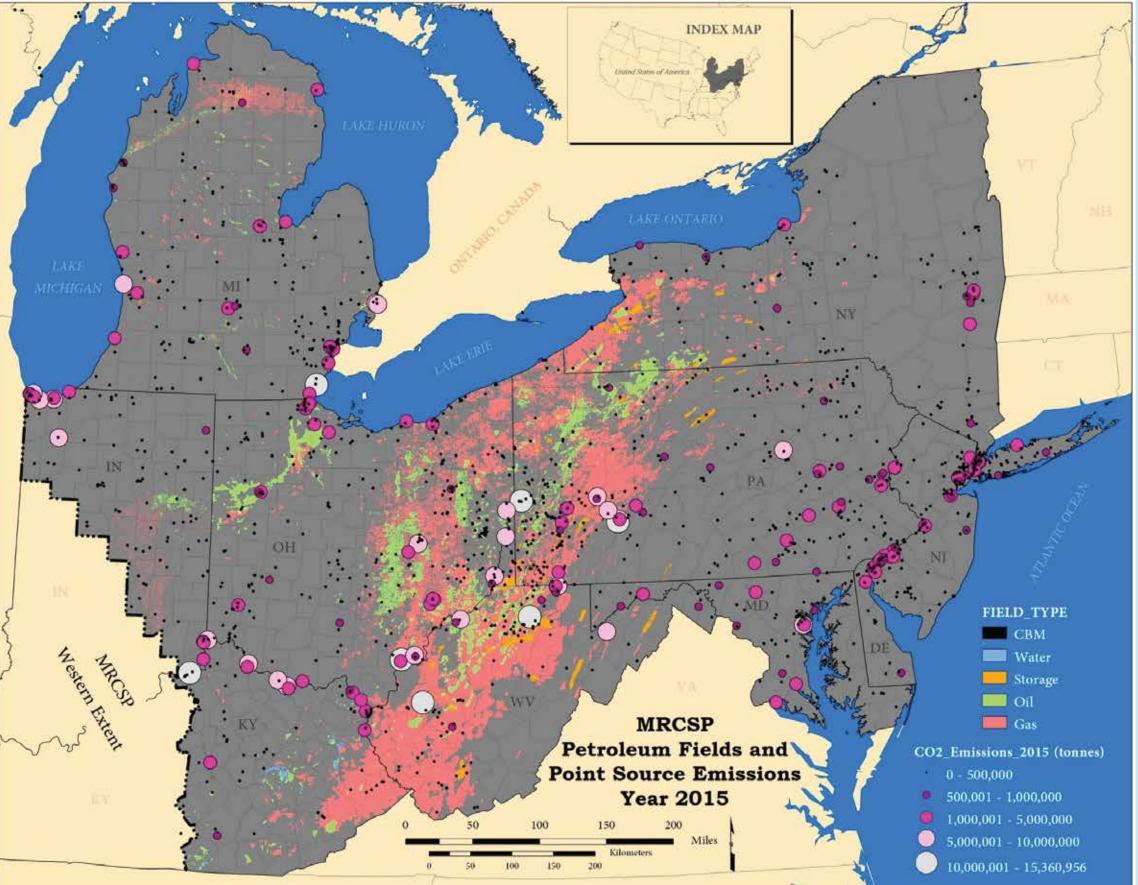
support of these efforts, MRCSP is characterizing Carbon Capture, roleum fields in the region has been one of the Survey (WVGES) across this region.

VGES is also working with other MRCSP researchers to construct a set f regional cross-sections illustrating subsurface opportunities for CC OR) in depleted oil fields; Enhanced G overy (EGR) in organic-rich shales, and CO, storage in deep salin aquifers. A set of three cross-sections will be delivered as part of this effort: a cross-section illustrating opportunities in the north-central reaches of the region; a central cross-section that ties into a similar section constructed during earlier research; and an offshore Atlantic section illustrating onshore-to-offshore opportunities in the Mid-Atlantic. These cross sections will augment existing knowledge of subsurface reservoirs across the region.

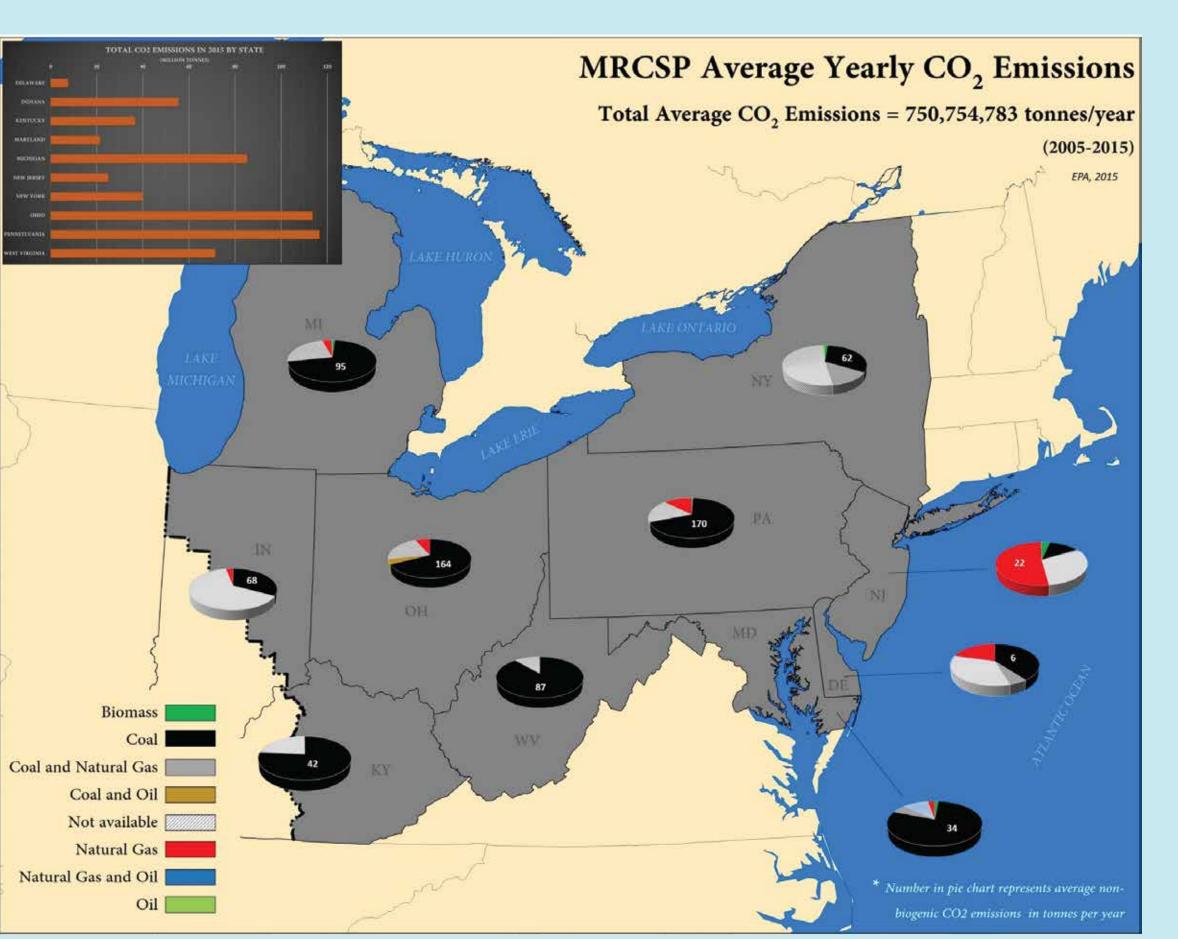
When combined with results from other areas of MRCSP research, these cross-sections enable policy makers, researchers, and other constituent groups across a wide geographic area to visualize and determine the types of CCUS strategies that represent viable options for mitigation of CO₂ point sources in their respective areas. MRCSP is supported by U.S. Department of Energy-National Energy Technology Laboratory Agreement No. DE-FC26-0NT42589.

Acknowledgements

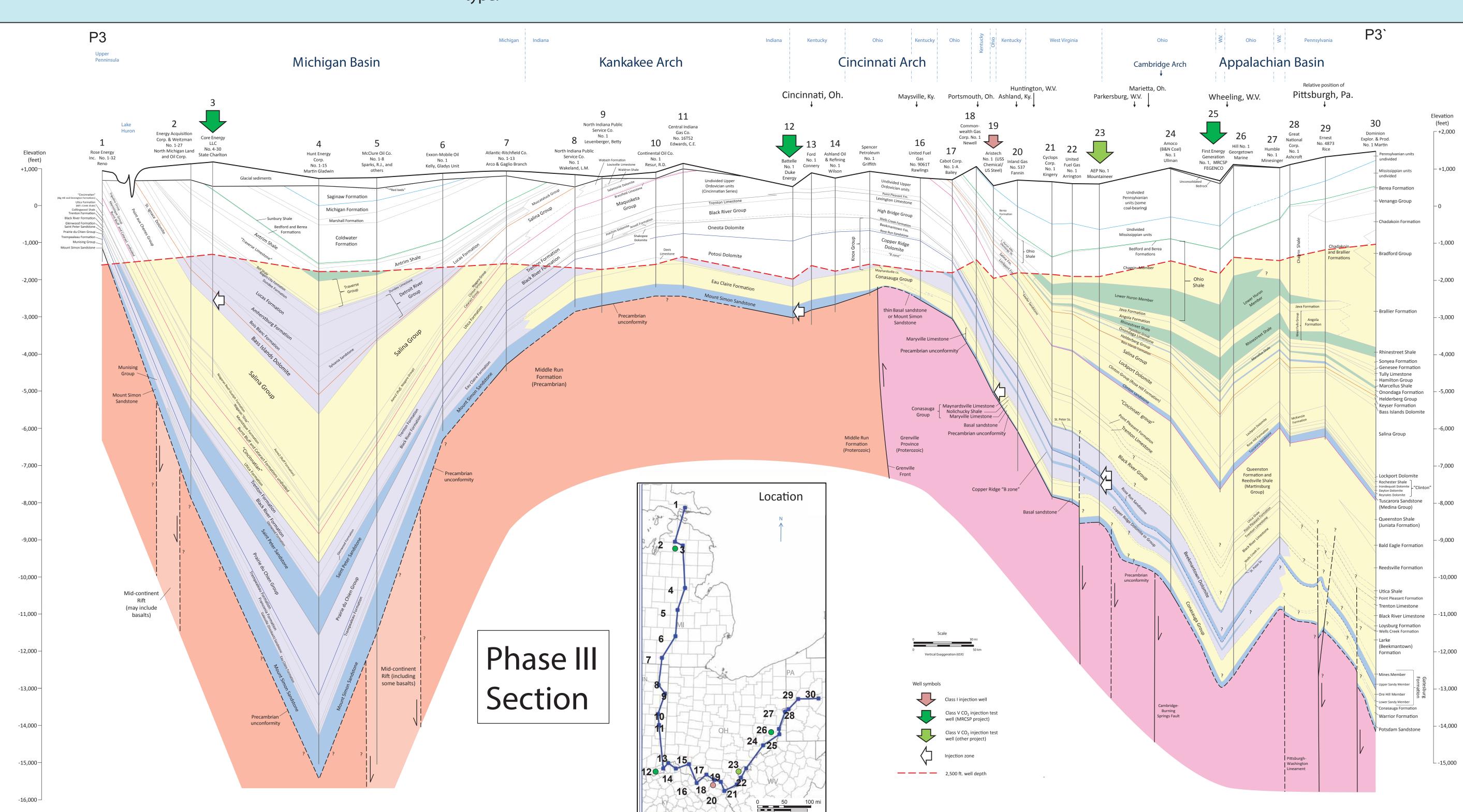
The authors would like to thank Battelle Memorial Institute who oversees the MRCSP contract as well as all of the partner states (DE, IN, KY, MD, MI, PA, OH, & Rutgers University) for their contributions. Kristin Carter (PA), Stephen Greb (KY), John Harper (PA), Chris Lombardi (Rutgers), Cristian Medina (IN), Ken Miller (Rutgers), John Rupp (IN), Michael Solis (OH), Thomas Sparks (KY) in particular had significant input on the cross sections displayed here.



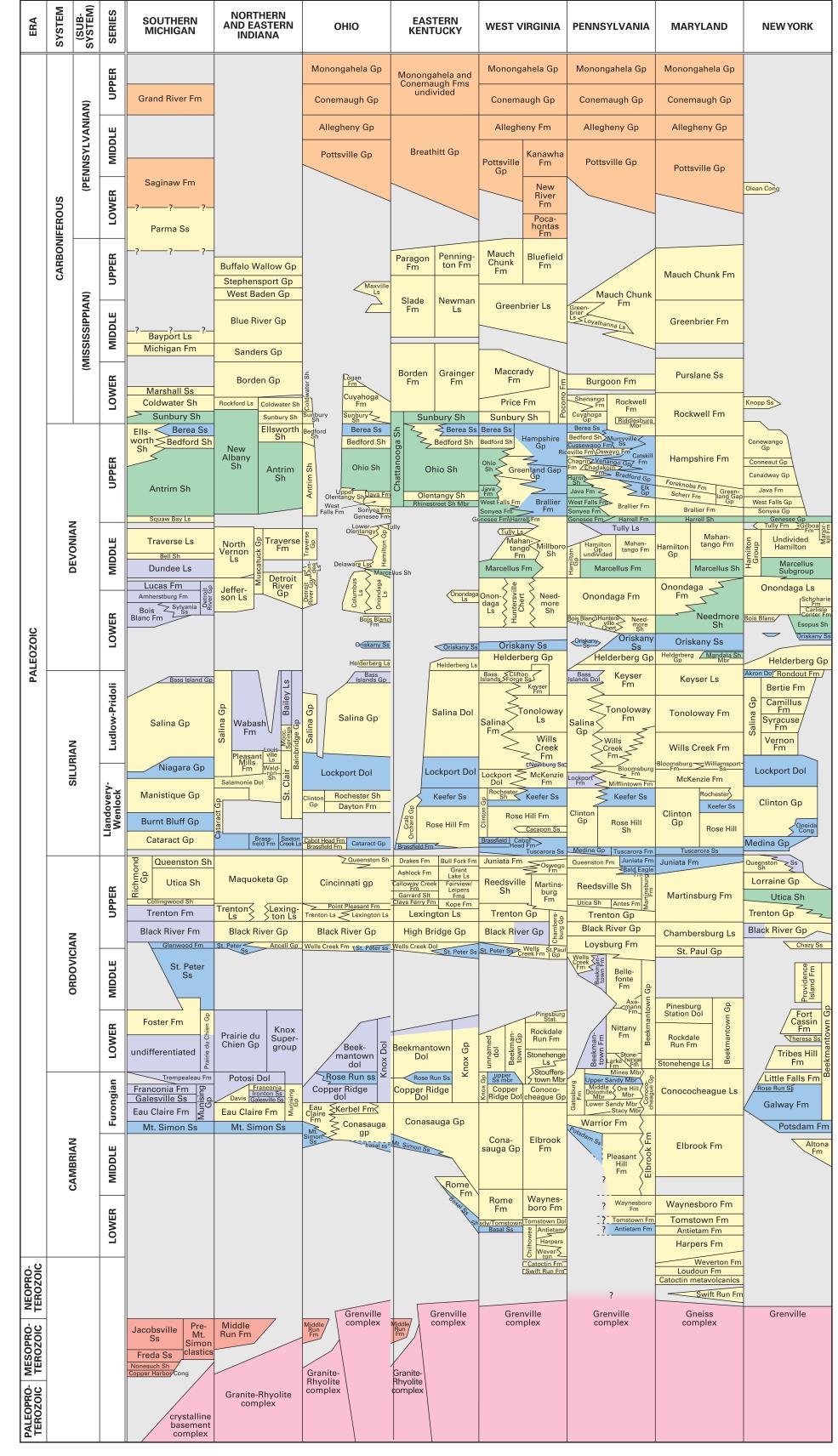
MRCSP region showing oil & gas fields and CO_2 point sources. CO_2 point sources are displayed according to emission levels.

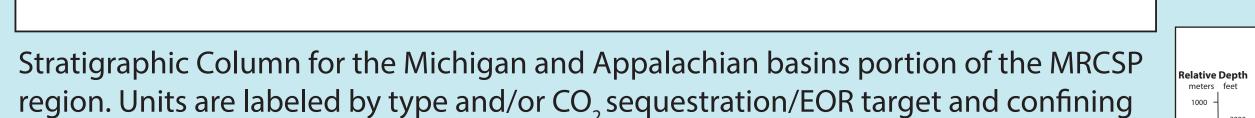


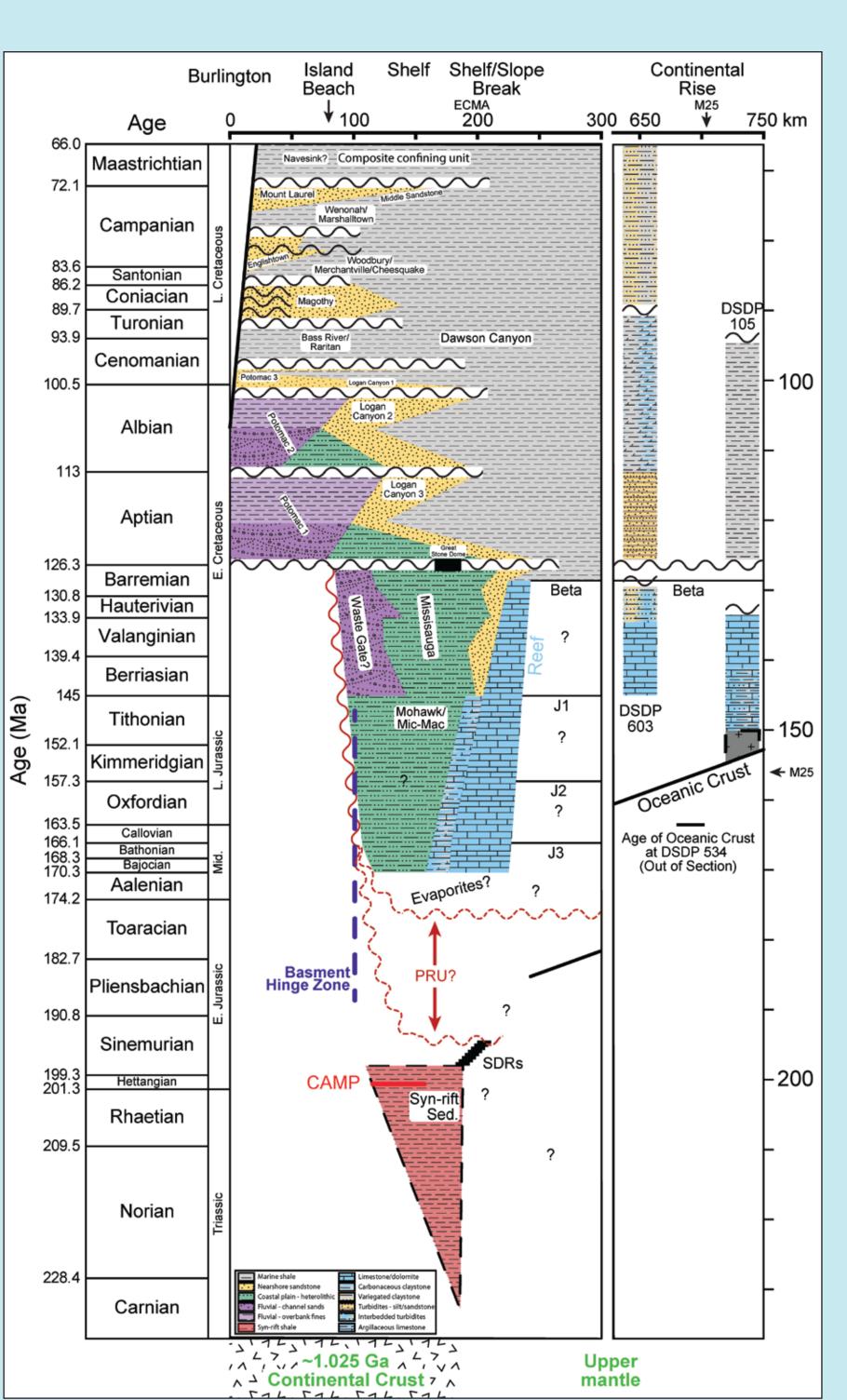
MRCSP region states diplaying yearly emissons by state and within state by emissions layers.

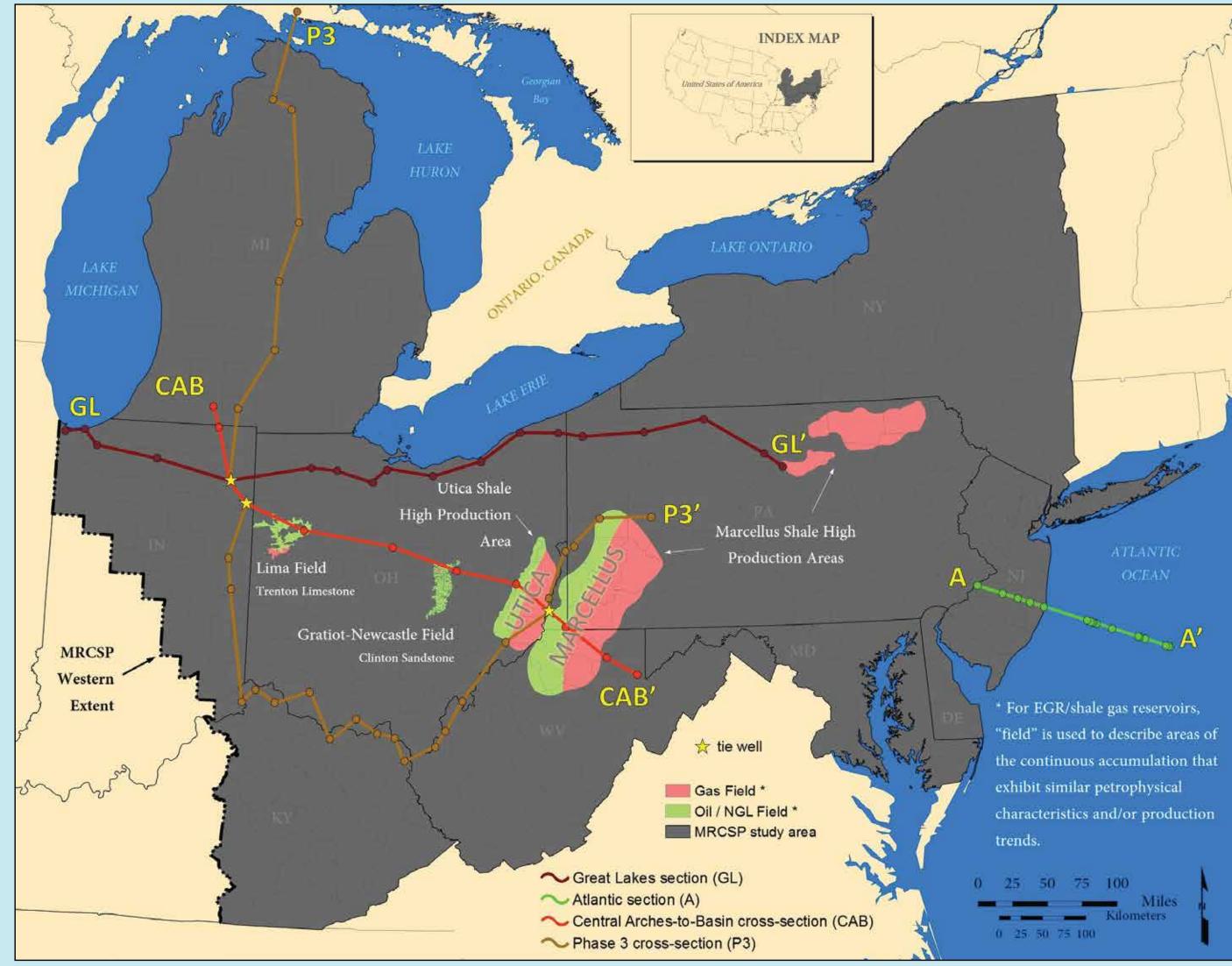


MRCSP cross section completed in earlier phases through Michigan, Indiana, Kentucky, West Virginia, & Pennsylvania. This section includes four wells drilled by U.S. Department of Energy-funded projects for the purpose of testing CO₂ storage technology in the region.



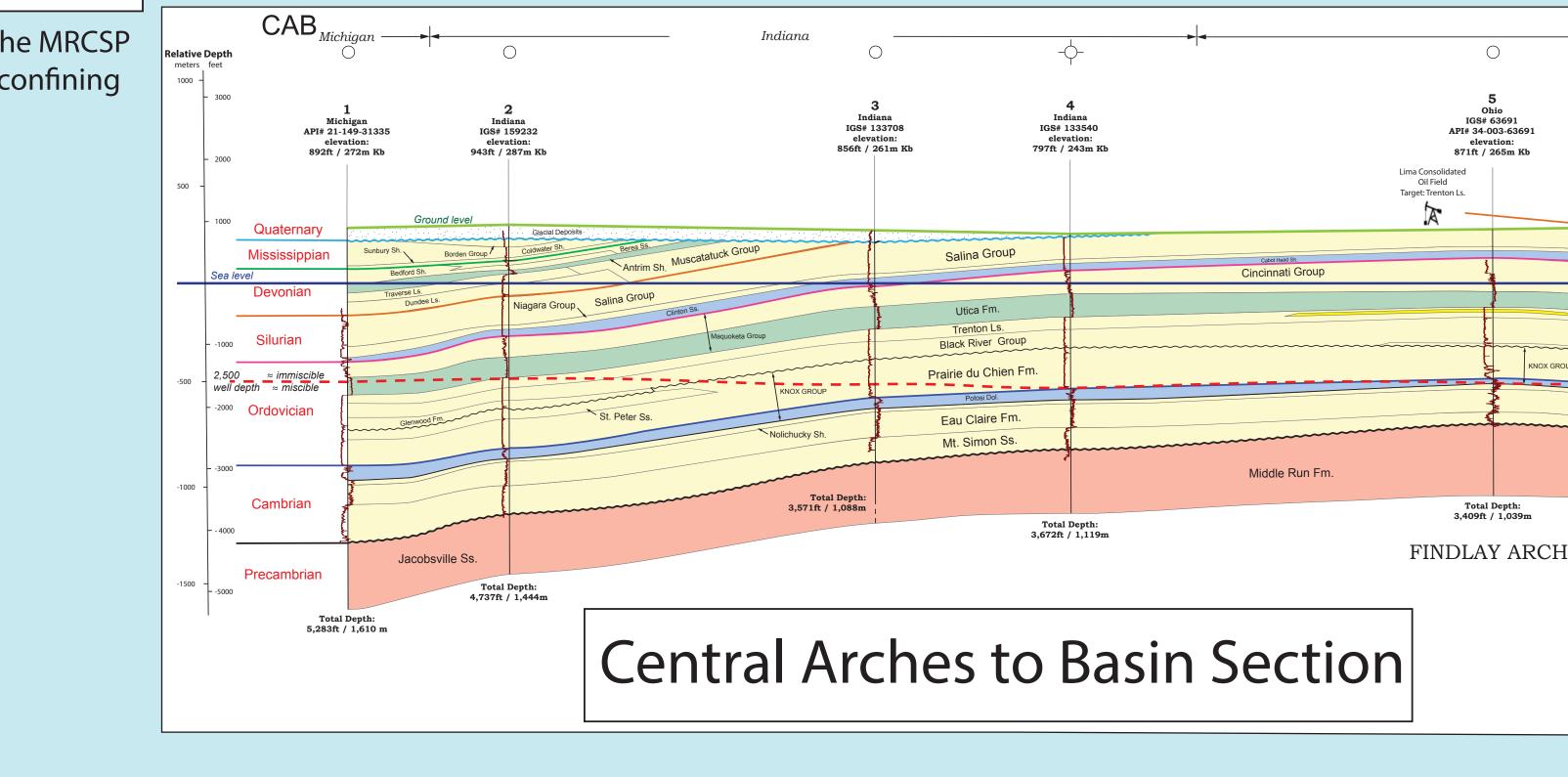


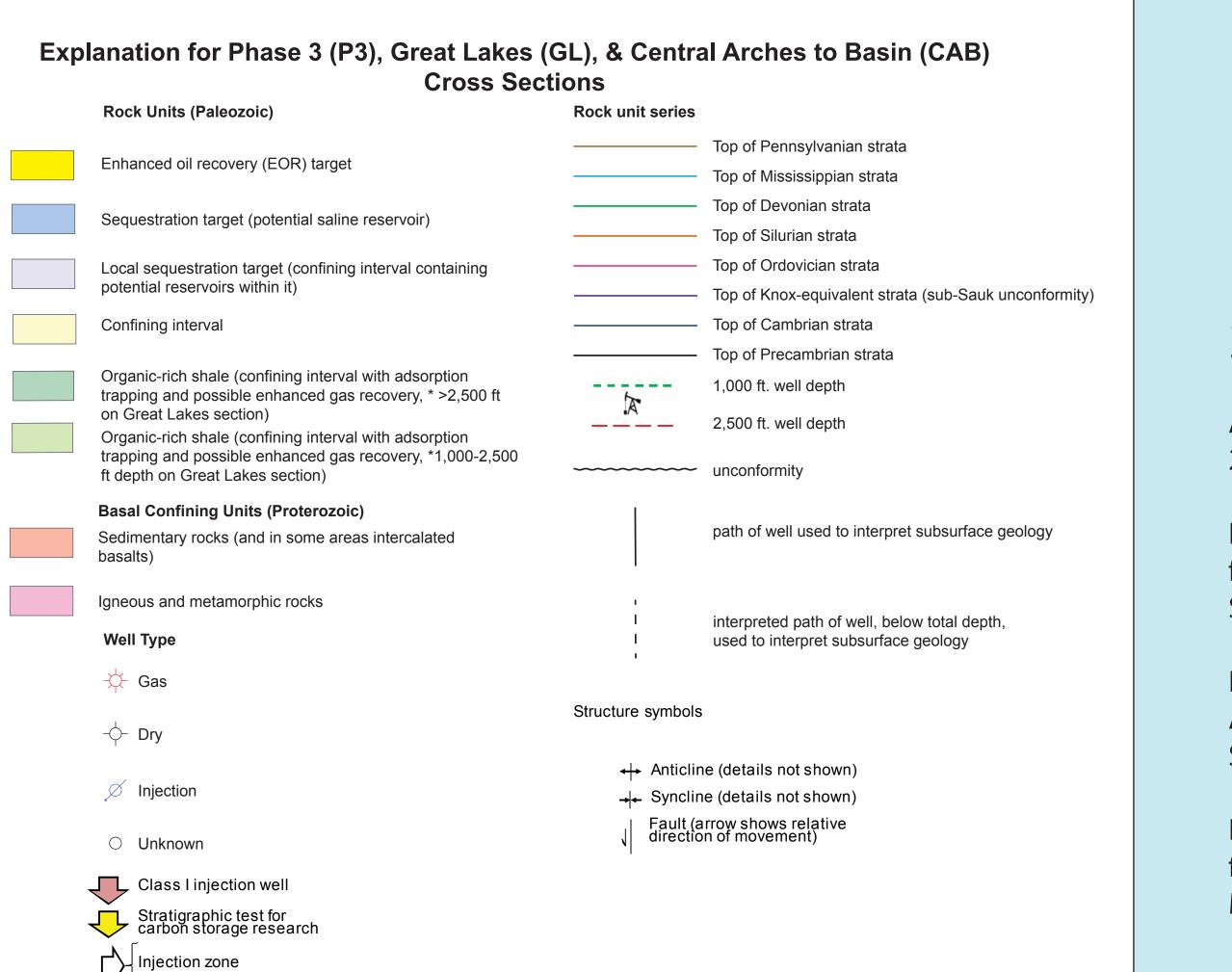




Regional cross sections are only one aspect of the work undertaken in the MRCSP project. Overall, the goals are to provide data for CCUS opportunities. Oil and gas fields have been evaluated and ranked for their suitability of CO₂ storage and/or utilization. This includes compiling characteristics (ex. porosity, permeability, API gravity, water saturation, etc.) on all fields in the MRCSP region. The fields were then ranked, among other variables, on storage efficiency and capacities. The regionalcross section are an ntegral part of the evaluation of CCUS opportunities and provide a subsurface understanding of the geology throughout the region from surface to basement. Cross section pathsand wells were selected to geographically cover the region, intersect important known geological features, and intersect highly ranked fields and/or areas. There is only a small number of wells that penetrate to basement in the deeper parts of the Appalachian basin and most were not recently drilled. Also, where applicable, MRCSP used interpretations from the U.S. Geological Survey regional cross sections. These cross sections are used to define, visualize, and evaluate the many reservoirs in the MRCSP region for potential CCUS opportunities.

Stratigraphic column for the Coastal Plain and Offshore portion of the MRCSP region. Units are labeled by lithology.





Antero Resources, 2017, Company Overview, http://s1.q4cdn.com/057781830/files/doc_presentations/ 2017/09/Company-Website-Presentation-(C)-September-2017-(1).pdf

Vertical Exaggeration: 34 X

0 10 20 30 40

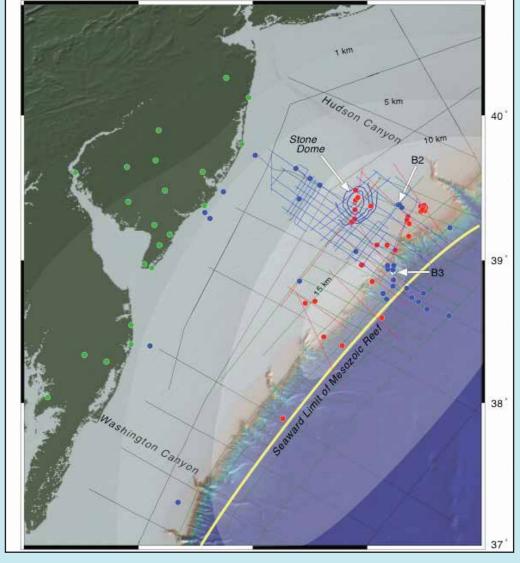
0 10 20 30 40

Ryder, R.T., Swezey, C.S., Crangle, R.D., Jr., and Trippi, M.H., 2008, Geologic cross section E–E' through the Appalachian basin from the Findlay arch, Wood County, Ohio, to the Valley and Ridge province, Pendleton County, West Virginia: U.S. Geological Survey Scientific Investigations Map 2985, 2 sheets, 48-p. pamphlet.

Ryder, R.T., Crangle, R.D., Jr., Trippi, M.H., Swezey, C.S., Lentz, E.E., Rowan, E.L., and Hope, R.S., 2009, Geologic cross section D–D' through the Appalachian basin from the Findlay arch, Sandusky County, Ohio, to the Valley and Ridge province, Hardy County, West Virginia: U.S. Geological Survey Scientific Investigations Map 3067, 2 sheets, 52-p. pamphlet.

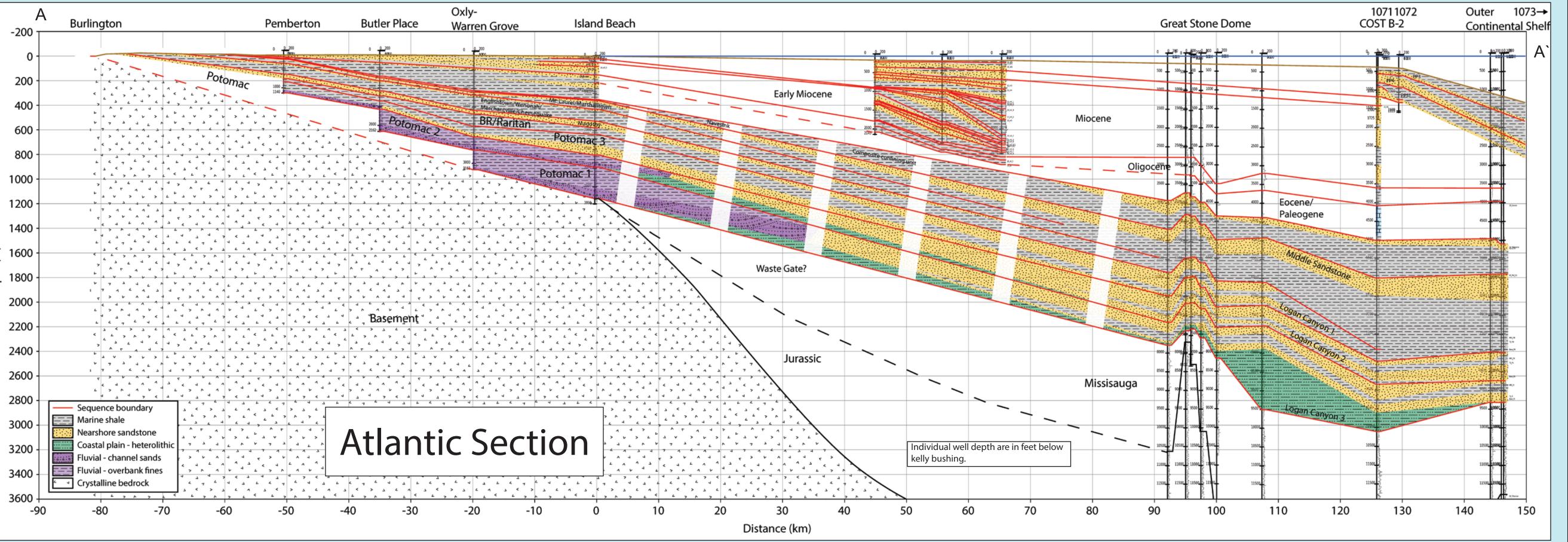
Ryder, R.T., Trippi, M.H., Swezey, C.S. Crangle, R.D., Jr., Hope, R.S., Rowan, E.L., and Lentz, E.E., 2012, Geologic cross section C–C' through the Appalachian basin from Erie County, north-central Ohio, to the Valley and Ridge province, Bedford County, south-central Pennsylvania: U.S. Geological Survey Scientific Investigations Map 3172, 2 sheets, 70-p. pamphlet. (Also available at https://pubs.usgs.gov/sim/3172/.)

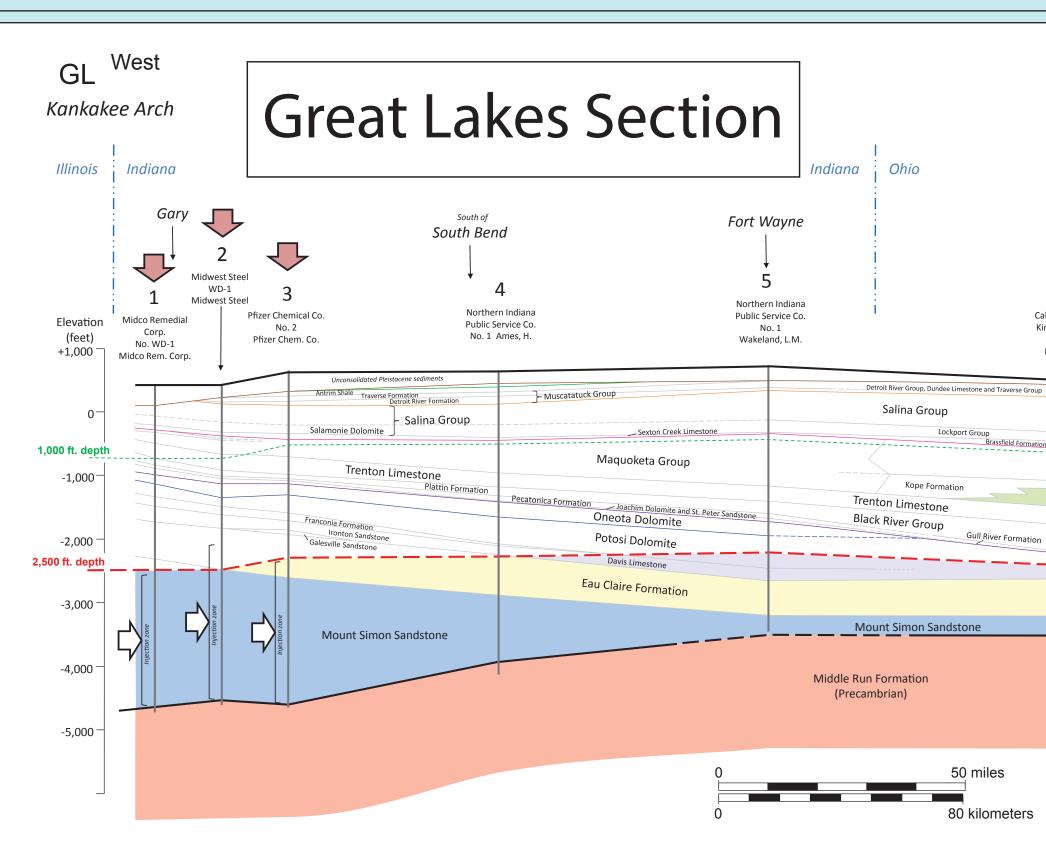
Barney Run / Monroe -Millwood Consolidated Coshocton Consolidated Oil Fields Oil Fields Target: Berea Ss. Target: Clinton Ss.



B-2 & B-3 (white DSDP. ODP. IODP. AMCOR co

Gilmore Salem, North Oil Field Oil Field Target: Berea Ss. Target: Oriskany Ss.





onsolidated Target: Maxville Ls. / Oil Field Keener Ss. / get: Berea Ss. Big Injun Ss. G

Greenland Gap Group Benson Ss.

Braillier Fm.

Oriskany Ss. Helderberg Ls. Mandata Sh.-

Juniata Fm.

Reedsville Sh.

Black River Group

St. Paul Group

Rose Hill Fm.

Bass Islands Dol.

Alexander S

Oswego Ss.

SELECTED REFERENCES

Total Depth: 3,409ft / 1,039





r simplicity, these are not shown, but they do occur in the subsurface

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Grenville Province (Precambrian)

Relative Depth

The three new cross sections shown here are drafts and everything on the cross sections is a work in progress. When completed, these cross sections will provide a regional resource for the MRCSP region. Though designed as tools for carbon capture and utilization opportunities, these cross sections could be utilized by a wide array of users for regional geology, structural, and stratigraphic correlat

FUTURE WORK

Editing is continuing for both subsurface geology and cross section format. The final cross sections will be deliverable products for the MRCSP submission to U.S. Department of Energy. Interpretations are ongoing as well as correlating geology over multiple states and geologic basins where facies, lithology, and formation names all







West Virginia Geological and Economic Survey

Rome Trough (minor branch)



Rome Trough (main branch)

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