Fluid and Gas Geochemistry of Organic-Rich Shales in the Appalachian Basin, Stephen Osborn and Jennifer McIntosh, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ 85721, sosborn@hwr.arizona.edu, mcintosh@hwr.arizona.edu

Accumulations of microbial methane in shallow coal beds and organic-rich shales account for a significant portion of the U.S. annual natural gas production. Research conducted on Upper Devonian organic-rich shales in the Michigan and Illinois Basins has shown that secondary microbial gas generation was enhanced by Pleistocene glaciation. Loading and unloading of kilometer thick ice sheets extended the natural shale fracture network and depressed the salinity of basinal brines by recharge of dilute glacial meltwater. Recharge occurred at the basin margins through the underlying carbonate regional aquifer system. The lack of published geochemical data from organic-rich shales in the Appalachian Basin has precluded comparative studies with adjacent basins aimed at understanding the lateral and vertical distribution of microbial methane. The northern margin of the Appalachian Basin has a similar glacial history to the Michigan and Illinois Basins. Differences in the thermal maturity, tectonic setting, and stratigraphy of the organic-rich formations in the three basins may elucidate the environmental controls on microbial methane generation.

Gas and formation waters were collected from active Upper Devonian oil and gas wells throughout the northern Appalachian Basin during the spring of 2007. Major, minor, and trace elemental analyses, alkalinity, stable isotopes (O, H, and C), and 14CDIC, were performed on formation waters. Gas composition and compound specific isotopes of CH_4, CO_2, and C^2 were also measured. Preliminary results will be used to investigate the fluid migration history at the basin margin, as well as the origin and distribution of natural gas accumulations.