Facies analysis and Reservoir Characterization of the Cambrian Mount Simon Formation in the Illinois Basin: Implications for CO₂ Sequestration and Storage Fischietto, N.E.¹, Bowen, B.B.¹, and Rupp, J.A.²

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Problem and Objective

A large and deep saline reservoir, the Cambrian Mount Simon Formation has recently been targeted by researchers as a potential reservoir for industrial scale CO_2 sequestration. Limited geological studies of the Mount Simon Formation exist, however, and those that do exist lack the resolution to accurately characterize the Mount Simon as a basin-scale reservoir. This project aims to improve our understanding of the Mount Simon Formation as a reservoir through facies analysis of new and pre-existing core and well log data basin-wide scale in order to pruduce a basinscale depositional model.

Background

of CO₂ into geologic reservoirs has become a area of increasing in of not only removing CO₂ from the atmosphere and sequestering it in the subsurface over geologic time, but also as a enhanced recovery method for mature hydrocarbon fields. Reservoirs that have been shown to have potential for storing CO₂ over geologic time periods include mature/abandoned oil and gas fields, coal beds, and saline aquifers. In the Illinois basin, the focus of this project, the reservoir with the potential to sequester the greatest amount of carbon is the saline reservoir of the Mount Simon Formation (Midwest Geological Sequestration Consortium, 2005). The Mount Simon Formation is an Upper Cambrian sandstone that unconformably overlies the Precambrian basement and is capped on top by the dolomites and muds of the Eau Claire Formation. The Mount Simon Formation ranges from under 300 feet thick in southern Illinois Basin to its maximum thickness of over 2000 ft in the northern part of the basin. It is dominantly a fine to very coarse, poorly sorted, quartz sand with thin interbedded muds. In some areas, the Mount Simon contains a basal arkosic sandstone (Indiana State Geological Survey Bulletin 57, 1978). Structurally, the Mount Simon is at its lowest elevation where it its thinnest, in the southern part of the basin, and at its highest at is thickest, in the northern part of the basin. Previous sedimentologic studies on the Mount Simon Formation are limited and focused on areas outside of the Illinois Basin (Driese, 1981) or localized at gas storage facilities (Morse, 2005). In west-central Wisconsin, the Mount Simon has been described as containing a tidal dominated nearshore, tidal flat, and braided fluvial system (Driese, 1981). In central Illinois, the Mount Simon at the Manlove gas storage field has been described as a tidal barrier bar complex (Morse, 2005).



Thickness and Structure on top of the Mount Simon Sandstone in the Illinois Basin. Red circles indicate location of wells with Mount Simon core that are described in this poster. (Modified from Midwest Geological Sequestration Consortium, 2005)





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• Depositional facies will be tied to detailed porosity measuremnets (Ochoa, 2009, this meeting) and well log data to generate a detailed model for the basin