



Satellite Remote Sensing and Crowd Sourcing to Monitor and Predict Cyanobacteria Blooms

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Introduction

- MERIS
 - 2-3 day intervals
 - 300 m resolution
 - MERIS -> Sentinel-3 (2015)



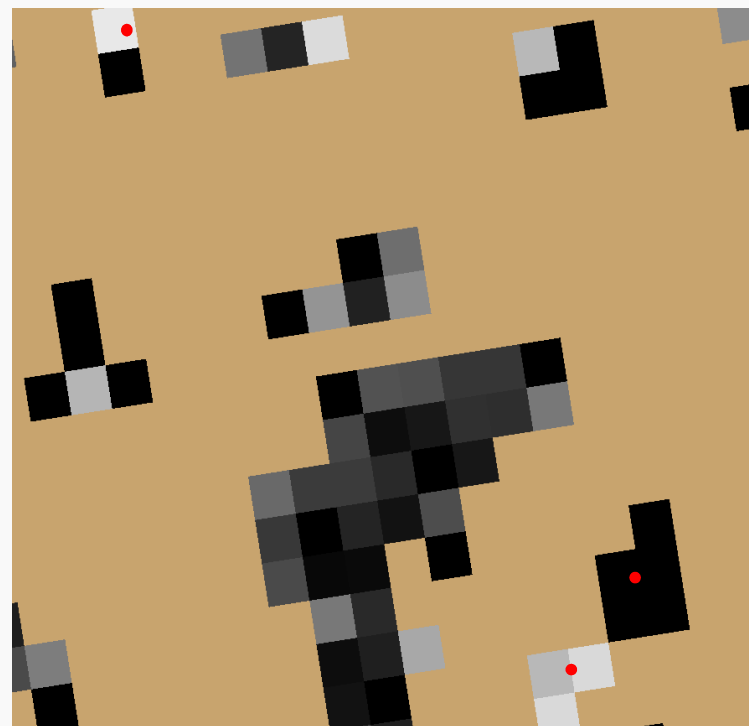


Introduction

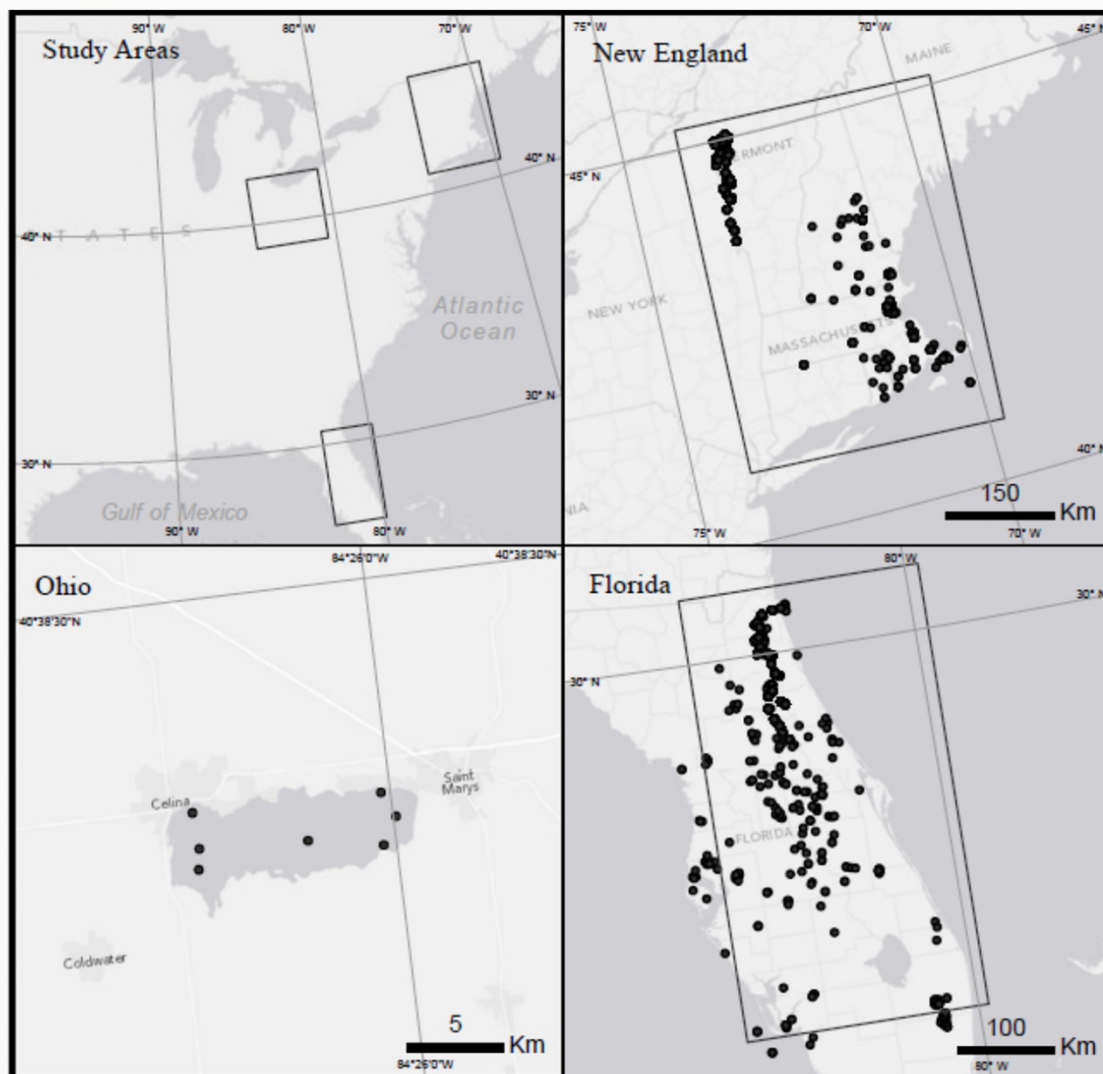
- 378,153 lakes in U.S.
- ~153,000 lakes included in 2007 National Lake Assessment
- MERIS and Sentinel-3
 - 9,347 lakes w/ 3x3 300 m pixel array
 - 6 % of National Lakes Assessment
- Landsat
 - ~153,000 lakes w/ 5x5 30 m pixel array
 - 100% of National Lake Assessment w/ 5x5 array

Methods

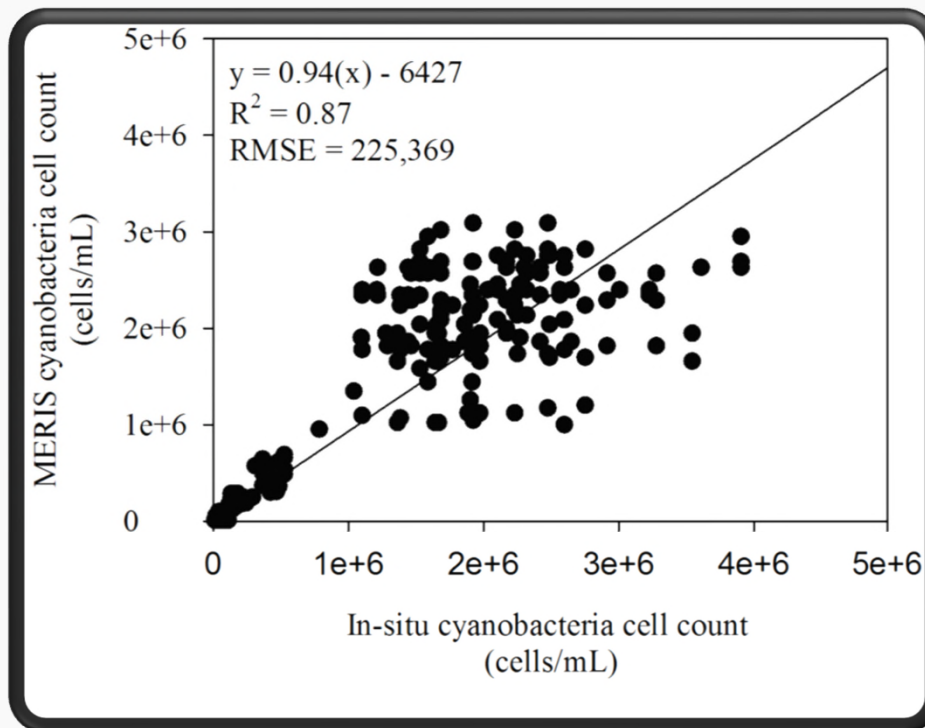
- Spatial scale
 - 300 x 300 m
- Temporal scales
 - \leq 1-day
 - \pm 1, 3, 5 and 7 days



Methods



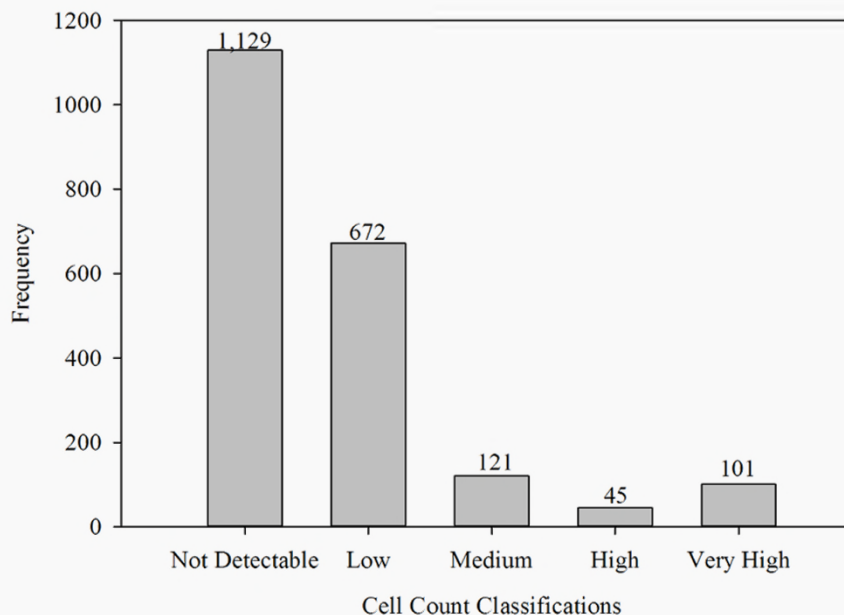
Results





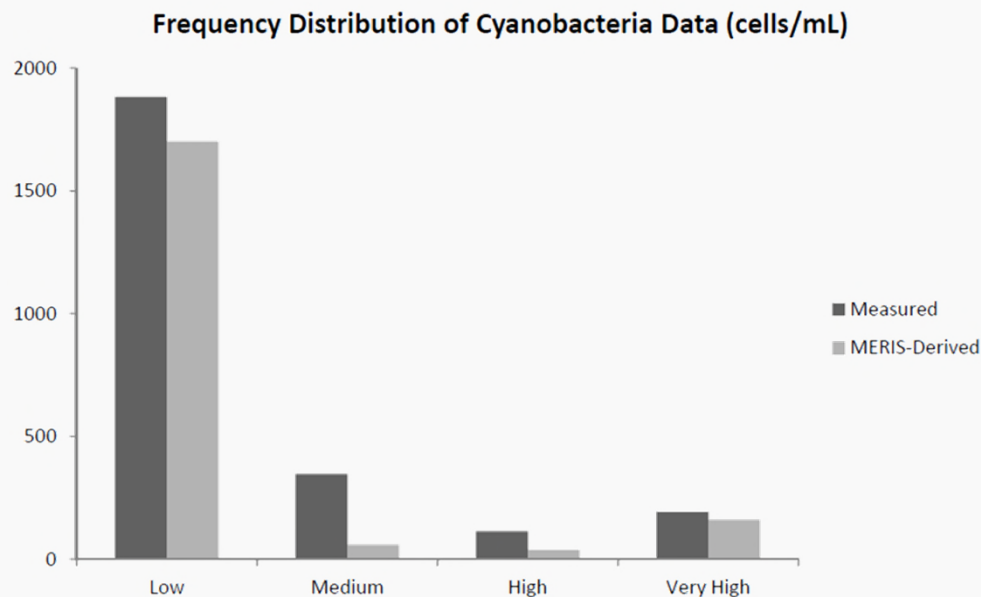
Results

- Cyanobacteria cell count ranges
 - Low (10,000–109,999)
 - WHO Low-Moderate
 - Medium (110,000–299,999)
 - High (300,000–1,000,000)
 - Very high (>1,000,000)



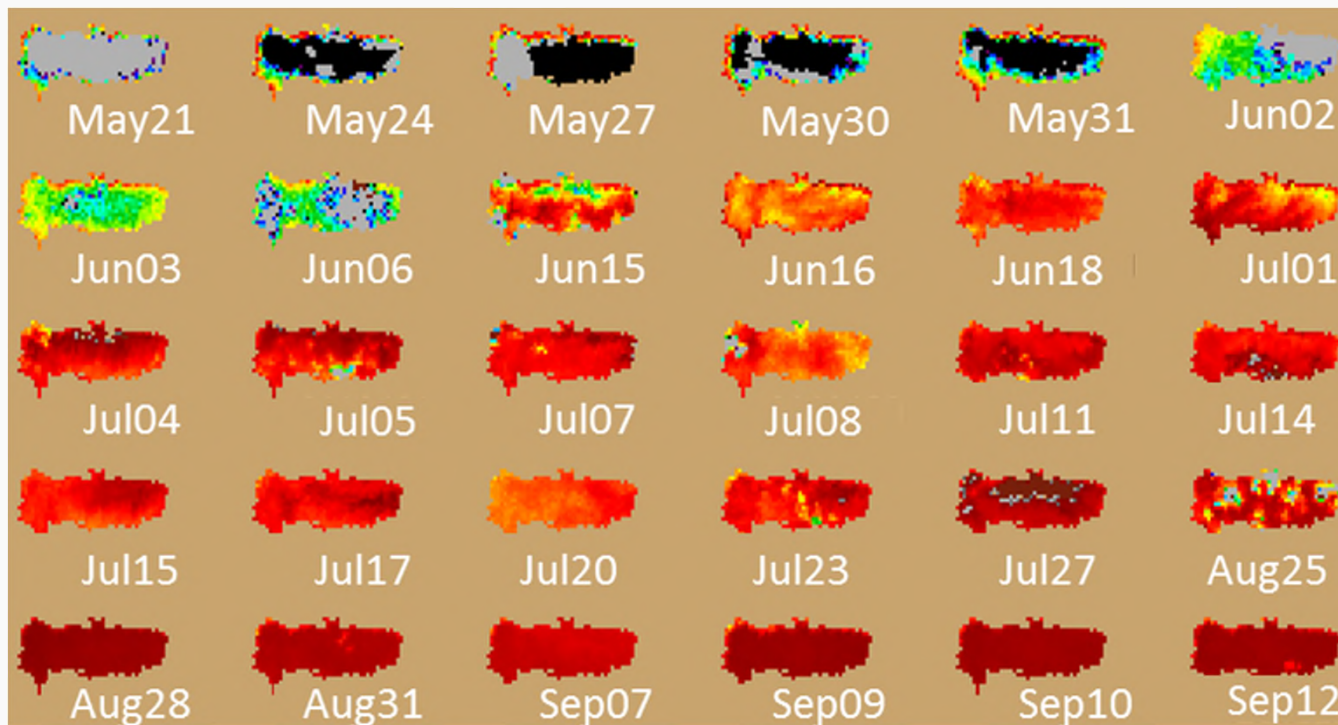
Results

- Correspondence % (+/- 7 days)
 - Low = 90%
 - Medium = 17%
 - High = 35%
 - Very High = 83%



Results

Grand Lake St. Mary, Ohio: MERIS Cyano index 2010



Low [conc]  Very High [conc]

Source: NOAA Coastal Ocean Science

Crowd Source Prediction Algorithm

- 2006 National Land Cover Database
- Water Quality Portal
- National Climatic Data Center
- MERIS/Sentinel-3 cyanobacteria counts





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