Relationships between Organic Matter Content, Meso- And Microporosity, and Gas Volumes in the New Albany Shale (Devonian – Mississippian), Eastern Illinois Basin

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This study investigates kerogen petrography, micro- and mesoporosity, and gas volumes of the New Albany Shale (Devonian-Mississippian) in the eastern part of the Illinois Basin. The study is based on detailed examinations at two cored locations, one in Owen County, Indiana (Fig. 1), within a cored interval of 415 to 435 m, and the other one in Pike County, Indiana within a cored interval of 830-860 m. The gas-in-place in both locations is primarily dependent on total organic carbon (TOC) content and the micropore volume of the shales. In contrast, there are no significant correlations between (i) TOC and mesopore volume and (ii) mesopore volume and gas content, suggesting that micropores (and not mesopores) are the main sites of methane adsorption. With vitrinite and inertinite contributing very little to the organic fraction in these locations, amorphous organic matter and alginite are the main sites of methane adsorption. The abundance of non-fluorescent bituminite shows the best correlation with micropore volumes at both locations (r^2>0.7), suggesting that this microbially reworked organic matter has superior methane-holding capacity. Moreover, higher maturity bituminite in Pike County (corresponding to vitrinite reflectance R_o ~0.70%) holds similar amounts of gas compared to the lower maturity bituminite in Owen County (R_o ~0.54%). Therefore, the amount of lower maturity bituminite is a superior predictor for gas-in-place (Fig. 2).

References:

Strąpoć, D., Mastalerz, M., Schimmelmann, A., Drobniak, A., Hasenmueller, N.R., 2010: Geochemical constraints on the origin and volume of gas of the New Albany Shale (Devonian – Mississippian) in the eastern part of the Illinois Basin. *AAPG Bulletin*, in press.

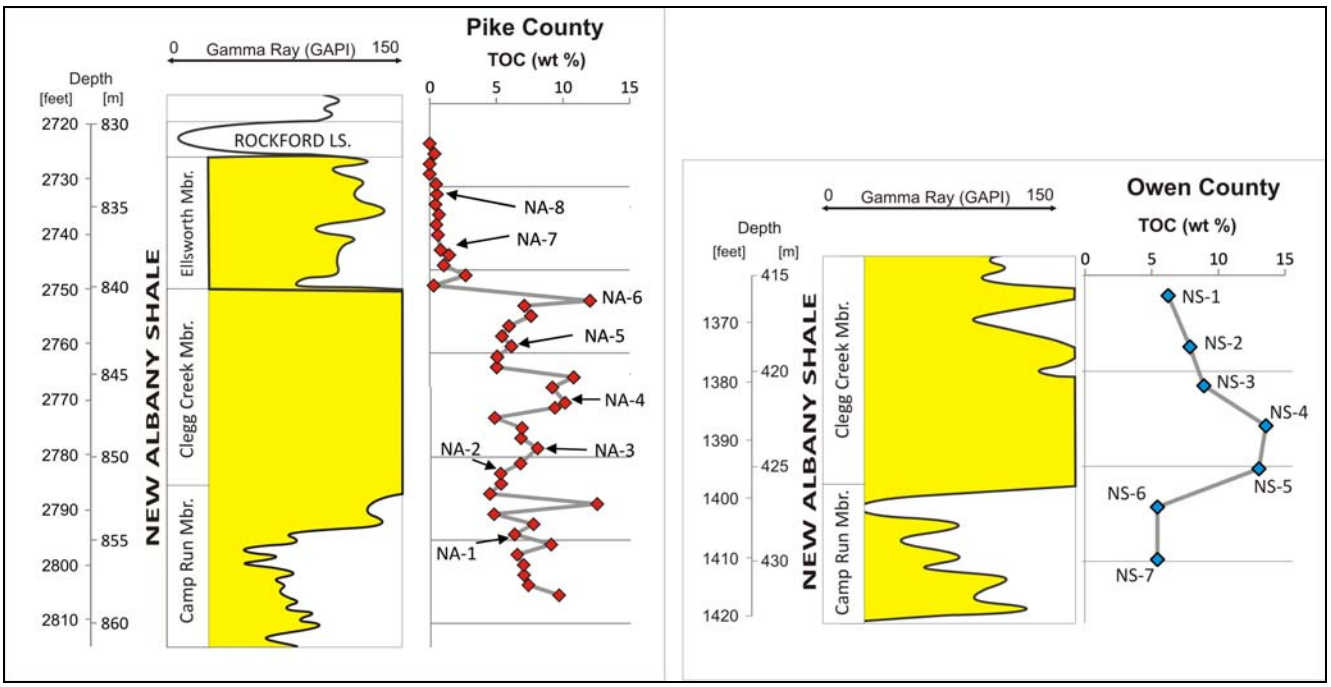

Figure 1. Stratigraphic positions and TOC contents (adapted from Strąpoć et al., in press).

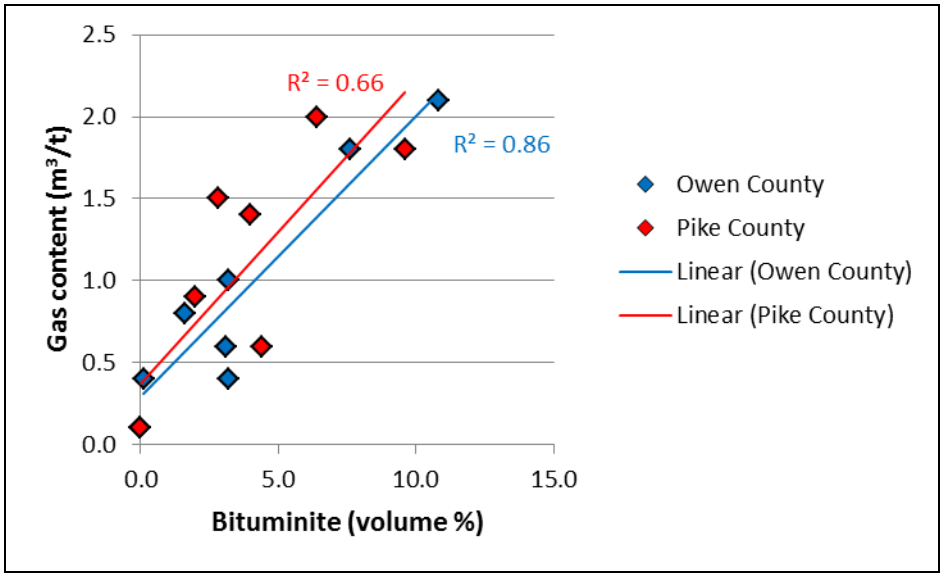

Figure 2. Relationships between bituminite content and gas content in shales at the locations studied.