Cyanobacteria Assessment Network (CyAN)

Serie de Capacitaciones en Línea NASA ARSET

Semana 4: El Monitoreo a Gran Escala Usando la Teledetección y la Ciencia Ciudadana

26 de septiembre de 2017

Wilson Salls
ORISE Research Fellow
U.S. EPA Office of Research and Development

Declaración de Misión y Objetivos

"Apoyar la gestión ambiental y el uso por parte del público de los lagos y estuarios de EEUU proporcionando una capacidad de detectar y cuantificar floraciones de algas y la calidad del agua relacionada usando registros de datos satelitales."

- Crear una metodología **estándar y uniforme** para identificar floraciones de algas nocivas (HABs)
- Desarrollar un sistema de **diseminación** de información
- Entender las conexiones entre las condiciones **sanitarias, económicas** y **ambientales** y las HABs


Fuente: Nicholas Aumen, USGS

Productos del Trabajo de CyAN

- Validación de datos de campo
- Desarrollo de algoritmos
- Evaluación de algoritmos
- Factores del terreno
- Efectos sobre la salud
- Beneficios económicos de la alerta temprana
- Diseminación de datos

Fuente: MERIS/NASA; procesado por NOAA/NOS/NCCOS

Datos In Situ

National Water Quality Monitoring Council
Working together for clean water

Water Quality Data

WQP Home | Download Data | How to use the WQP | National Results Coverage | About the WQP

LOCATION

Place:
Country: All
State: All
County: All

Point Location: ?
Within miles of
Lat:
Long:
Use my location

Bounding Box: ?
North:
South:
East:
West:

SITE PARAMETERS

Site Type: All
Organization ID: All
Site ID:
HUC:
Minimum sampling activities per site:
Search Upstream and Downstream (BETA) ?

SAMPLING PARAMETERS

Sample Media: All
Characteristic Group: All
Characteristics: All
Project ID: All
Parameter Code: (NWIS ONLY)
Minimum results per site:
Date range - from: mm-dd-yyyy to: mm-dd-yyyy
Biological sampling parameters: ?
Assemblage: All
Taxonomic Name: All

Leaflet | Powered by Esri | HERE, DeLorme, MapmyIndia, © OpenStreetM...

DATA SOURCE

Select database:

Show sites on map
Style sites: By source

Select data to download:
- Site data only
- Sample results (physical/chemical metadata)
- Sample results (biological metadata)
- Sample results (narrow)
- Sampling Activity
- Sampling Activity Metrics
- Result Detection Quantitation Limit Data

File format:
- Comma-separated
- Tab-separated
- MS Excel 2007+
- KML (Keyhole Markup Language - for Sites only)

Sort data

DOWNLOAD

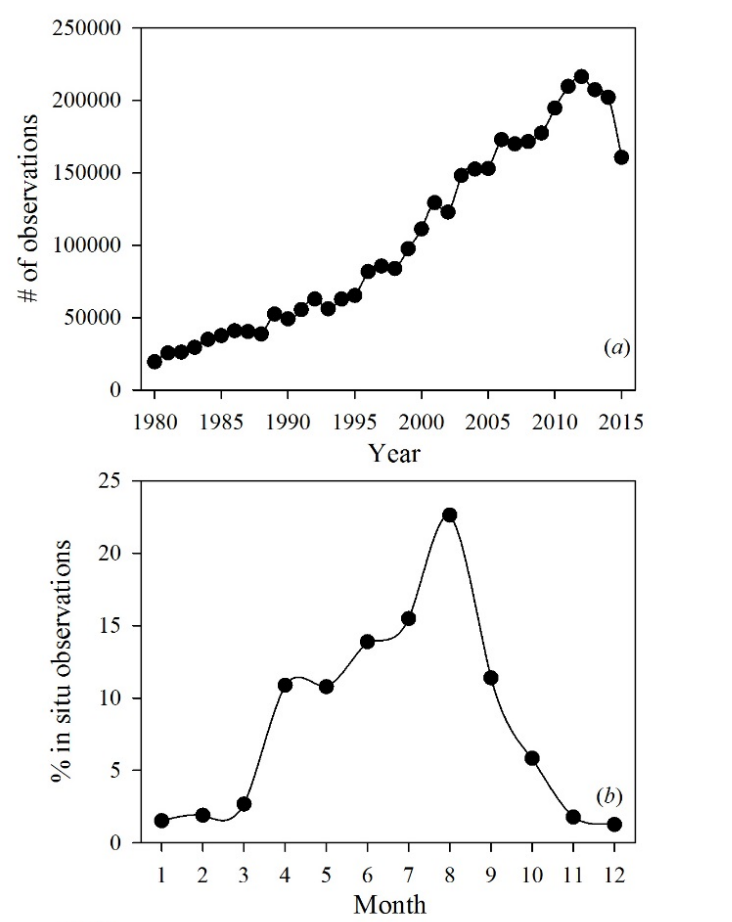
Show Web Service Calls | Show ArcGIS Online Parameters ?

Contact us

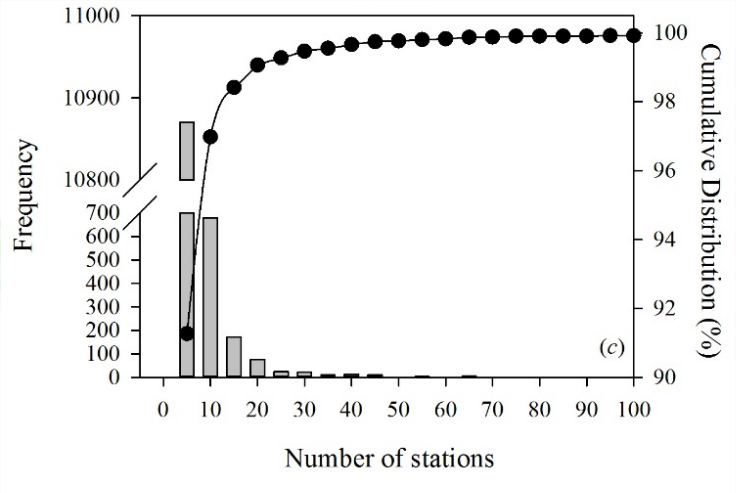
https://www.waterqualitydata.us/

Muestreo In Situ: Resolución Espacial y Temporal

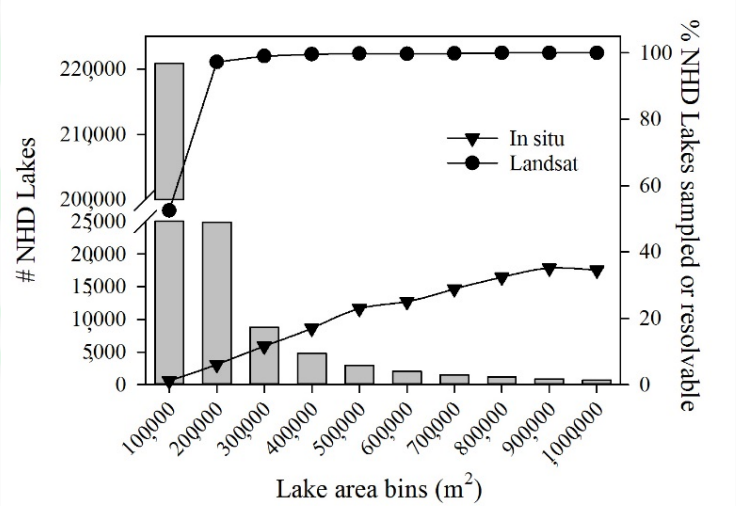
Ejemplo: Temperatura Lacustre



Número de observaciones in situ al año (sup.) y distribución de muestras por mes (inf.).



Número de estaciones por lago y distribución acumulativa por lago.

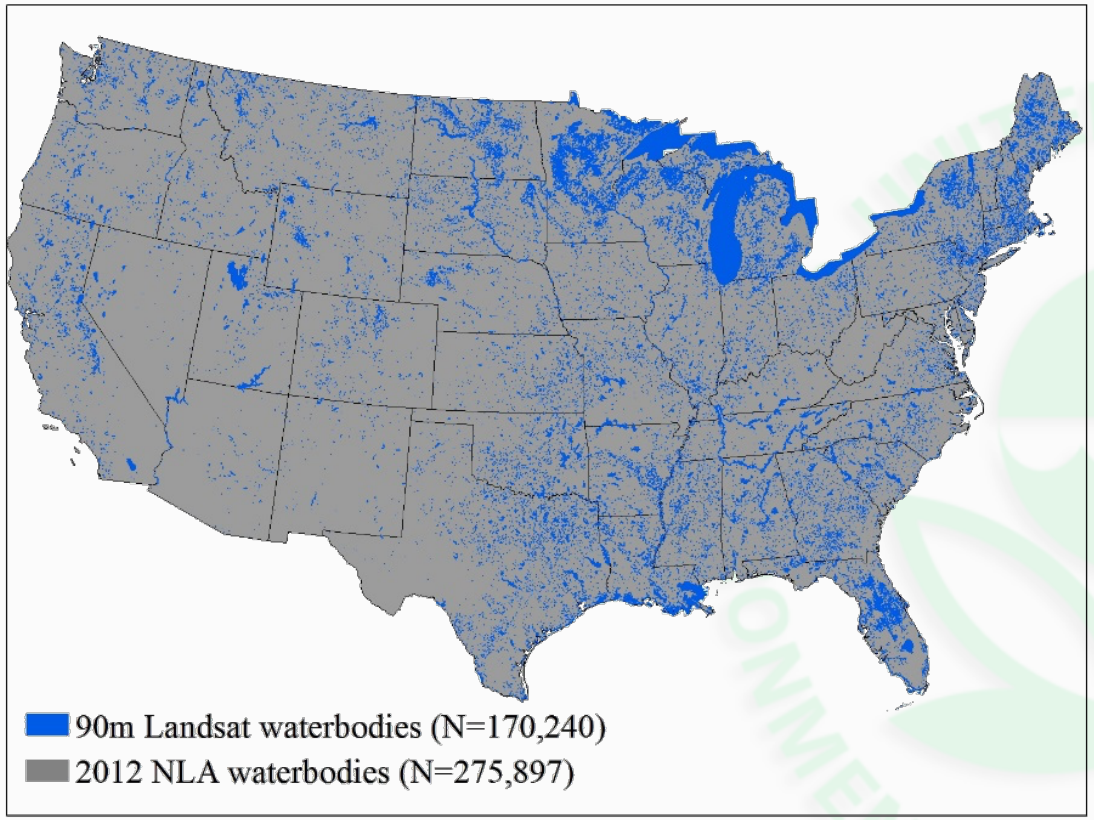


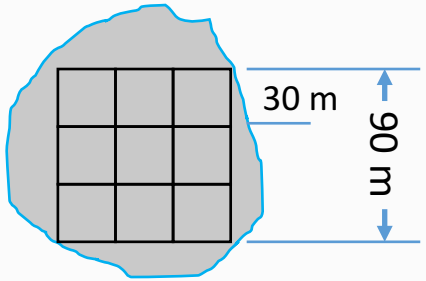
Porcentaje de lagos muestreados por área superficial

Fuente: Iiames et al. (*in prep.*)

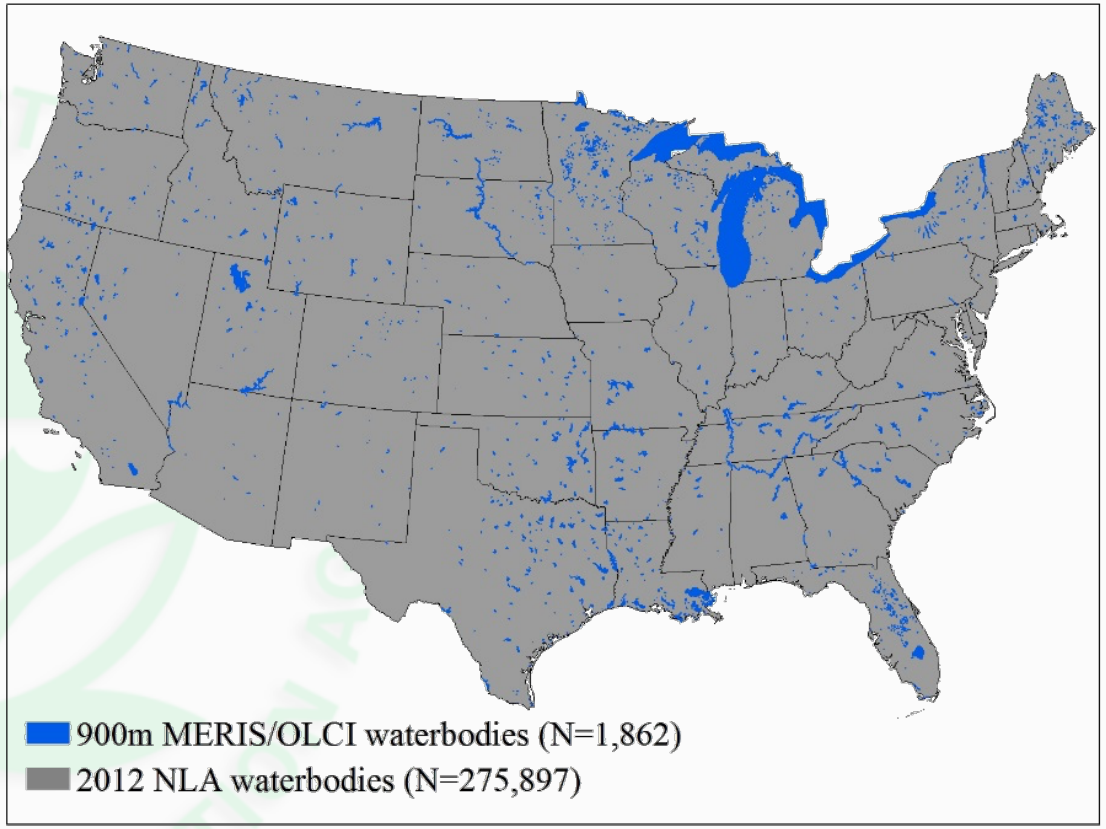
Resolución Espacial

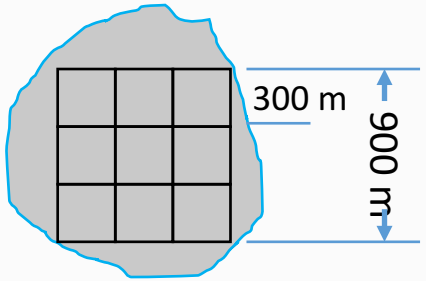
Landsat 8 Operational Land Imager (OLI)





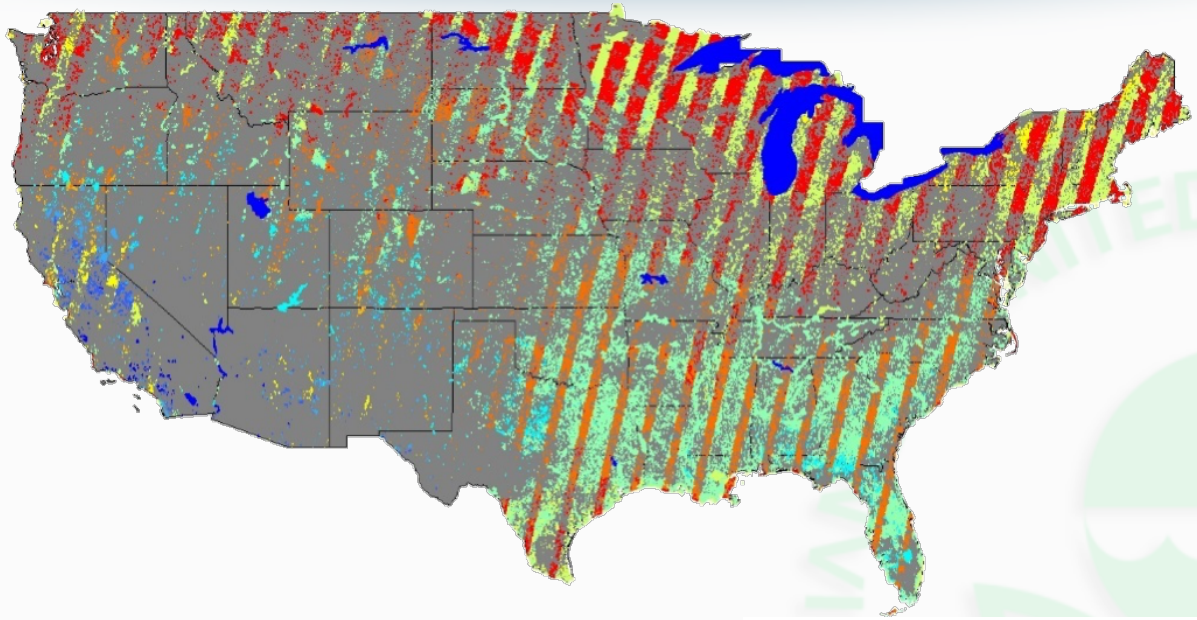
Envisat **MEdium Resolution Imaging Spectrometer (MERIS)**

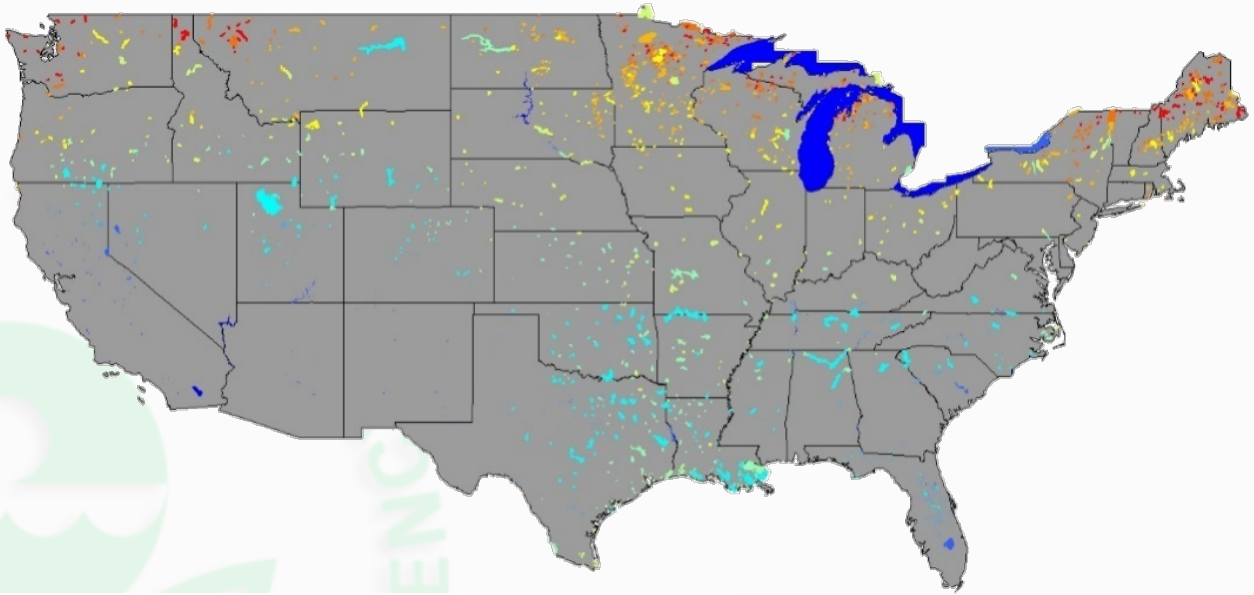




Fuente: Clark et al. 2017. Ecological Indicators. 80: 84-95.

Resolución Temporal



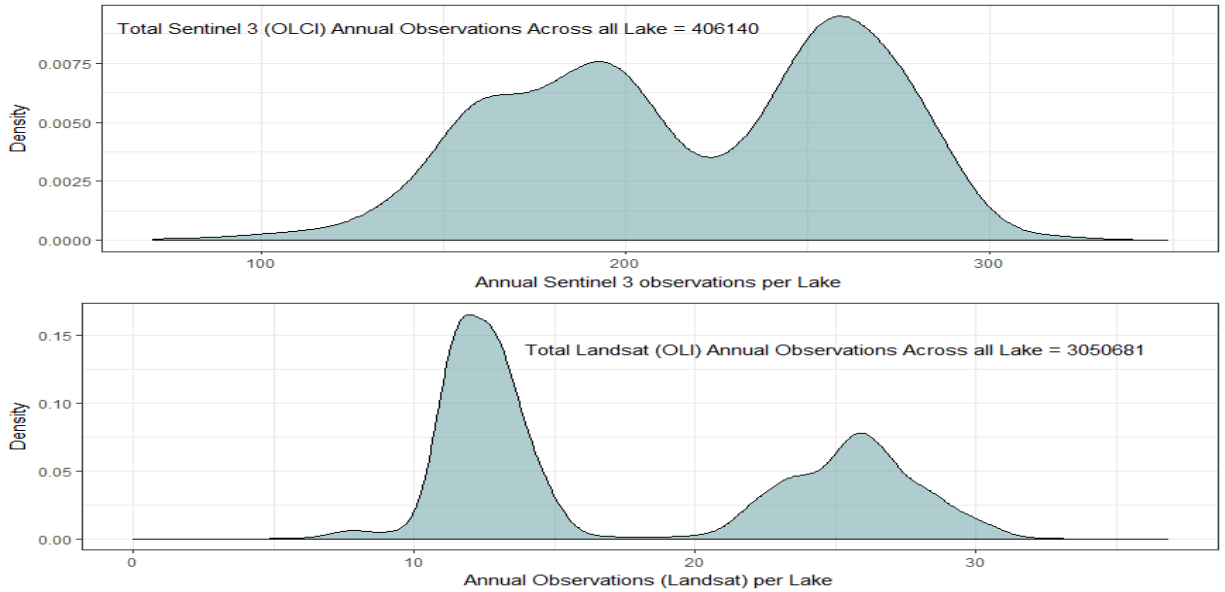


Observaciones libres de nubes por año

Landsat_Full_Year_Cloudfree_views

#Observations/Yr

- 0.00 - 6.76
- 6.77 - 8.21
- 8.22 - 9.52
- 9.53 - 10.93
- 10.94 - 12.79
- 12.80 - 14.90
- 14.91 - 17.39
- 17.40 - 20.56
- 20.57 - 24.89
- 24.90 - 32.29

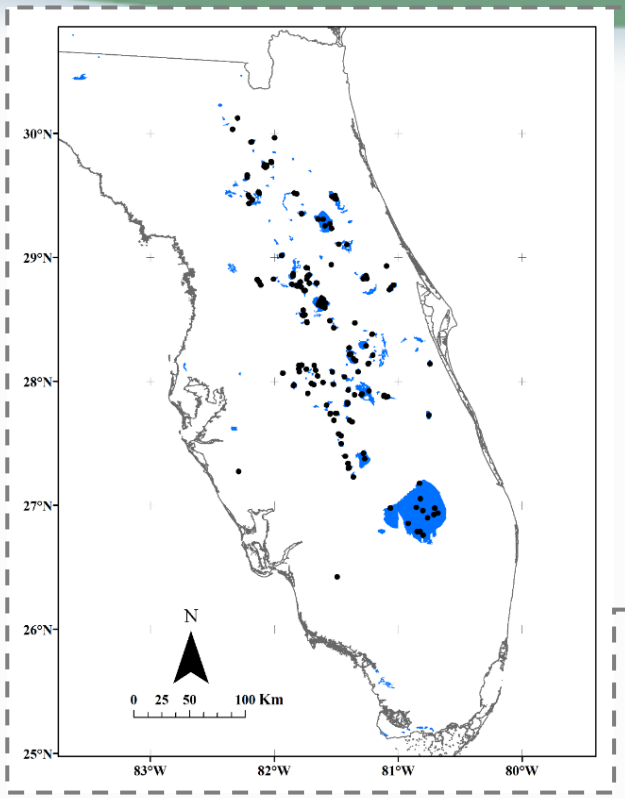


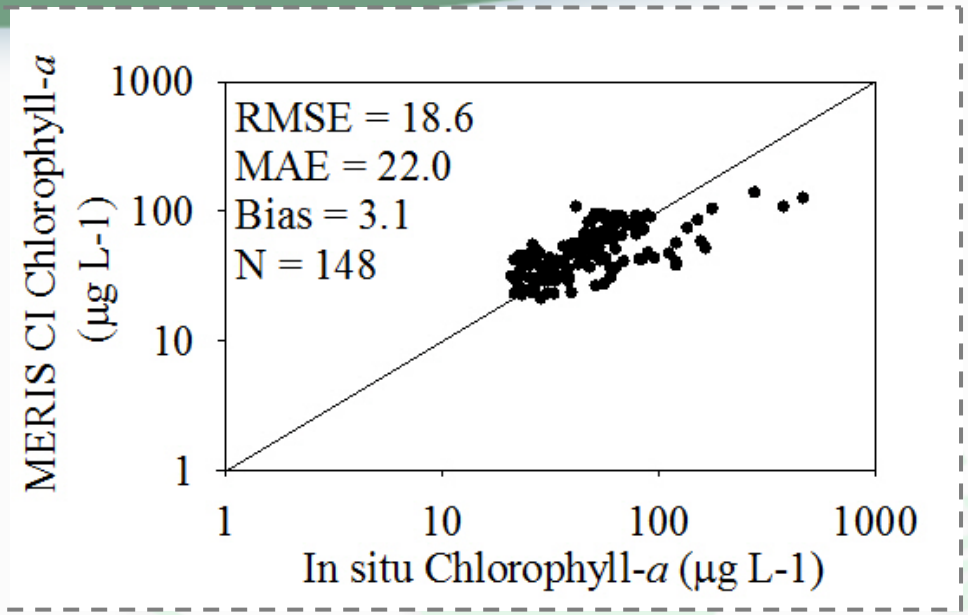
Sentinel 3

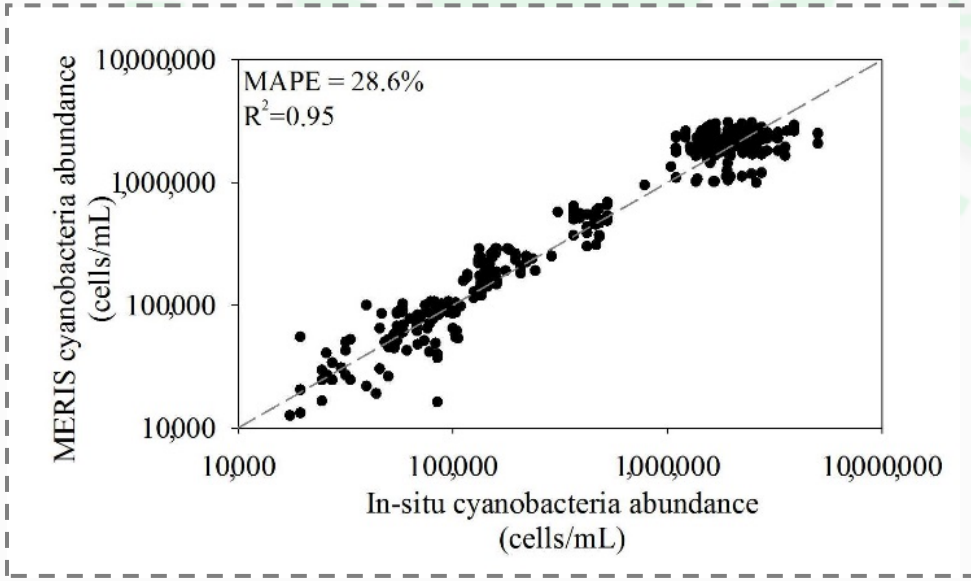
Observaciones por año

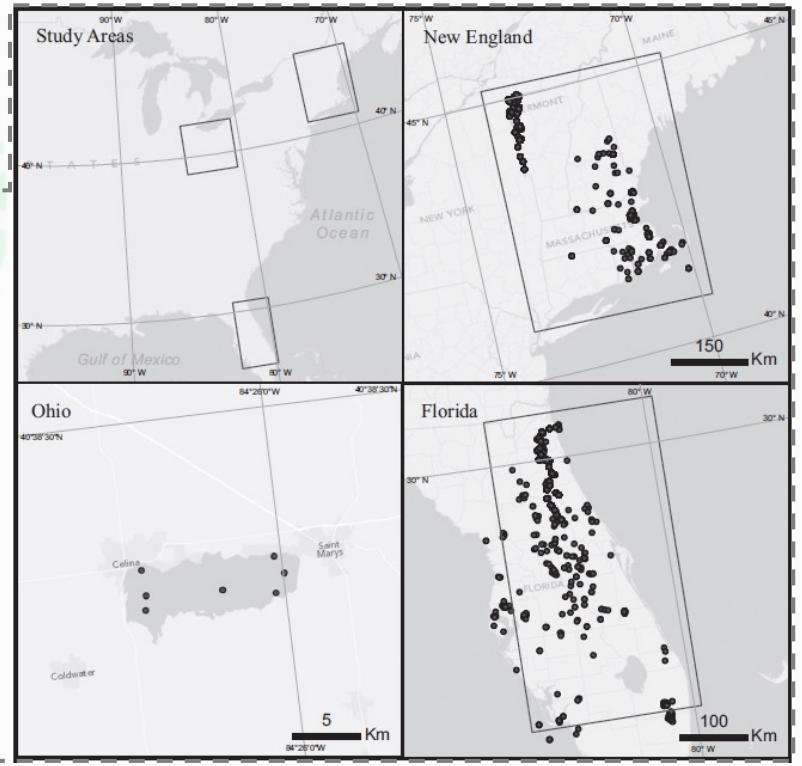
- 0.00 - 110.16
- 110.17 - 147.01
- 147.02 - 168.48
- 168.49 - 187.49
- 187.50 - 205.21
- 205.22 - 226.41
- 226.42 - 246.67
- 246.68 - 263.09
- 263.10 - 279.77
- 279.78 - 348.71

Validación



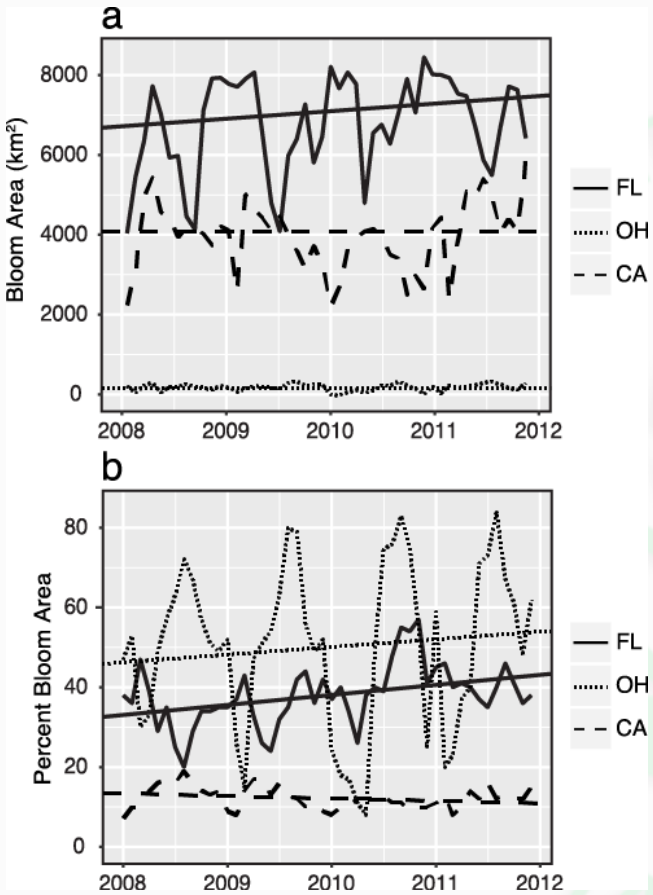






Fuente: Lunetta et al. 2015. Evaluación de la detección del conteo de células de cianobacterias derivada de imágenes MERIS a lo largo del Este de EEUU. RSE 157:24-34.

Extensión Espacial de CyanoHABs

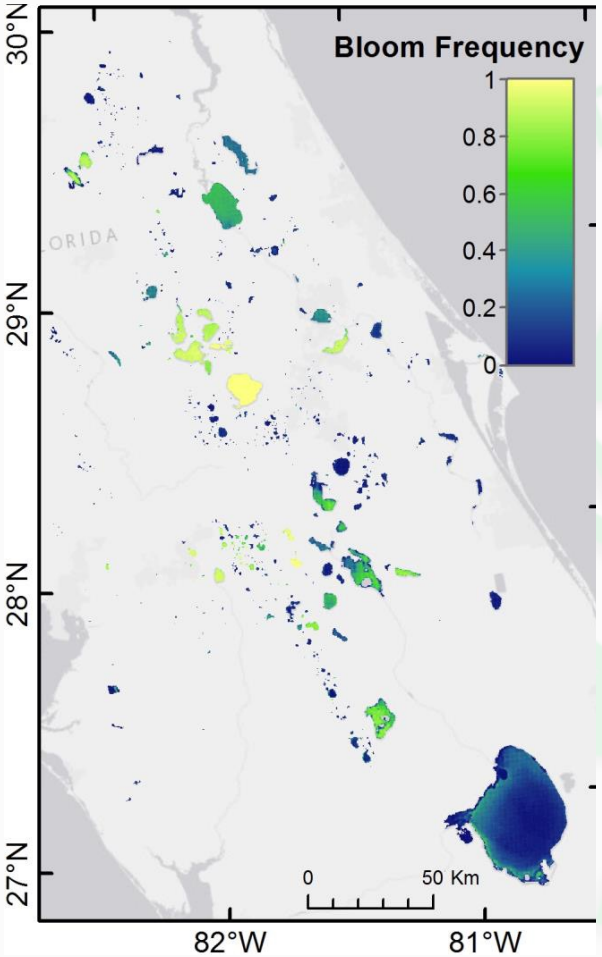


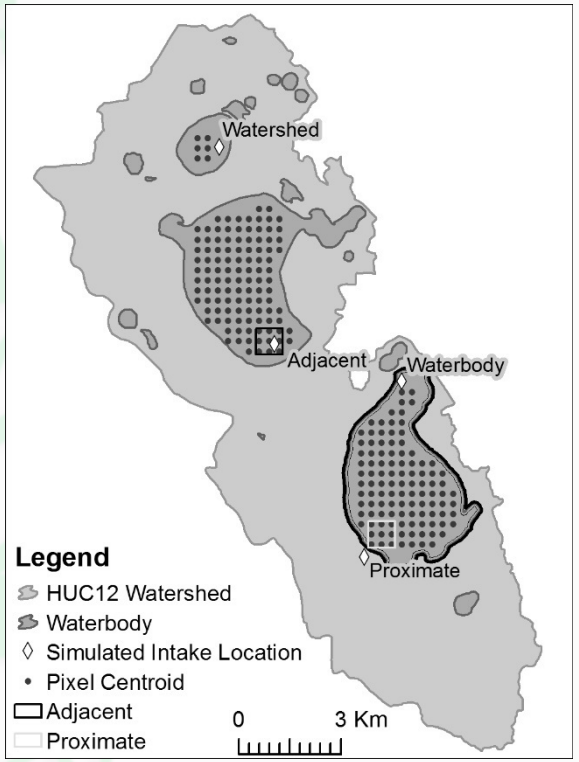
region	WHO	Y
FL	ND	3.3
	bloom	4.1
	low	7.8
	mod	26.4
	high	1.9
OH	ND	7.94
	bloom	>100
	low	Inf
	mod	7.72
	high	29.4
CA	ND	2.9
	bloom	43.9
	low	6.5
	mod	24.4
	high	31.9

Variabilidad residual (Y):
Años necesarios para indicar una tendencia de cyanoHABs

Fuente: Urquhart et al. 2017. Harmful Algae. 67: 144-152.

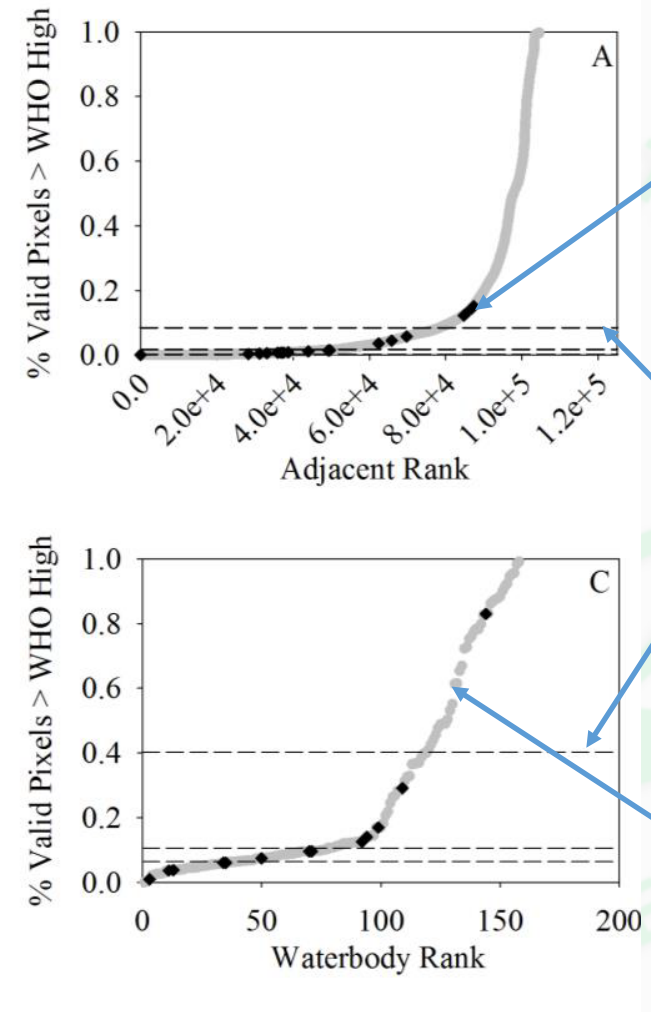
Frecuencia de CyanoHABs





Fuente: Clark et al. 2017. Ecological Indicators. 80: 84-95.

La Priorización del Agua Potable y de las Aguas Recreativas



Ranking por ingreso de agua potable en la superficie

Cuartiles

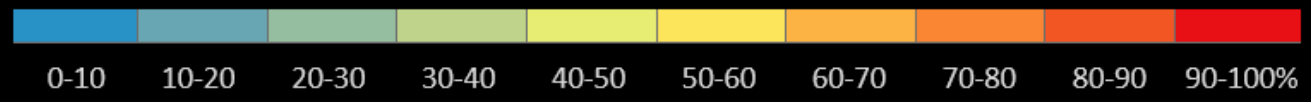
Ranking de lagos individuales

Fuente: Clark et al. 2017. Ecological Indicators. 80: 84-95.

-DATOS PRELIMINARES-

Frecuencia de Cianobacterias

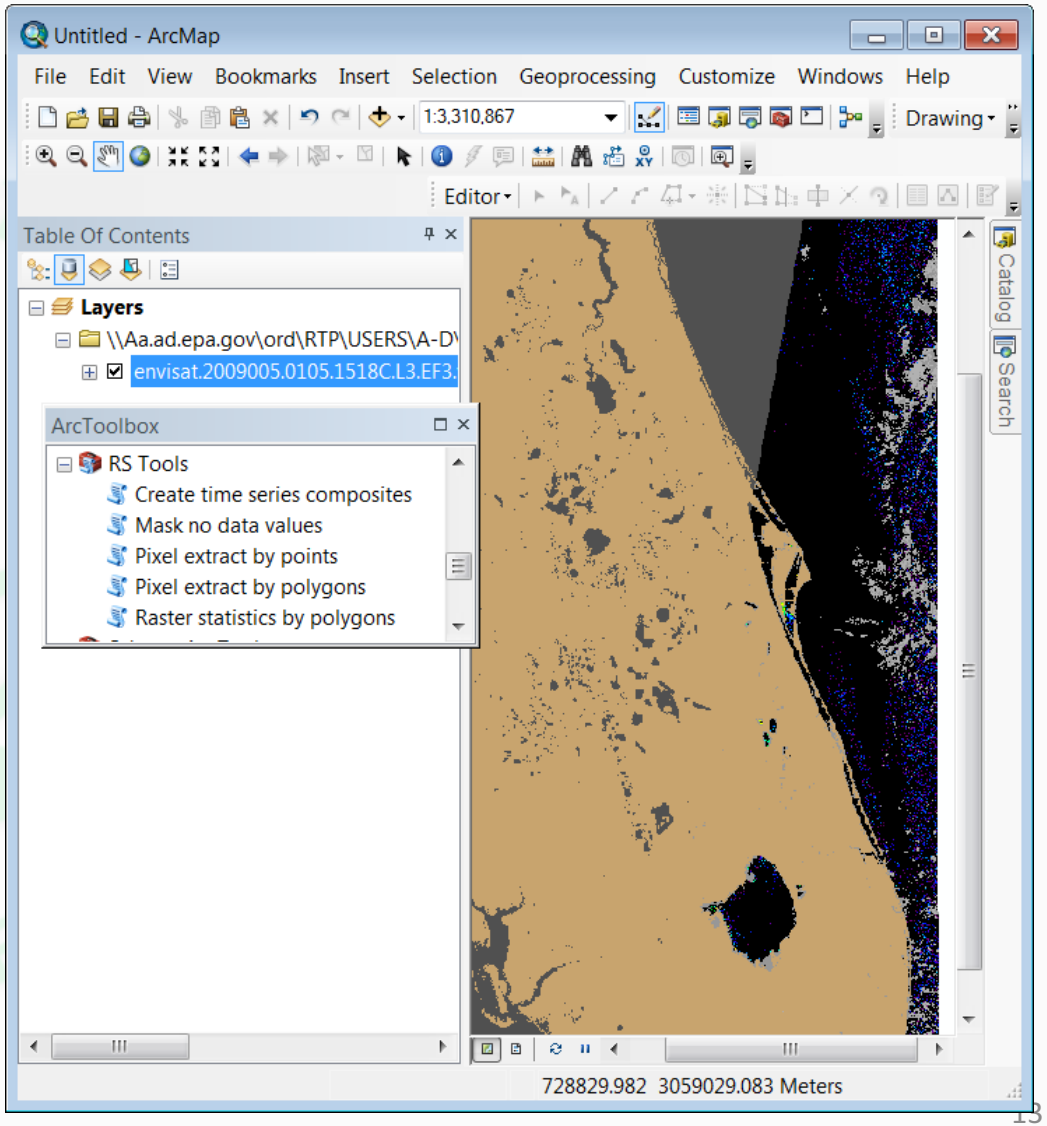
Porcentaje de fechas de observación con alta concentración cianobacterial (>100,00 células/ml). Años 2008-2011



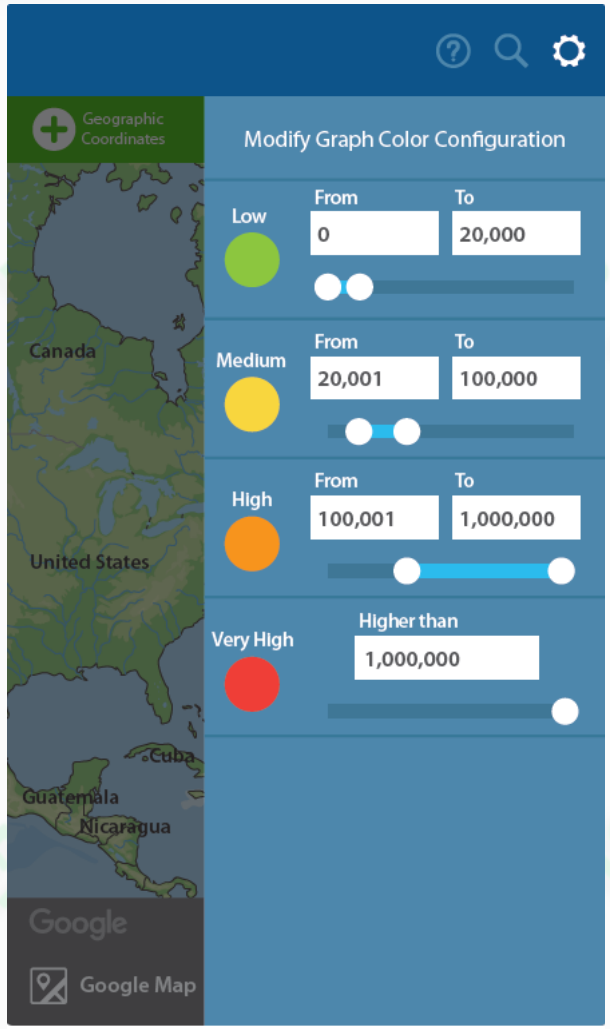
Herramientas

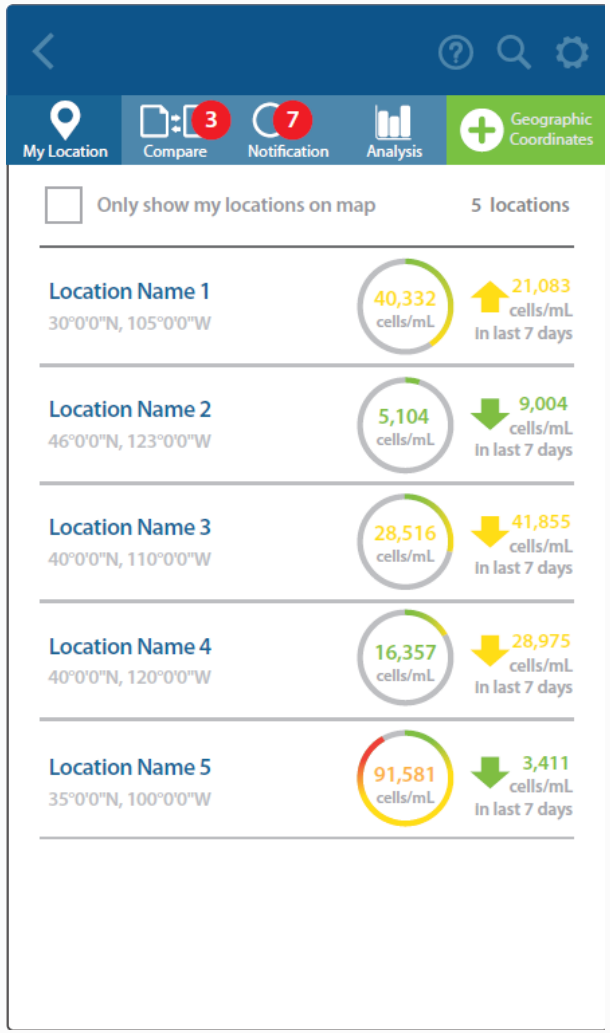
- NASA SeaDAS
- NOAA RS Toolt
  - ArcGIS Toolbox para extraer dagos de archivos geoTIFFs
  - Comuníquese con Michelle Tomlinson para tener acceso: michelle[punto]tomlinson[arroba]noaa[punto]gov

https://seadas.gsfc.nasa.gov/

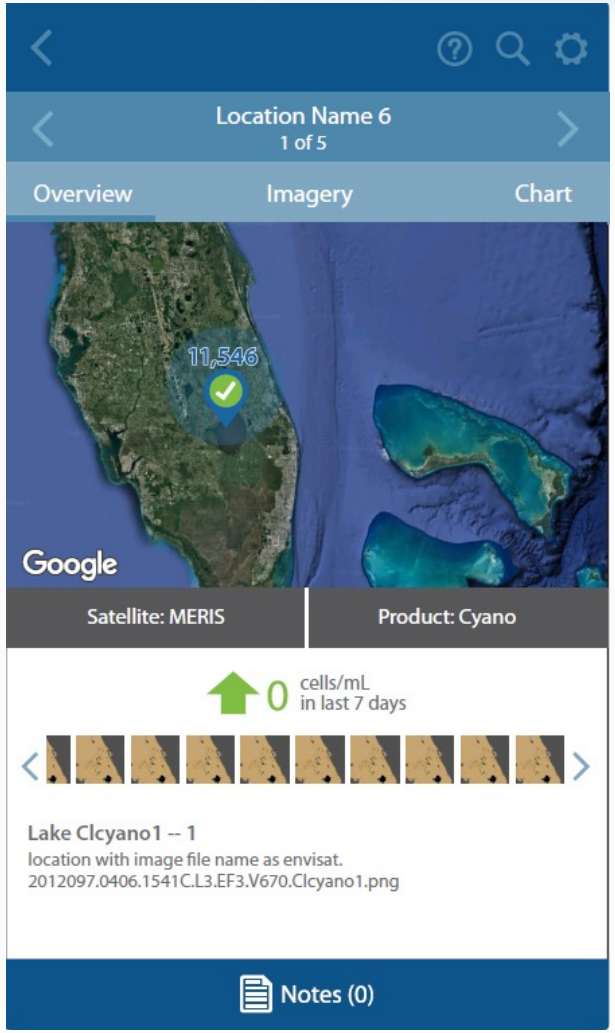


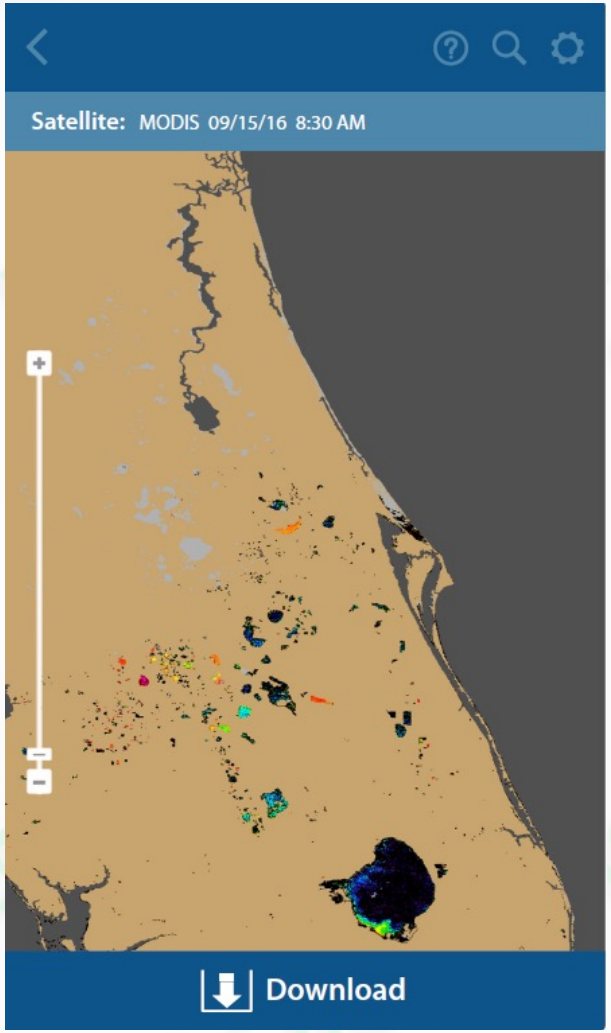
Aplicación Móvil CyAN EPA

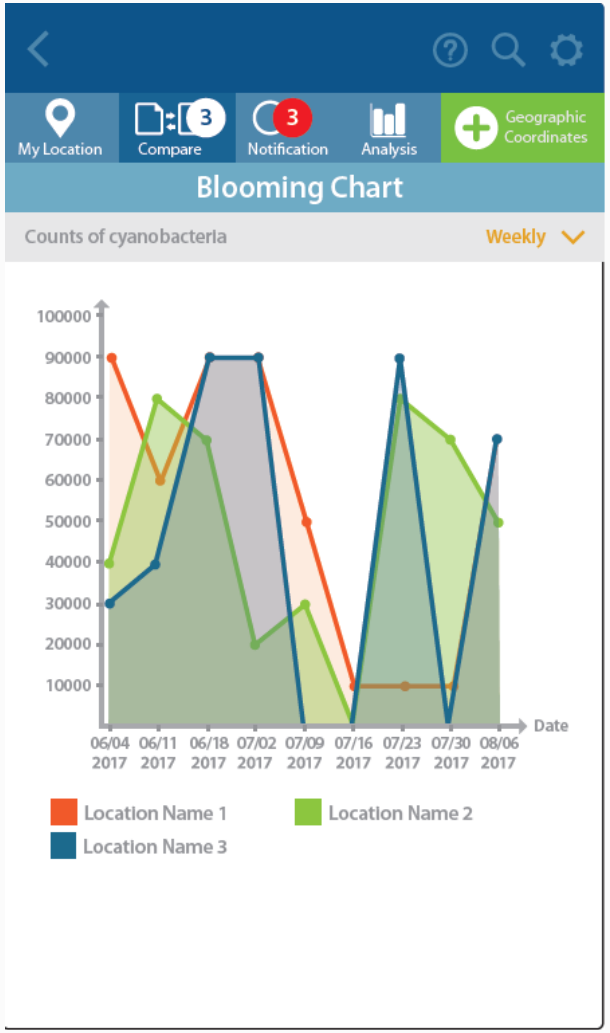




Fuente: Schaeffer et al. (*In Review*). Título: Cyanobacteria Assessment Network (CyAN) satellite mobile device application. Environmental Modelling & Software.

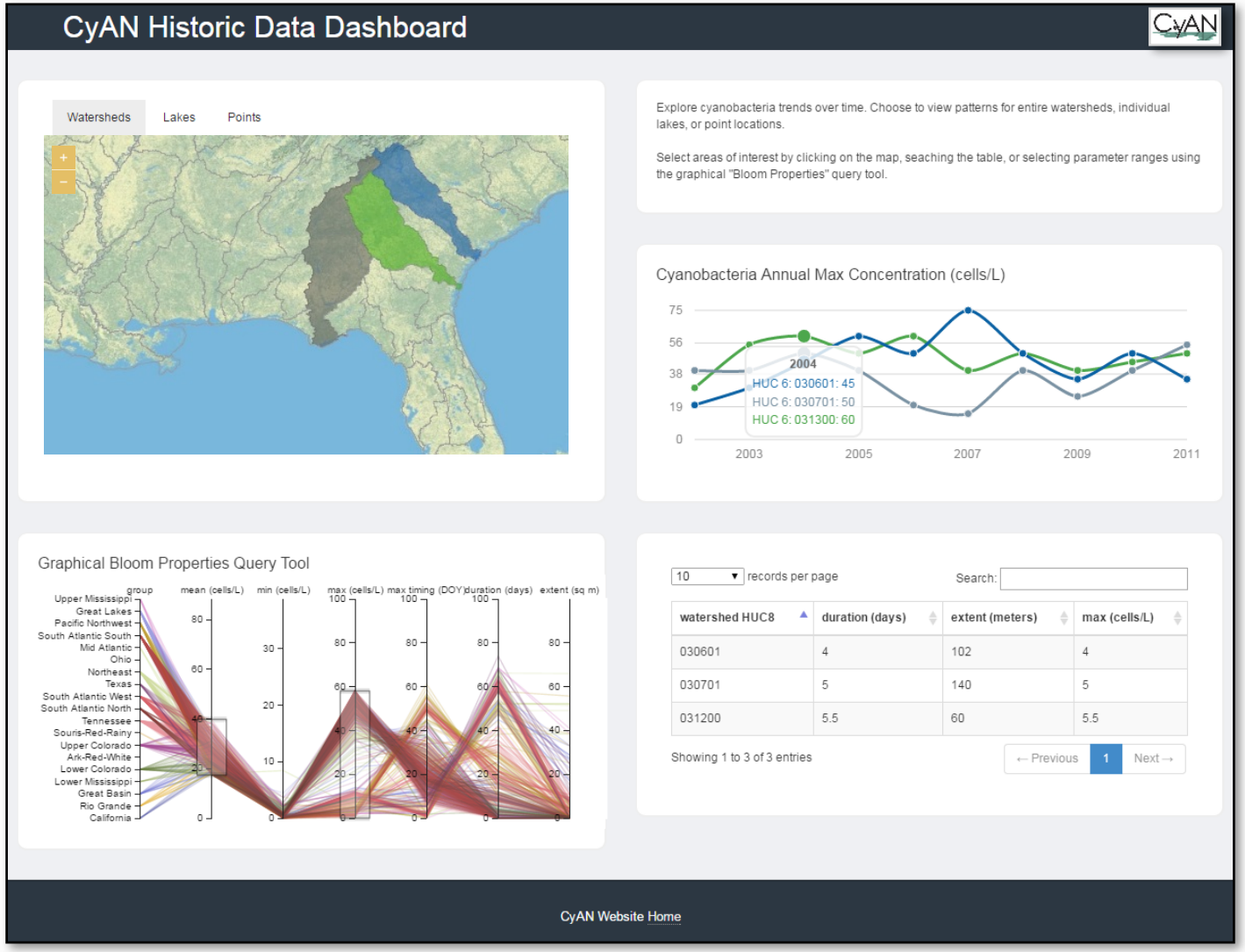




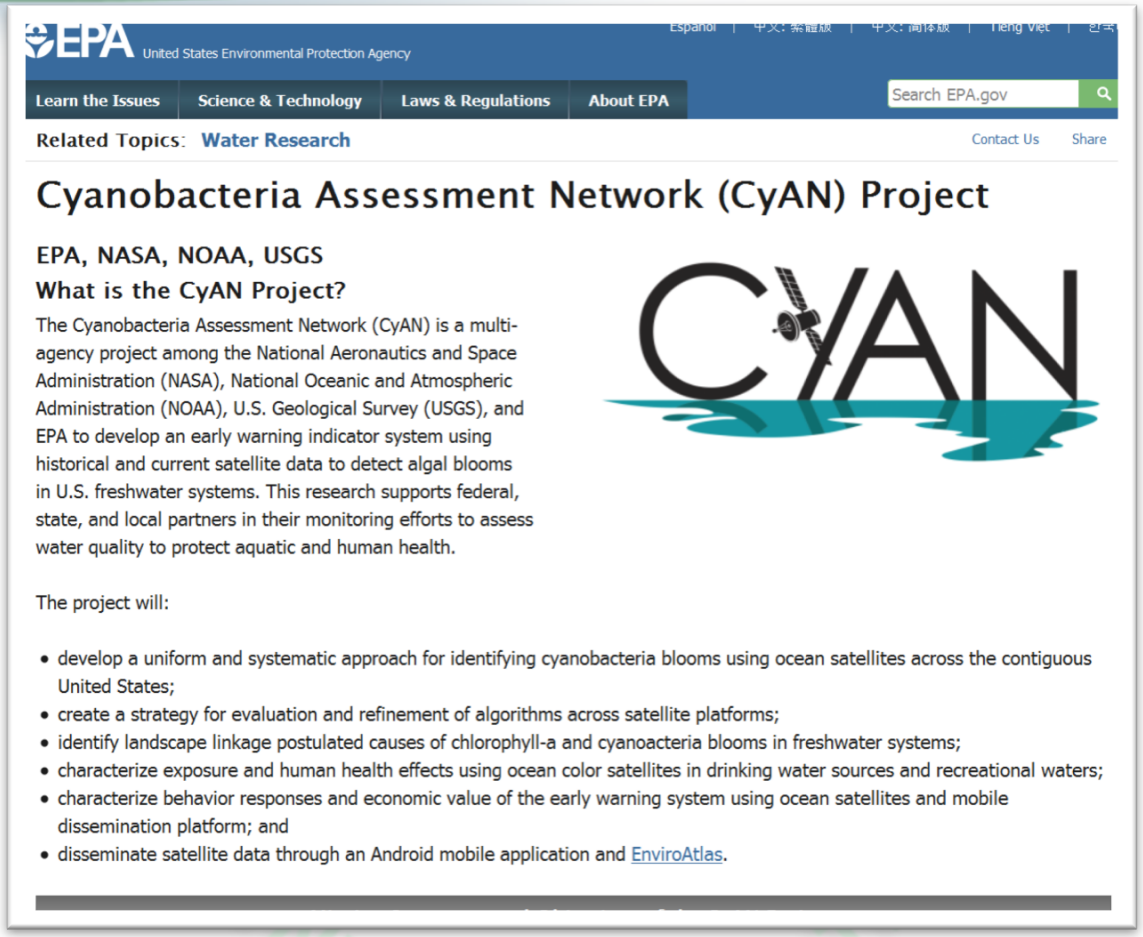


Fuente: Schaeffer et al. (E*n Revisiój*). Títlulo: Cyanobacteria Assessment Network (CyAN) satellite mobile device application. Software de Modelado Ambiental

Comienza con EnviroAtlas



¡Gracias!



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Cyanobacteria Assessment Network (CyAN) Project

EPA, NASA, NOAA, USGS

What is the CyAN Project?

The Cyanobacteria Assessment Network (CyAN) is a multi-agency project among the National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey (USGS), and EPA to develop an early warning indicator system using historical and current satellite data to detect algal blooms in U.S. freshwater systems. This research supports federal, state, and local partners in their monitoring efforts to assess water quality to protect aquatic and human health.

The project will:

- develop a uniform and systematic approach for identifying cyanobacteria blooms using ocean satellites across the contiguous United States;
- create a strategy for evaluation and refinement of algorithms across satellite platforms;
- identify landscape linkage postulated causes of chlorophyll-a and cyanoacteria blooms in freshwater systems;
- characterize exposure and human health effects using ocean color satellites in drinking water sources and recreational waters;
- characterize behavior responses and economic value of the early warning system using ocean satellites and mobile dissemination platform; and
- disseminate satellite data through an Android mobile application and EnviroAtlas.

epa.gov/cyanoproject

salls.wilson@epa.gov