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Spatiotemporal variability of *E. coli* concentrations in two irrigation ponds

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Escherichia coli is the most commonly assessed indicator of fecal contamination. The presence of elevated levels of *E. coli* is used to evaluate the microbial water quality in recreational and irrigation water sources. *E. coli* concentrations are spatially and temporally variable. Monitoring of the variability inherent in water measurements can help create and implement effective monitoring designs and solutions. The objective of this work is to determine if there exist spatial patterns that are stable in time over years of observations. Two irrigation ponds in Maryland USA were monitored for three years during the growing seasons (June to August). Water samples and in situ measurements were collected in the same 47 locations biweekly for three years. The presence of stable spatial patterns was researched for relative differences between the logarithm of concentrations in specific locations and the average logarithm across the pond for each of observation times. The mean of these relative differences (MRD) over the observation period formed consistent spatial patterns. We found stable patterns of locations across the pond and found higher MRD values near the banks than the pond interiors. MRDs computed for separate years were more variable and had amplitudes different from the overall average MRD over the three years, although the similarities between patterns across years was apparent.