Mapping and Characterization for Geologic Sequestration by the Midwest Regional Carbon Sequestration Partnership (MRCSP)

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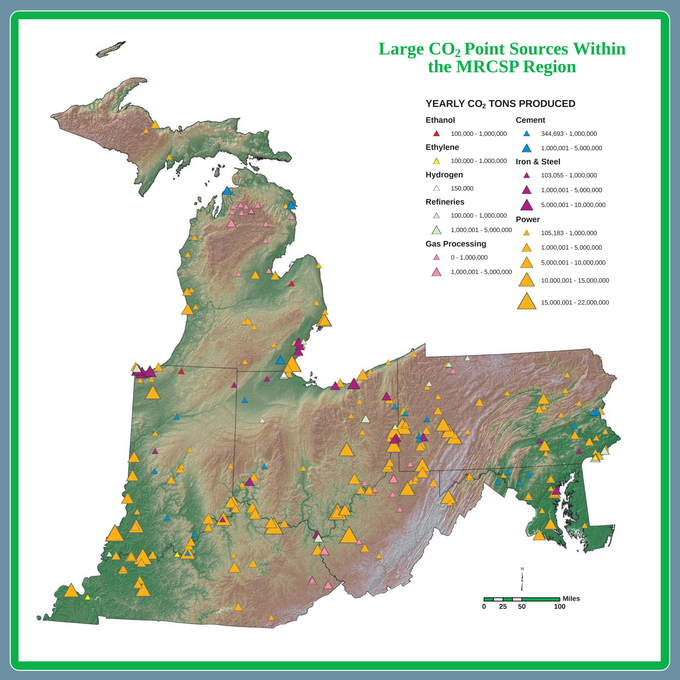
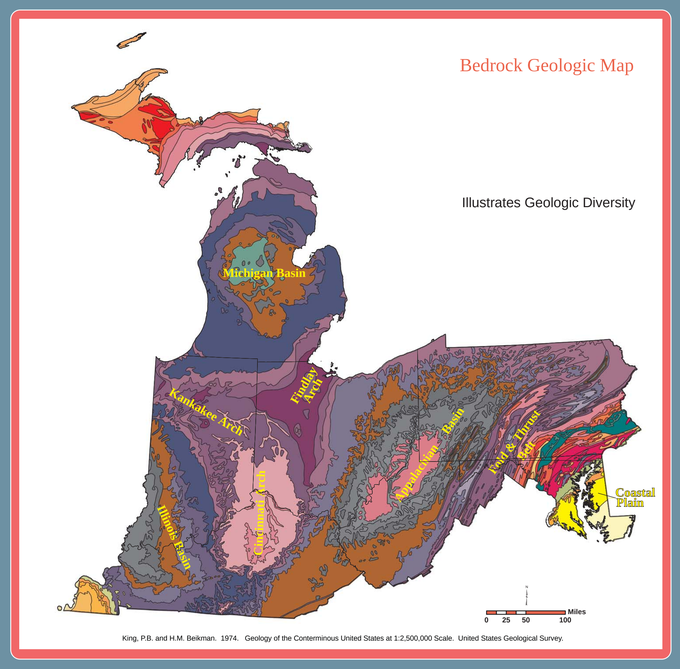
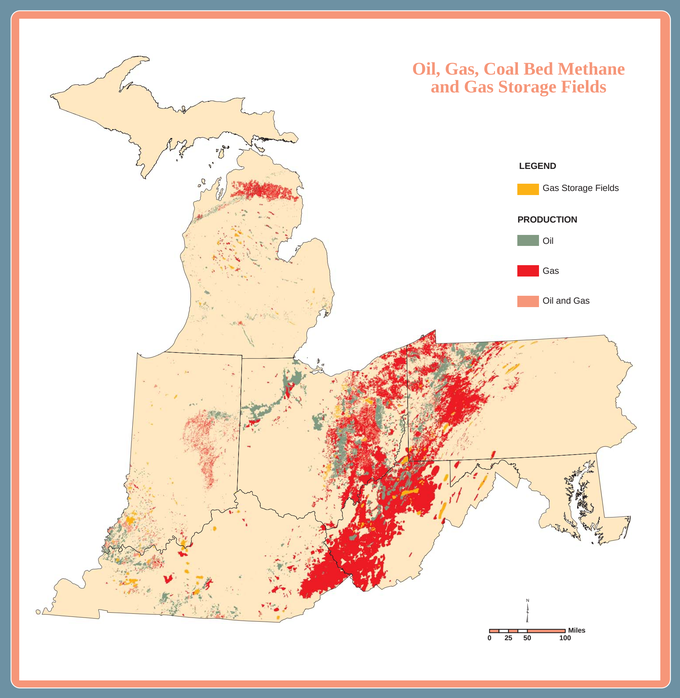
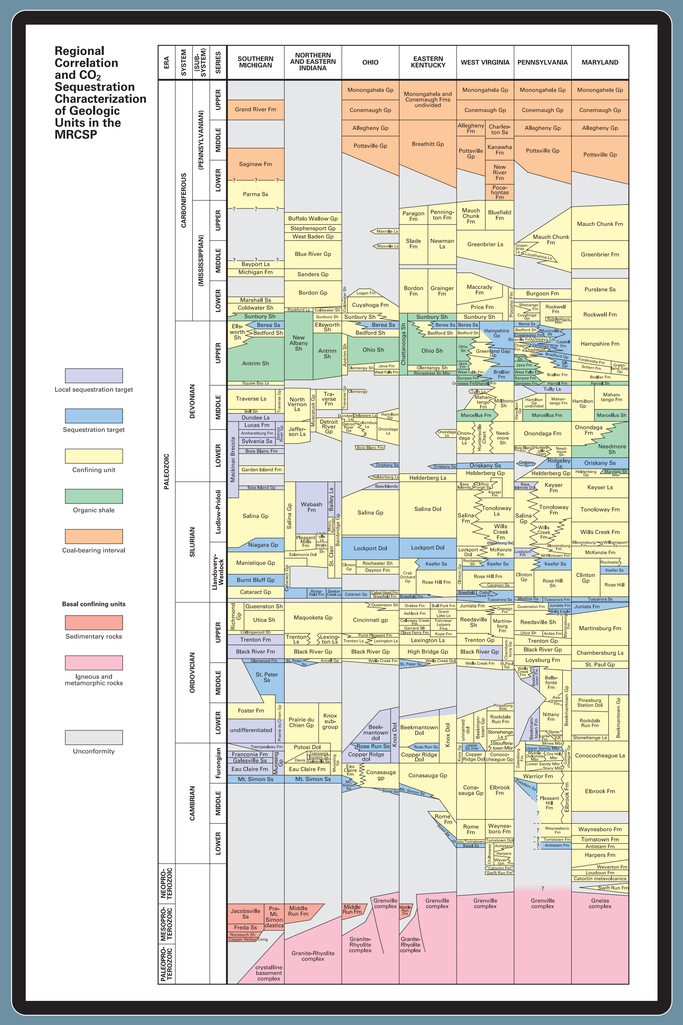


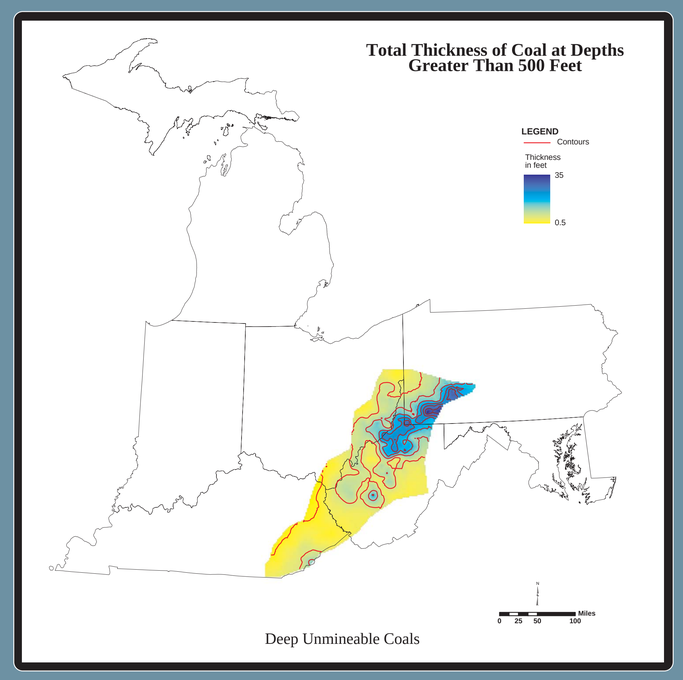


King, P.B. and H.M. Beikman. 1974. Geology of the Conterminous United States at 1:2,500,000 Scale. United States Geological Survey.

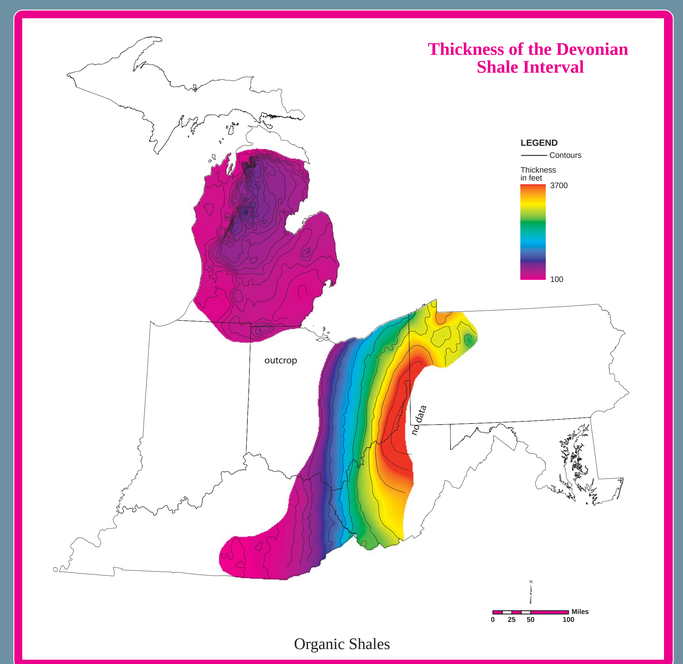


- The Midwest Regional Partnership area is a large, seven-state region with a wide diversity of geologic settings – all or portions of three major sedimentary basins, structural and depositional arches, deep Precambrian and Cambrian rift basins, coastal plains…
- The region also contains a variety of potential carbon reservoir types – deep saline aquifers, oil and gas fields – both depleted and those with enhanced recovery potential - and deep unminable coal seams. In addition, the area has vast deposits of organic rich shales which may prove to be large carbon reservoirs.
- These diverse settings result in huge opportunities and challenges for the region in developing geologic carbon sequestration options. Large areas are underlain by ideal sequestration reservoirs and combinations of reservoirs, some areas contain marginal sequestration opportunities, some appear to have very little sequestration capacity, and in some areas there is insufficient data to properly assess sequestration potential. All of these determinations are important for future siting of large CO2 point sources and designing CO2 infrastructure.
- The MRCSP geologic partners have built a stratigraphic model that identifies the major reservoirs and confining strata for the region. Maps of depth and thickness for the major prospective reservoirs and seals have been created and models generated for the other parameters necessary for capacity calculations: porosity, pressure, temperature, and salinity.
- The partnership is now creating a model within the GIS environment to graphically summarize the relative quality (value?) of any given area within the partnership for geologic carbon sequestration.

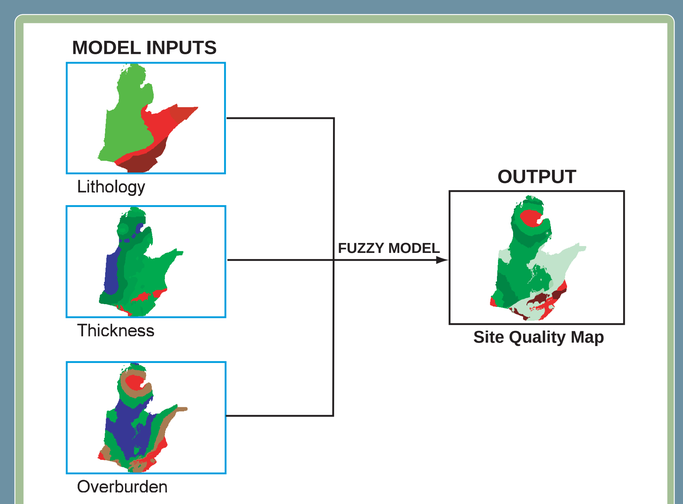




Deep Unmineable Coals



Organic Shales



HOW ARE THESE MAPS GOING TO BE USED?

Where is the geology favorable for CO2 injection?

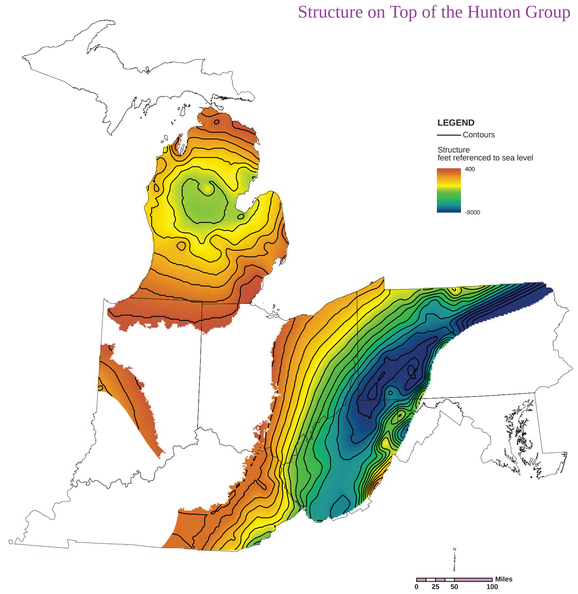
- Goal: combine multiple geologic maps (grids) to make a single map of geologic quality for CO2 injection.
- Approach: Fuzzy modeling procedures provide a straightforward method for combining multiple data sets and expert knowledge into a single map. The map can be combined with other economic/engineering factors for use in comprehensive site selection models that add civil engineering and political factors.

Examples of Geologic Mapping Products

MRCSP
MIDWEST REGIONAL CARBON SEQUESTRATION PARTNERSHIP

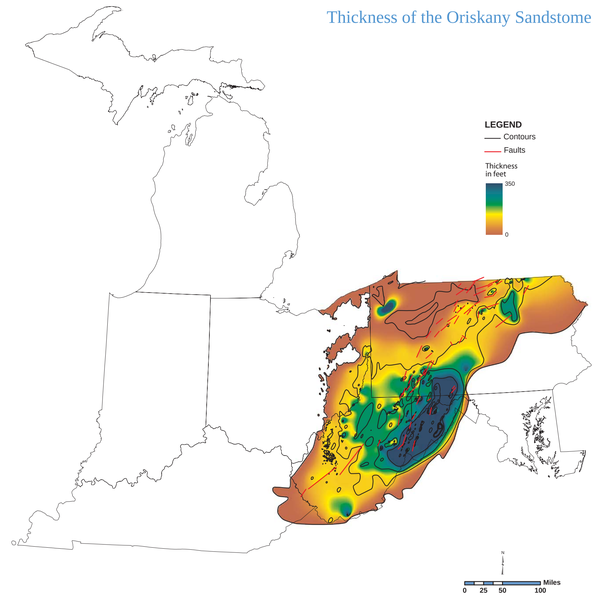
O.D.N.R. GEOLOGICAL SURVEY

Structure on Top of the Hunton Group



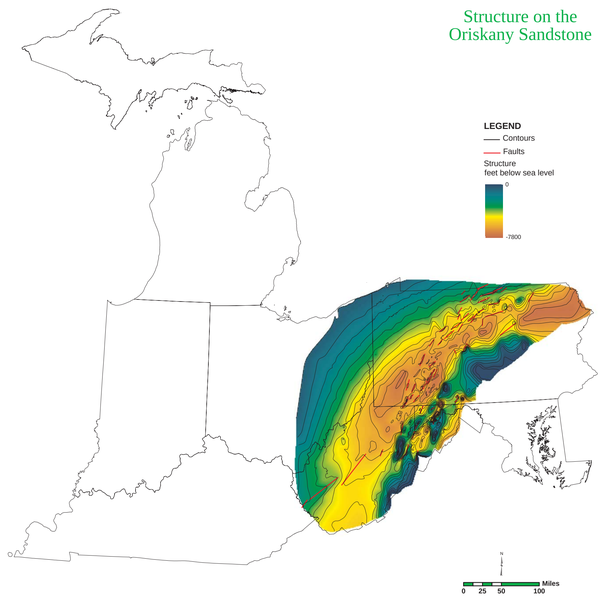
Interval Contains Multiple Carbonate Saline Aquifers

Thickness of the Oriskany Sandstone



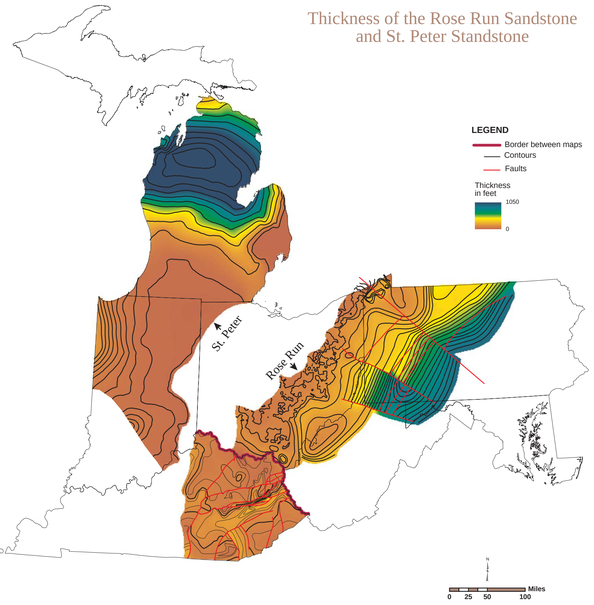
Deep Saline Aquifer and Petroleum Reservoirs

Structure on the Oriskany Sandstone



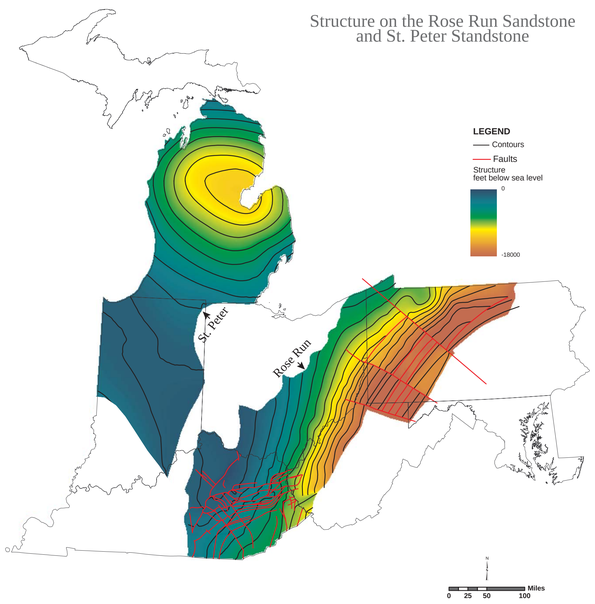
Deep Saline Aquifer and Petroleum Reservoirs

Thickness of the Rose Run Sandstone and St. Peter Standstone



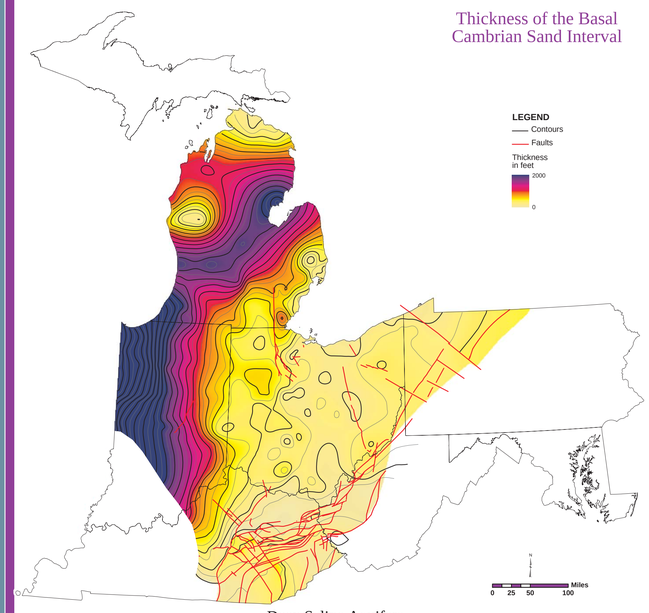
Deep Saline Aquifers - Rose Run also has Petroleum Resevoirs

Structure on the Rose Run Sandstone and St. Peter Standstone



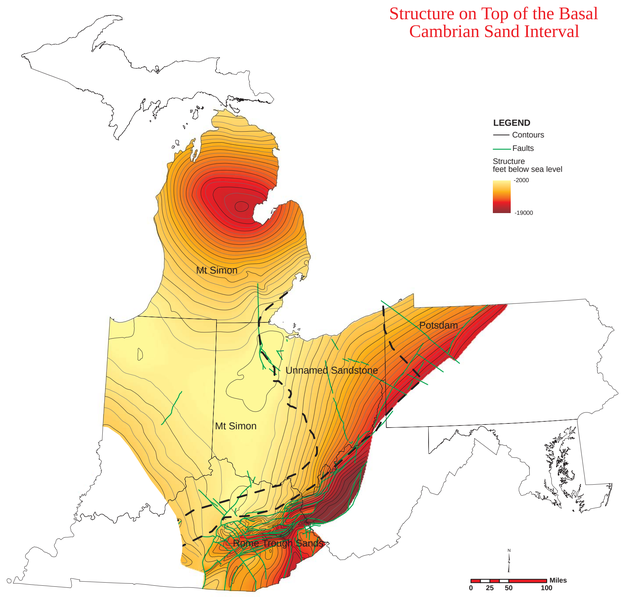
Deep Saline Aquifers - Rose Run also has Petroleum Resevoirs

Thickness of the Basal Cambrian Sand Interval



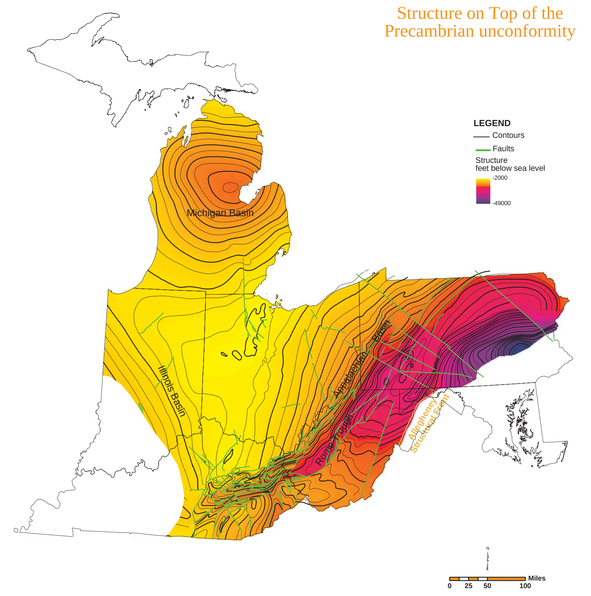
Deep Saline Aquifers

Structure on Top of the Basal Cambrian Sand Interval



Deep Saline Aquifers

Structure on Top of the Precambrian unconformity



Basal Seal

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