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AQU 0: ENS Approaches for Observing and Sensing of Microbial Communities in Aquatic Ecosystems An Overview

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Authors

Gaurav Sukhatme
David Caron
Carl Oberg
et al.

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ENS Approaches for Observing and Sensing of Microbial Communities in Aquatic Ecosystems: An Overview

Gaurav Sukhatme, David Caron, Carl Oberg, Bin Zhang, Amit Dhariwal, Beth Stauffer, Stefanie Moorthi, Arvind Pereira
 University of Southern California <http://robotics.usc.edu/~namos>

Introduction: Project Goals

Technological Goals

- Development of robust, decentralized algorithms and supporting hardware
- Acquisition of high-resolution, spatio-temporal information in near-real time of pertinent environmental factors that affect the distribution and dynamics of plankton assemblages.

Application Goals

- Use of this technology and conceptual approach to make real-time chemical and physical measurements within natural aquatic ecosystems
- Generate and test novel hypotheses involving the dynamics of microbial taxa of societal and ecological relevance.

Problem Description: Sensor Network Design & Construction

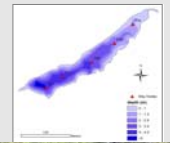
NAMOS is a combination of static & mobile components

- Static buoys provide high resolution on a temporal scale at several locations
- Mobile Robotic Boat provides high resolution on a spatial scale in areas where buoys are not deployed
- Mobile Robotic Boat also provides sampling capabilities
- Buoys & Robotic Boat are outfitted with chlorophyll fluorometers & thermistors

Study Site: Lake Fulmor, CA

Multiple Deployments in Lake Fulmor have been conducted in 2005 & 2006.

NAMOS has allowed us to document seasonal differences in phytoplankton communities & unusual diel changes in chlorophyll distribution.



Proposed Solution: Field & Laboratory Experimental Results

NAMOS deployments in LF, 2005 & 2006

- Spatial & Temporal Patterns of Chlorophyll Distribution in Lake Fulmor: Multi-scale Measurements
 - Heterogeneous chlorophyll distribution along lake & seasonally
 - Diel variations in chlorophyll concentration indicate a highly migratory phytoplankton assemblage
- Highly variable phytoplankton community
 - Shifts in community structure towards cyanobacteria dominance in late Summer
- Current & future work includes additional measurements of environmental parameters meaningful for phytoplankton growth & success

Laboratory investigations of *Lingulodinium polyedrum*

- Prolonged red tides of *L. polyedrum* off CA coast in recent summers present excellent model system
 - Potential for toxin production
- Experiments conducted in water column testbed to better understand vertical migration
- New quantitative PCR method developed for identification & rapid enumeration of *L. polyedrum* in natural water samples

Results & Figures

