



**SENSORS FOR MONITORING OF HARMFUL ALGAE, CYANOBACTERIA AND THEIR TOXINS – Current Status and Integration Into Observing Systems**

- An Alliance For Coastal Technologies Technical Workshop -

**Day 1 – Monday, 30 January 2017**

*8:15 – 9:00* Arrival at MLML; coffee and treats in seminar room

*9:00 – 9:30* Welcome & Introductions

- MLML logistics
- quick intros (name, affiliation, interest in workshop)
- quick review of recommendations from 2008 workshop
- outline overall goals for this workshop

*9:30 – 10:30* **SESSION 1: OVERVIEW: Current State of HAB Detection Technologies and Integration with Regional Observing Systems**

- 20 min: R. Kudela – overview of technology in use (in situ, remote, modeling), toward management applications
- 20 min: T. Davis – the Great Lakes example
- 20 min: Ana Lara-Lopez – highlights from the Nov 2016 HAB workshop in Australia

*10:30 – 10:45* BREAK

*10:45 – 12:30* **SESSION 2: HAB and TOXIN TECHNOLOGY/DETECTION CHALLENGES**

*10:45-11:30* Breakout into four groups (groups will be mix of industry/research/stakeholders) to discuss charge questions

- Q1: What are the cost, usability and readiness levels for current methods? What are improvement suggestions?
- Q2: Identify region/HAB/water type-specific gaps and issues for HAB sensor technologies and their implementation.

- Q3: What are paths forward for transitioning to operational use for current and near-future technologies?

11:30-11:45 Rep from each group will give 3-5 minute group summary

11:45-12:30 Open discussion

12:30 – 1:30 LUNCH ON SITE

1:30 - 3:15 **SESSION 3: STAKEHOLDER NEEDS**

1:30-2:15 Breakout into four groups (groups will be mix of industry/  
research/stakeholders) to discuss charge questions

- Q1: Do currently available detection technologies meet stakeholder needs?
- Q2: What constraints may limit widespread adoption of currently available technologies?
- Q3: What surveillance needs are not being met?
- Q4: Are there viable solutions in the R & D pipeline?

2:15-2:30 Rep from each group will give 3-5 minute group summary

2:30-3:15 Open discussion

3:15 – 3:30 BREAK Group photo on deck

3:30 – 4:30 **SESSION 4: SHARED CHALLENGES ACROSS MARINE AND FRESHWATER ECOSYSTEMS**

- Open discussion - What are the shared challenges across ecosystems? Are there agency/organization barriers to collaboration across the marine-freshwater continuum? What are some approaches for integration of data streams? What are the regional complexities for bridging knowledge gaps?

4:30 – 5:00 Daily Wrap up and return to Monterey

**Day 2 – Tuesday, 31 January 2017**

8:15 – 9:00 Arrival at MLML; coffee and treats in seminar room

9:00 – 9:15 Recap of Day 1 Outcomes, quick intro to sections for this day

9:15 – 9:30 Jen Rhoades – update on IOOS investments in HAB sensor technology

9:30 – 9:45 Marc Suddleson – update on NCCOS involvement/investments in sensors for observing systems

9:45 – 12:00 **SESSION 5: INTEGRATING DETECTION WITH EXISTING SYSTEMS**

- 9:45-10:30 Breakout into four groups (groups will be mix of industry/ research/stakeholders) to discuss charge questions
- Q1: What performance assessments (QA/QC) methods are in use for current technologies?
  - Q2: What ground-truth methods are in use for current technologies?
  - Q3: What's needed/feasible to expand on these approaches?
  - Q4: What contextual data is required for interpretation of HAB detection patterns and alerts?
  - Q5: What end products are needed/desired?

10:30-10:45 Rep from each group will give 3-5 minute group summary

10:45 – 11:00 BREAK

11:00 – 12:00 Continue Session 5 with Open Discussion

12:00 – 1:00 LUNCH ON SITE

1:00 – 3:00 **SESSION 6: HAB TECHNOLOGY TESTING / 'CERTIFICATION'**

1:00 – 1:15 T. Johengen – Overview of ACT Performance Verification Process

- 1:15 - 2:00 Breakout into four groups (groups will be mix of industry/ research/stakeholders) to discuss charge questions
- Q1: What level of verification testing is needed? (i.e. *what is "good enough" in the context of price versus performance for different data uses*)
  - Q2: Are there 'gold standards' of reference?
  - Q3: Are there shared metrics to assess performance across systems (eg. marine versus fresh water) and uses (e.g. research versus management)?
  - Q4: How would performance testing of these technologies ideally be conducted in the field?
  - Q5: What are end-user QA/QC needs for HAB data?

2:00-2:15 Rep from each group will give 3-5 minute group summary

2:15-3:00 Open discussion

3:00 – 3:15 BREAK

3:15 – 5:00 Continue SESSION 6 – Performance Testing

3:15 – 4:00 Breakout into four groups (groups will be mix of industry/  
research/stakeholders) to discuss charge questions

- Q1: What opportunities can we utilize to demonstrate newly verified sensors?
- Q2: In what ways can we involve other organizations/programs in the verification/demonstration process?

4:00 – 4:15 Rep from each group will give 3-5 minute group summary

4:15 – 5:00 Open discussion

5:00 – Return to Monterey

### **Day 3 – Wednesday, 1 February 2017**

8:30 – 9:00 Arrive at MLML, Coffee, continental breakfast

9:00 – 12:00 **SESSION 7:** Steps Forward – Group Discussion

9:00 – 9:20 T. Johengen/T. Davis – development of an operational HABs  
forecasting system in Lake Erie

- recommendations for challenges
  - related to stakeholder needs
  - related to system integration
- recommendations for moving forward with coordination of marine and freshwater approaches
- recommendations for verification and knowledge-sharing