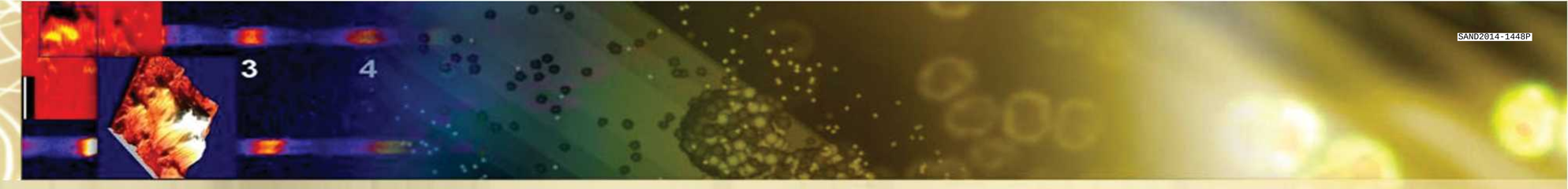
SANDIA BIOSCIENCE



SAND2014-1448P

Spectroradiometric Monitoring of Algal Cultures:

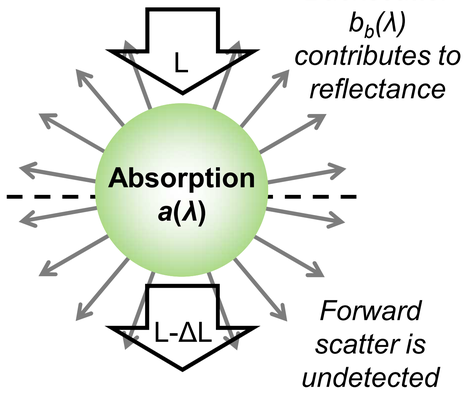
From initial field demonstrations to ongoing deployments

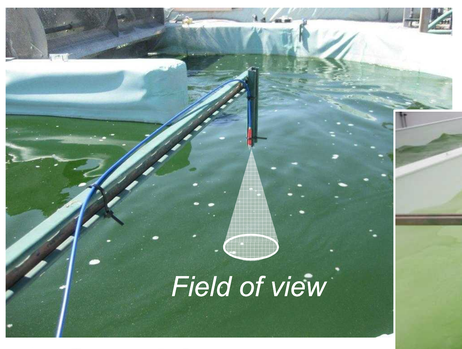
Thomas A. Reichardt, Aaron M. Collins, and Jerilyn A. Timlin

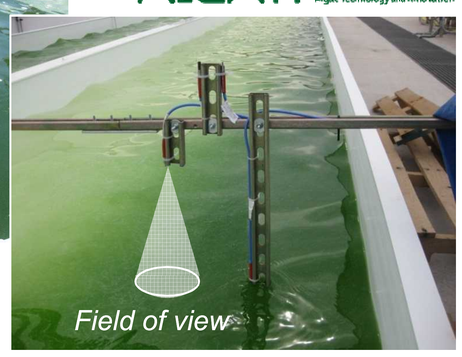
Challenges In Large Scale, Outdoor Algal Cultivation

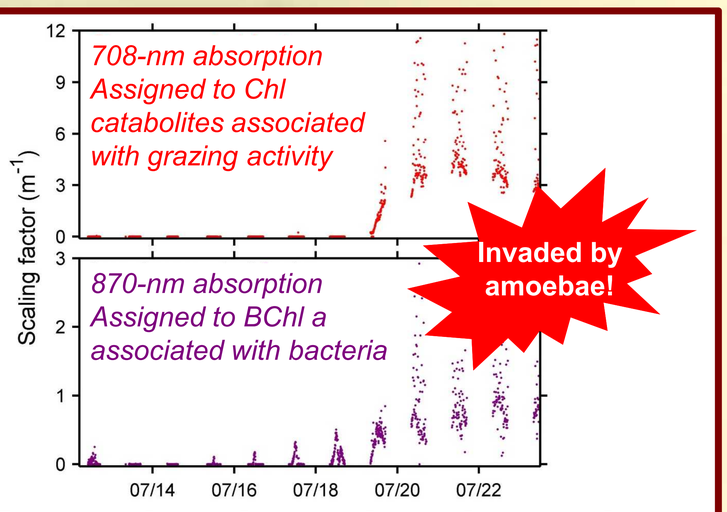
- Dynamic response to multiple environmental parameters → productivity changes hourly
- Bottom of food chain → predators abound
- Existing production monitoring provides only a 24-hr average from a single grab-sample.
- Real-time methods for characterizing cultures are critical, ***but did not exist.***

Development timeline









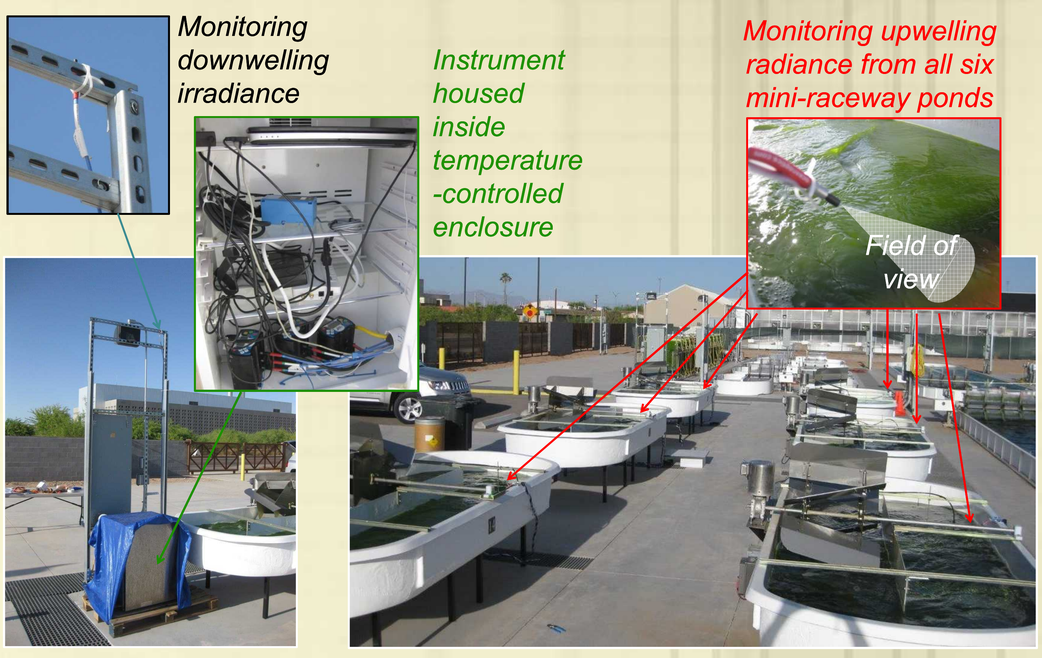
Demonstrate concepts ***Field tests*** ***Extend to invader detection***

2009 2010 2011 2012 2013 2014

Filed patent appln.

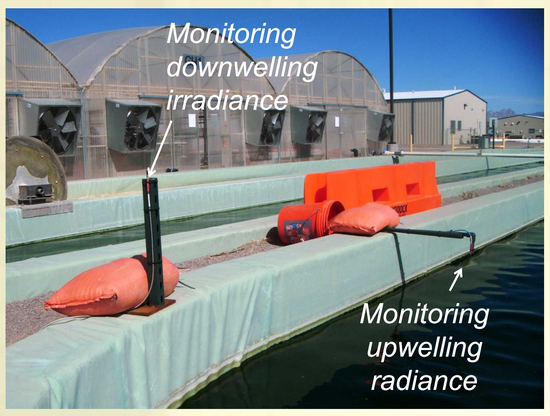
Arizona State Univ. (ASU)

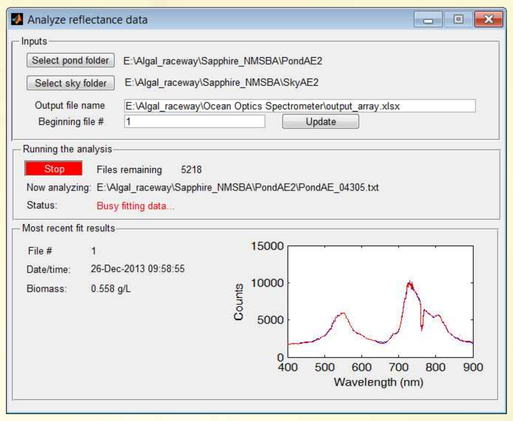
- Monitoring 6 mini-raceway ponds for the Algae Testbed Public Private Partnership (ATP^3).



Sapphire Energy, Inc.

- Sapphire Energy purchased components for a system intended for dedicated use at their Las Cruces, NM, R&D facility.
- Sandia provided guidance for the system configuration and a GUI executable for real-time biomass measurement.





Further Needs

- Monitoring approach was developed rapidly so that we could field demo in 2012
- Encouraged adoption by Sapphire Energy, ASU
- Concern that insights will get "stuck in the field"
  - Dedicated lab experiments to follow up on spectroscopic markers of invaders
  - Extend model to higher algal densities

Acknowledgments

- Sincere gratitude to Craig Behnke, Robert McBride, Becky Ryan, and the Sapphire Energy team, John McGowen and Thomas Dempster and the AzCATI team.
- This work was funded in part by the LDRD Program at Sandia National Laboratories, the DOE Integrated Biorefinery Program (Award #BM0102060-05794-1004173), ATP^3 project grant funding under the DOE ABY FOA (DE-FOA-0000811, Award #0615-1504), and a grant from the New Mexico Small Business Administration.
- Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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