



Temporal stability of indicator bacteria concentrations in PA creek characterized with Empirical Orthogonal Functions

Eun-Mi Hong (1), Cary Coppock (1), Edward Wells (2), Dana Harriger (2), and Yakov Pachepsky (1)

(1) USDA-ARS, Environmental Microbial and Food Safety Lab, Beltsville, MD, United States of America , (2) Wilson College, Division of Integrated Sciences, Chambersburg, PA, United States of America

Pathogenic microorganisms in irrigation waters present the subject of concern. Indicator bacteria such as *Escherichia coli* and Enterococci are commonly used to assess microbial water quality. We tested the hypothesis that the indicator bacteria concentrations along the creek are temporally stable under the baseflow conditions when irrigation is necessary. We sampled water at five different locations along the Conococheague Creek, PA, weekly from October 2015 to September 2017. Inspection of the dataset showed the presence of the seasonal oscillations that were similar for two years and the trend of increase of the concentrations along the creek. To further analyze the data, we applied the method of Empirical Orthogonal Functions (EOFs) which is a powerful technique to discover time-invariant spatial patterns and possibly relate them to environmental factors. The first EOF which explained 75% of the total variation over the year and 83% of the total variation during the growing season, followed the land use change along the creek. High concentration of indicator organisms during the baseflow period implied that contents of the indicator organisms in bottom sediment might be controlling some of other EOFs. Overall, the temporal stability of indicator organisms in creek water was well pronounced and could be used to guide the development of microbial water quality monitoring strategy.