Figure 1. Dr. Jake Beaulieu and Megan Berberich collecting sediment cores with K-B corer

Dr. Ishi Buffam, Assistant Professor of Biology and Geography at the University of Cincinnati completed an Ohio Water Resources Center 104(b) funded project. The project, **"Characterizing the Link Between Algal Bloom Biomass and Methane Production in Ohio Reservoirs"**, aimed to characterize the relationship between algal blooms and sediment CH_4 production rates in Ohio reservoirs, as mediated by sediment organic matter quantity and quality and the sediment microbial community.

Algal blooms and their known negative environmental impacts associated with nutrient enrichment have been the leading cause of impairments of Ohio's surface waters. However, there has been little research evaluating the increased potential for in-lake production and emission of methane (CH_4) associated with eutrophication. Some lab studies show the potential for increased methane production in surface water sediments when labile algal organic matter is added, but it is unknown whether this relationship translates to the field scenario.

Dr. Buffam's team took samples from Harsha Lake in Ohio and determined CH_4 production rates, composition of organic matter in sediment and genetic composition of methanogens (Figure 1). The results indicated that quantity of organic matter but also source (terrestrial versus algae derived) were both important for methane production rates in the reservoir. For Harsha Lake, areal CH_4 production rates were highest in the riverine portion of the reservoir, even when rates were normalized to organic matter quantity (OM) (Figure 2). This suggests that not only was OM more abundant in the riverine zone, it was also more readily utilized by methanogens. Additionally, this zone was the shallowest, and the researchers determined methanogen archaea community shift towards acetate utilizers in locations with higher terrestrial OM contribution. Based on our results that show high degree of spatial variation in CH_4 production rates, studies of reservoirs as well as natural lakes with substantial riverine inputs should take into consideration a spatially-aware sampling approach to determine CH_4 production and emissions, rather than sampling only at a single deep location.

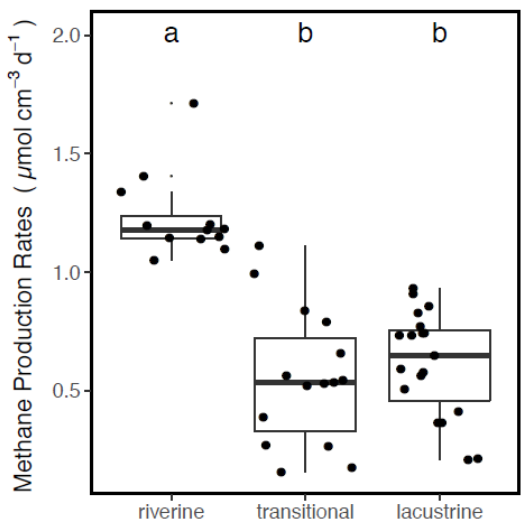

Figure 2. Potential methane production rates from sediment slurries in each of the reservoir zones, normalized to sediment volume

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Researcher Profile: Dr. Ishi Buffam received his Ph.D. from the Swedish University of Agricultural Sciences. His research training stems from aquatic chemistry and biogeochemistry, and more specifically focuses on carbon and nitrogen transformations and hydrological transport with boreal and temperate watersheds. He also has experience in putting freshwater carbon cycling processes into the context of landscape and regional scale carbon cycling.