

# OCEAN OPTICS XXIV

Valamar Lacroma Dubrovnik Hotel | Dubrovnik, Croatia | October 7–12, 2018

<https://oceanopticsconference.org>

Thursday, October 11

Oral Session 9

08:30–10:30

09:30–09:50

## **LOW-COST SPECTRORADIOMETER SYSTEMS FOR IMPROVED SPATIAL AND TEMPORAL WATER QUALITY MONITORING**

Spectroradiometric measurements of surface water can provide valuable information about the bio-geochemical composition including phytoplankton type and abundance, sediment concentration, carbon stocks, water clarity, and presence of harmful algae. While satellite ocean color remote sensing has shown great utility to provide global water quality information, limitations exist for optically complex inland waters. Spectroradiometers deployed in the field offer the capability to resolve small scale spatial features such as cyanobacteria blooms that orbiting platforms may not. Historically, in-situ radiometric devices are expensive and require significant user expertise and therefore often prohibit measurements at the spatial and temporal scales needed to fully characterize the water quality phenomena of interest. The Michigan Tech Research Institute (MTRI) has developed several new low-cost high-fidelity radiometric instruments that can be used to better monitor water quality in challenging environments. The first instrument package is designed for deployment on fixed structures with the intent of measuring water-leaving radiance at sub-minute time-scales. This high temporal frequency radiometric data is shown to resolve the size and biomass of cyanobacteria surface mats undergoing advection from prevailing water currents. The second instrument is a handheld radiometer system which uses an off-the-shelf NoIR webcam detector and 3D printed optical housing. A controlling application for smartphones or tablets has also been created to guide non-experts through the measurement process to ensure quality data is collected. The low cost nature of this solution allows for the potential distribution of many radiometers to citizen scientists and water managers toward the formation of a distributed sensor network.

**Robert Shuchman**, Michigan Tech Research Institute (MTRI), Michigan Technological University, [shuchman@mtu.edu](mailto:shuchman@mtu.edu)

Mike Sayers, MTRI, Michigan Technological University, [mjsayers@mtu.edu](mailto:mjsayers@mtu.edu)

Reid Sawtell, MTRI, Michigan Technological University, [rwsawtel@mtu.edu](mailto:rwsawtel@mtu.edu)

Karl Bosse, MTRI, Michigan Technological University, [krbosse@mtu.edu](mailto:krbosse@mtu.edu)

Steve Ruberg, NOAA Great Lakes Environmental Research Laboratory, [steve.ruberg@noaa.gov](mailto:steve.ruberg@noaa.gov)

John Lekki, NASA Glenn Research Center, [John.D.Lekki@nasa.gov](mailto:John.D.Lekki@nasa.gov)