



DRIVERS OF BLOOM
INITIATION & TERMINATION

Characterization of *Microcystis* sp. blooms in Lake Okeechobee and its downstream estuaries

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PROJECTS SUMMARY

HALO – *Microcystis* cell concentrations from flow cytometry, distributions, **dead/live cells**, **metabolic rates** (FDA), and photophysiology

IRLNEP – Phytoplankton composition and abundance in the IRL and **SLE** (including HAB species)

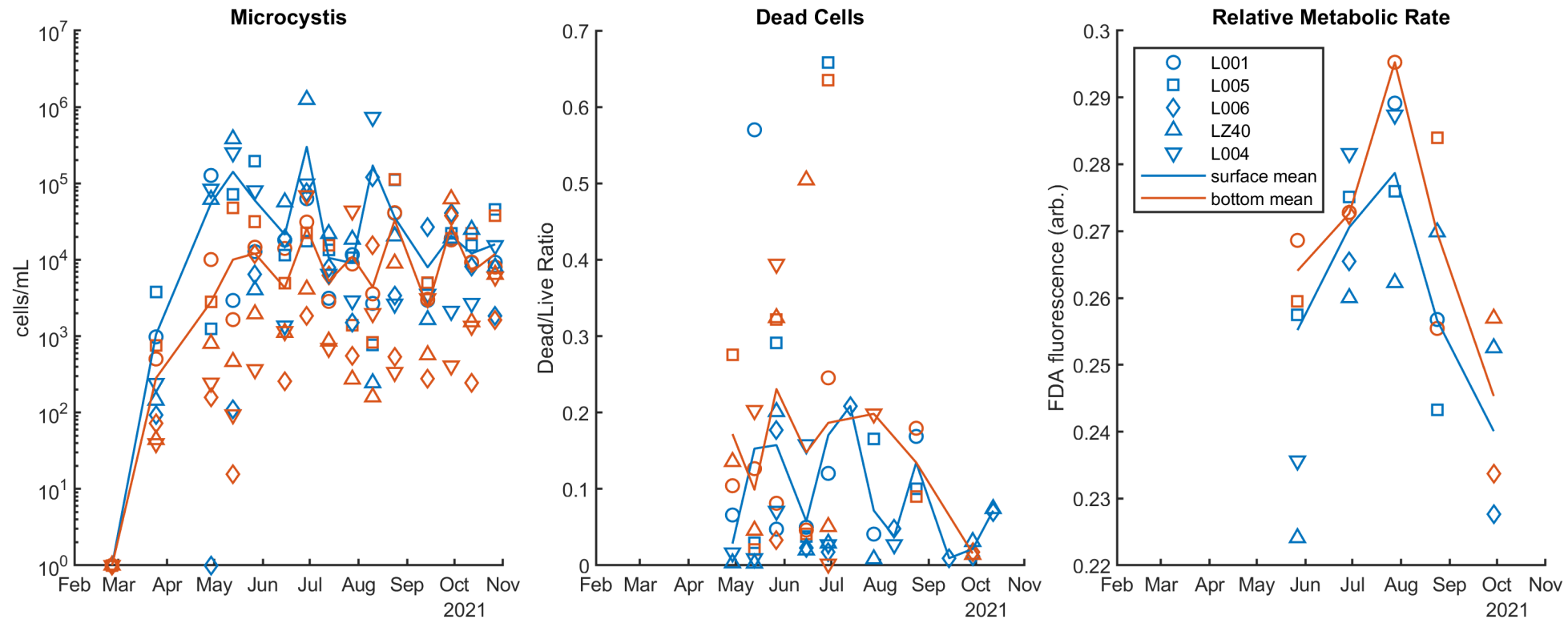
CCHH – Toxin dynamics, microbial **metagenomics**, and trophic transfer in the IRL and SLE

NASA-WR – *Microcystis* and microcystin distributions and modeling in LO, CRE, SLE, and Kissimmee basin

FDOH & CDC – Human exposure to aerosolized microcystin (Gordon & Schaefer)



MAJOR TAKEAWAYS

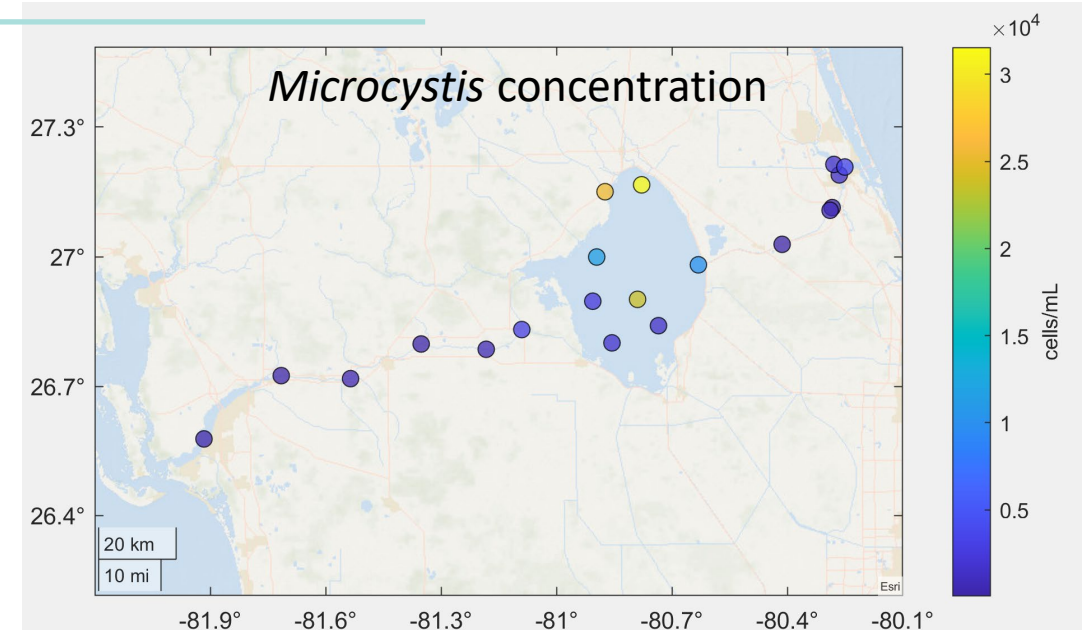
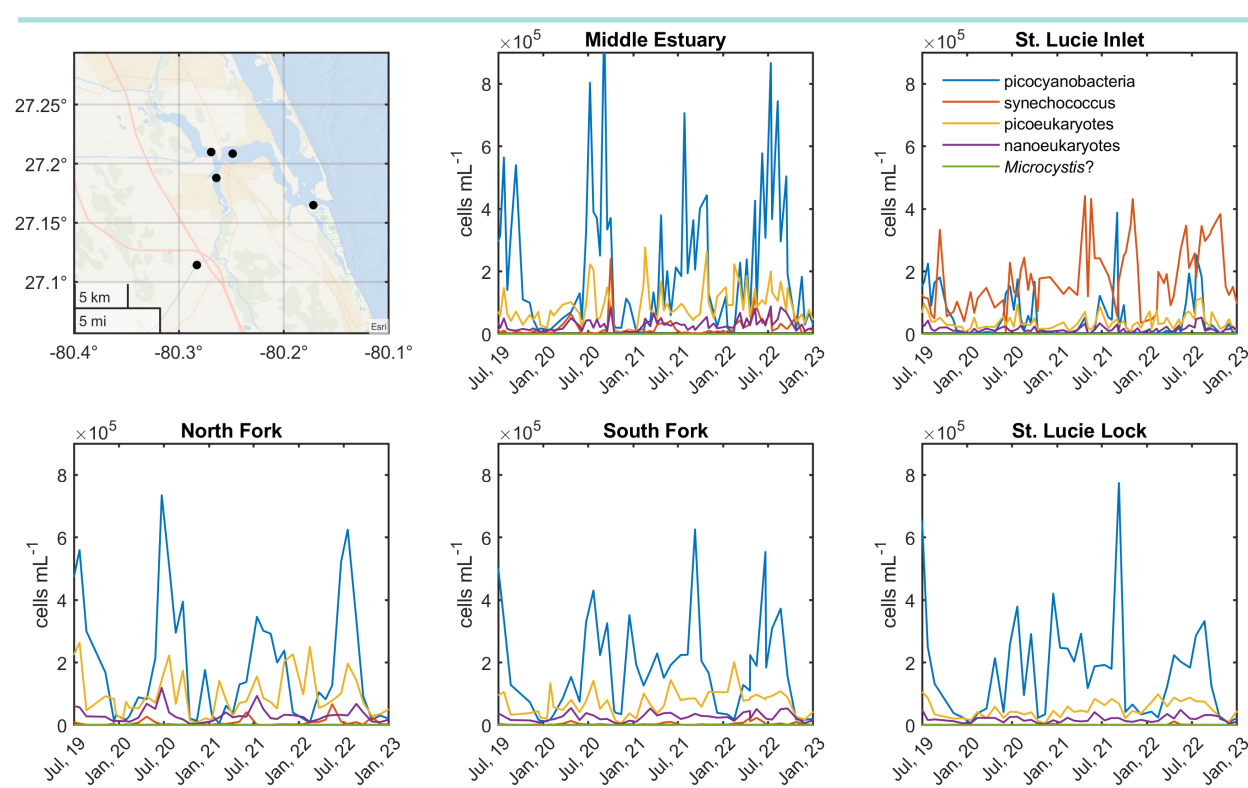


HALO

- Most dead *Microcystis* cells in early bloom stages (rapid recycling?)
- *Microcystis* metabolic rates peak in late bloom stages
- Almost no colonies in sediments



MAJOR TAKEAWAYS



IRLNEP, NASA-WR, CCHH

- No major SLE *Microcystis* blooms without LO discharge
- Microbial community composition important to bloom dynamics
- *Microcystis aeruginosa* vs. *panniformis*?
- CyanoHAB toxins are entering the food web



RESEARCH PRIORITIES

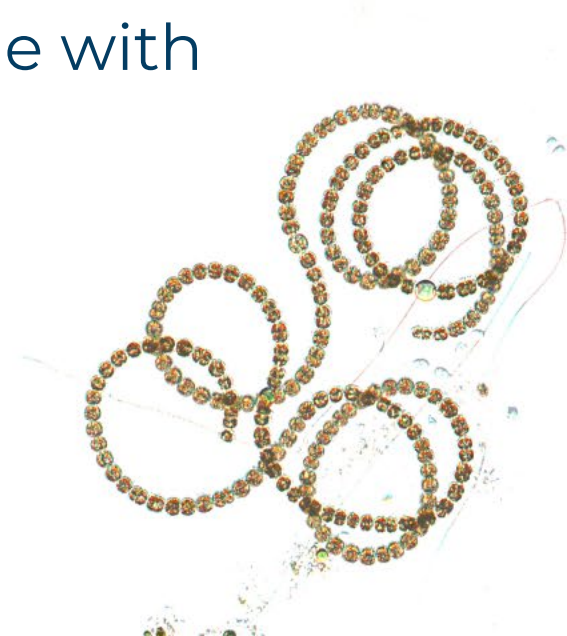
RELEVANT RESEARCH PRIORITIES IDENTIFIED IN 2019:

- Understand the factors that contribute to initiation, persistence, severity, and decline of blue-green HABs
- Evaluate past and current hydrology and the effects of freshwater releases on blue-green algae in ~~Lake Okeechobee~~ the St. Lucie Estuary
- Understand the movement of toxins into the environment, including air
- Determine how to adequately measure bloom initiation
- Evaluate the role of viruses and viral interactions
- Assess food web ramifications and develop better ecological models



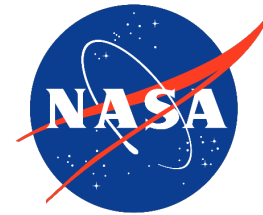
NEW DATA GAPS

- **HAB species** – who are we actually dealing with?
- **HAB physiology** – may help explain bloom persistence
- **Microbial associations** – including heterotrophic bacteria and microzooplankton grazers
- **HAB monitoring** – improve resolution in space and time with autonomous observations to understand dynamics
- **Modeling and forecasting** – incorporate growth rates, mortality, nutrient recycling, and vertical migration; consider ML/AI based approaches



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