

Paula Mouser, Assistant Professor at Civil, Environmental and Geodetic Engineering at the Ohio State University and Mary Ann Thomas, researcher from USGS completed an Ohio Water Resources Center funded project via OWDA subaward. Their project titled “**Characterizing Methane in Geologic Formations of Ohio; Phase 1: Seed Grant to Investigate Natural Biogenic Methane from Domestic Wells Unaffected by Oil and Gas Production**” will serve as a starting point for compiling information about “baseline” methane in Ohio subsurface formations. This information could ultimately be used to assist investigations of stray gas complaints.



Figure 1 Groundwater Sampling

Eleven domestic wells in southwestern and central Ohio unaffected by shale gas development were sampled (Figure 1) and methane was detected in all raw water samples. The volume percent of methane was 0.03-0.7 % for 7 samples and 61-92 % for 4 samples. The isotopic signature of methane was determined for the 4 samples with higher methane concentrations, and results were consistent with biogenic methane. During 2014, further DNA analysis and sequencing were conducted. The number of species (richness) identified within samples ranged from 33-97 when subsampled to 250. The PR_239 site was the most unusual from all other sites as it was dominated by the presence of OTUs within the *Firmicutes* (Figure 2). All other sites were dominated by various *Proteobacteria* (orange in Fig 1). Other dominant phyla include the

Nitrospirae (nitrifiers), *Actinobacteria*, and candidate phylum OP3. The presence of certain *Euryarchaeota* was notable across the PR sites, while contributing on average less than 0.2% of the other sites. This group contains the methanogenic orders of microorganisms.

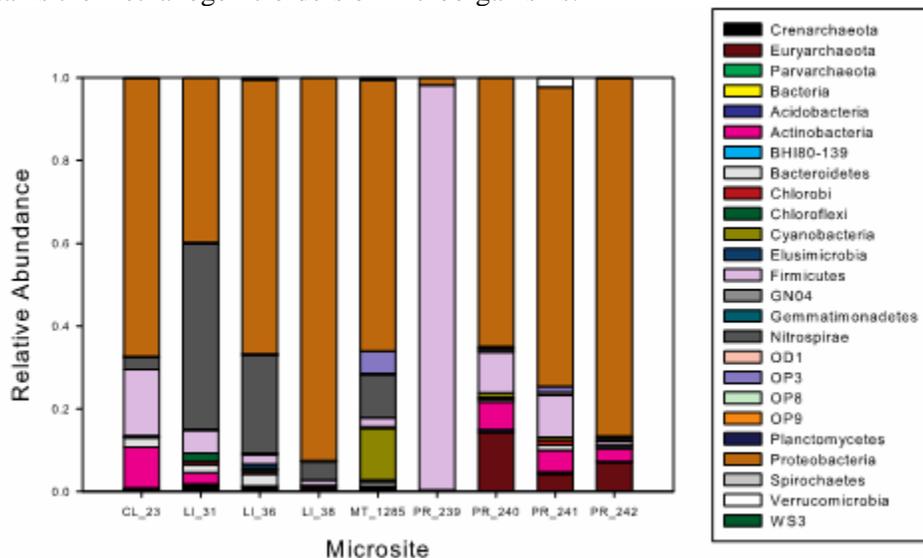


Figure 2 Bar charts of the relative abundance of Phyla OTUs detected in the survey.

Researcher Profile: Dr. Paula Mouser investigates microbial-environmental interactions in engineered subsurface systems ranging from floodplain aquifers and drainage channels to granitic bedrock aquifers and deep hydrocarbon shale. She is also interested in how microorganisms interact with material surfaces, such as membranes used for water treatment and casing used for shale gas wells. Applications of such research include improving detection and remediation strategies for the protection of water resources, and optimizing technologies for water treatment.