

**Population dynamics of estuarine
microbiome and their response to nutrients
and dissolved organic matter**

H. WANG¹, F. CHEN¹, J. TAO², C. ZHANG², AND J. KAN^{3*}

¹Institute of Marine and Environmental Biotechnology,
University of Maryland, Baltimore, MD 21202, USA

²Department of Ocean Science and Engineering, Southern
University of Science and Technology, Shenzhen,
Guangdong 518055, China

³Stroud Water Research Center, Avondale, PA 19311, USA
(*correspondence: jkan@stroudcenter.org)

The Chesapeake Bay (CB) provides a dynamic environment for estuarine microbiomes. Thus planktonic bacteria and archaea experience strong environmental gradients such as salinity, temperature, nutrients and other dissolved constituents. In this study, high throughput sequencing revealed many previously unreported taxa and showed that CB contained highly diverse and dynamic microbial communities (both bacteria and archaea). Microbial diversity indices decreased from the upper Bay to lower Bay. Microbes in summer and autumn were more diverse and stable than those in winter and spring, however bacteria and archaea exhibited distinct spatiotemporal patterns. While groups of bacteria and archaea responded to salinity and temperature, the spatiotemporal patterns of microbial distributions were also influenced by nutrient, Chl *a*, light availability and dissolved organic matter (e.g. dissolved organic nitrogen and dissolved organic phosphorus). The findings highlight that in addition to physical gradients, the synergistic interactions of microbiomes and nutrients as well as dissolved organic matter shape a stable and reoccurring microbial community pattern in an estuary with a long residence time.