Bloom Early Detection (BED) Model

A platform for forecasting and visualizing harmful algae blooms.
Check us out at: https://forensx.github.io/bloom-early-detection/

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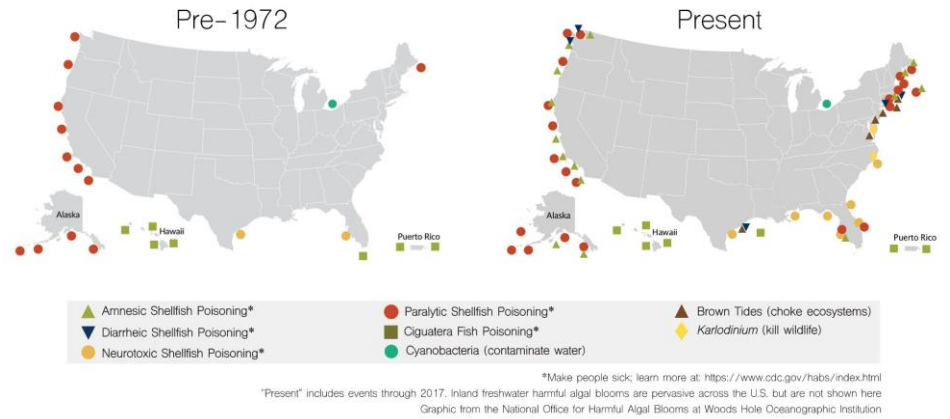
Figures courtesy of [NOAA]

Motivation

- Detrimental to economies: $900 million each year on health and illness costs
- Over last three decades
  - More severe
  - More frequent



The Problem

01

Harmful algal bloom (HAB) portals are hard to use for the general public.

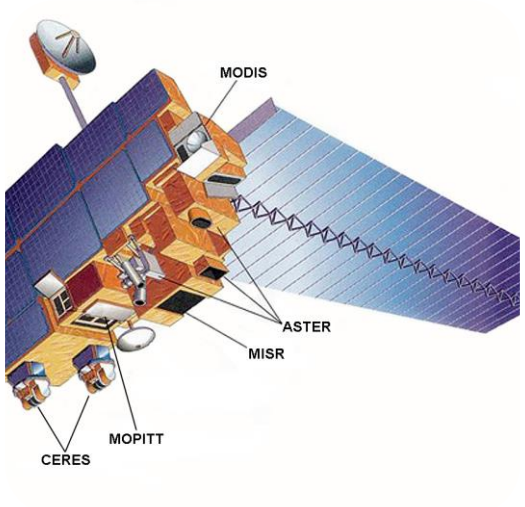
02

Forecasting algal blooms is difficult and time consuming.

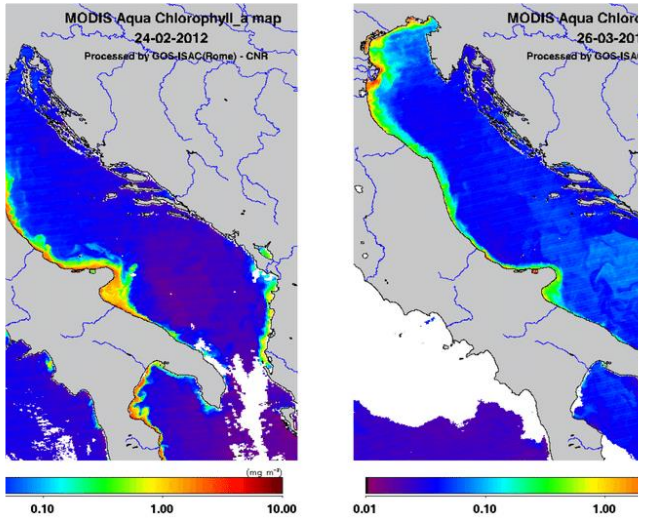
03

Wanted to develop a dashboard for identifying HAB growth with a focus on ease of use and accessibility.

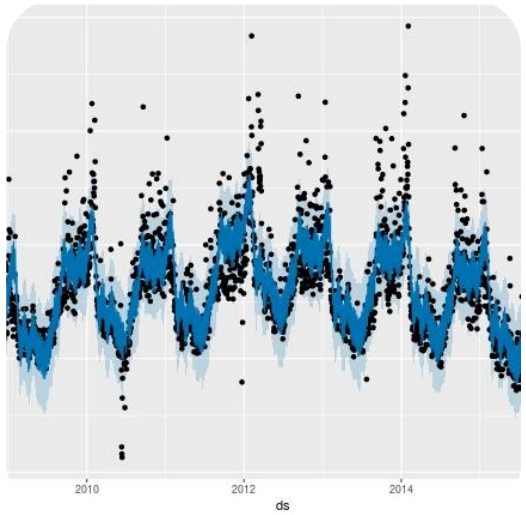
Our Model



Data collected from Aqua MODIS



Data processed to extract Chlorophyll-A and Sea Surface Temperature data over time



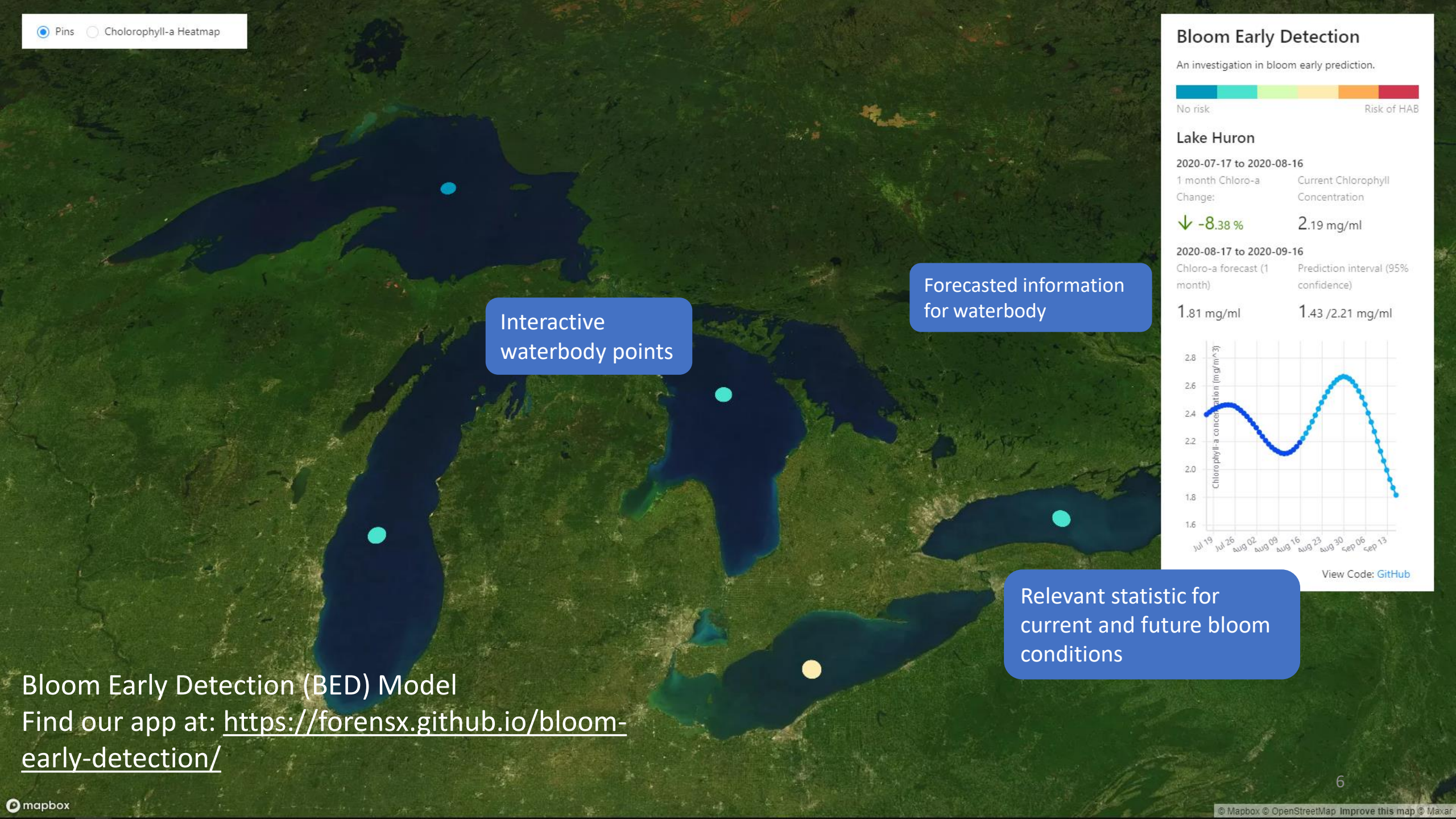
Machine learning model used to learn multivariate trends in location-specific waterbodies

Our Solution

Easy to use interactive dashboard with bloom forecasting

Monthly predictions provided with machine learning algorithm

Multivariate study: uses Sea Surface Temperature and Chlorophyll-A data to determine risk


Pins
Cholorophyll-a Heatmap
Bloom Early Detection
An investigation in bloom early prediction.
No risk
Risk of HAB
Lake Huron
2020-07-17 to 2020-08-16
1 month Chloro-a Change:
Current Chlorophyll Concentration
-8.38 %
2.19 mg/ml
2020-08-17 to 2020-09-16
Chloro-a forecast (1 month)
Prediction interval (95% confidence)
1.81 mg/ml
1.43 /2.21 mg/ml
Chlorophyll-a concentration (mg/m^3)
2.8
2.6
2.4
2.2
2.0
1.8
1.6
Jul 19
Jul 26
Aug 02
Aug 09
Aug 16
Aug 23
Aug 30
Sep 06
Sep 13
View Code: GitHub
Interactive waterbody points
Forecasted information for waterbody
Relevant statistic for current and future bloom conditions
Bloom Early Detection (BED) Model
Find our app at: https://forensx.github.io/bloom-early-detection/
mapbox
© Mapbox © OpenStreetMap Improve this map © Maxar


Pins
Cholorophyll-a Heatmap
Multiple visualizations available: surface pins and Chlorophyll-a concentration heatmap
Bloom Early Detection
An investigation in bloom early prediction.
Low concentration
High concentration
United States
Percent of states with harmful algae blooms annually
> 50 %
Percent of waterbodies with excessive nutrient input
> 65 %
Annual health costs
$ 900,000,000
Dead Zone surface area
245,000 (sq. km.)
View Code: GitHub
Visualization can readily handle millions of points with ease in real time
Bloom Early Detection (BED) Model
Find our app at: https://forensx.github.io/bloom-early-detection/
mapbox
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