

USING SATELLITES TO DETECT & FORECAST HARMFUL ALGAL BLOOMS



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What is a Harmful Algal Bloom (HAB)?

- HABs occur when colonies of algae — simple plants that live in the sea and freshwater — grow out of control and produce toxic effects on people, animals or ecosystems.
- Florida experiences different types of HABs such as:
 - Red tide: caused by algal species *Karenia Brevis*; occurs along coast.
 - Blue-green blooms: caused by cyanobacteria species; occurs in fresh, brackish and salt water.

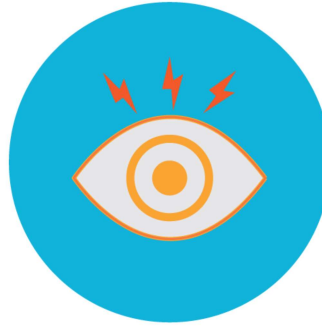


Symptoms of HAB exposure

- HABs produce toxins that can be detrimental to the health of humans, pets, livestock and wildlife.
- Potential symptoms of HAB exposure include but are not limited to:



Respiratory irritation

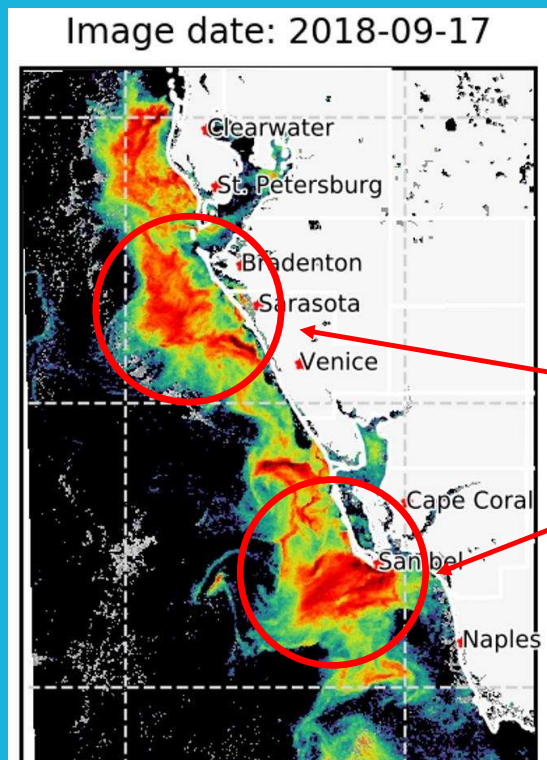


Itchy/ irritated eyes



Skin rashes

Satellite images of HABs in Florida



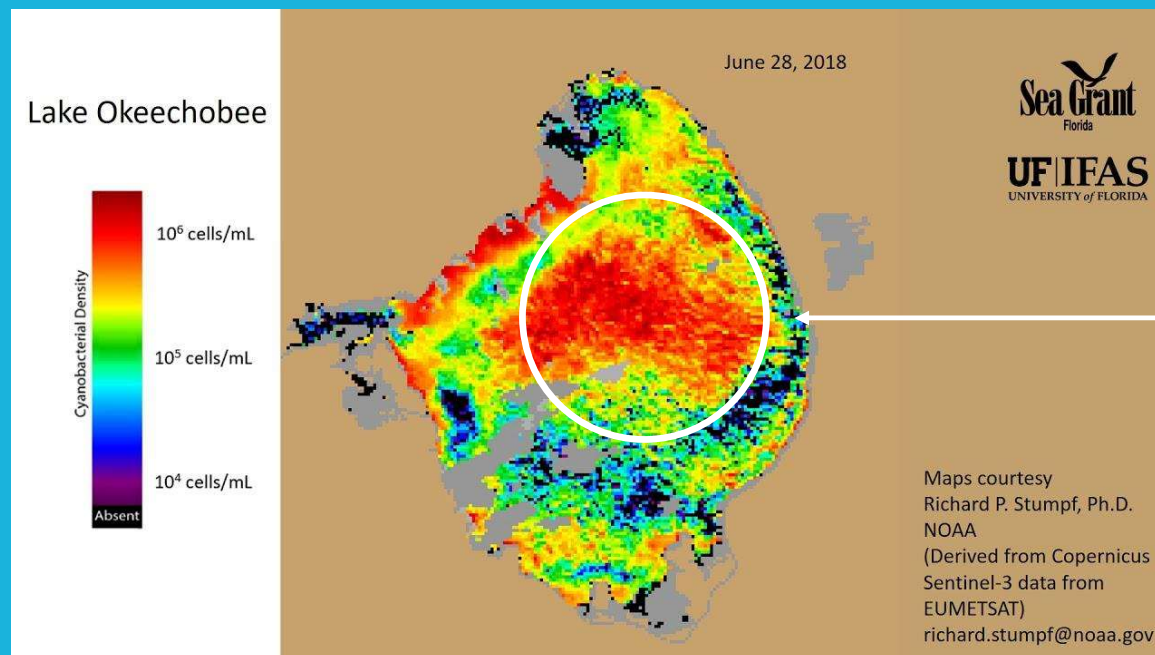
Plant pigments in algal blooms produces a visible color change in water.

This color change can be detected by satellites in the Earth's orbit.

High concentrations of *K. brevis* during a red tide event pictured off Florida's west coast in 2018.

Most ocean color imagery uses a color palette ranging from purple to red as algae concentration increases.

Satellite images of HABs in Florida

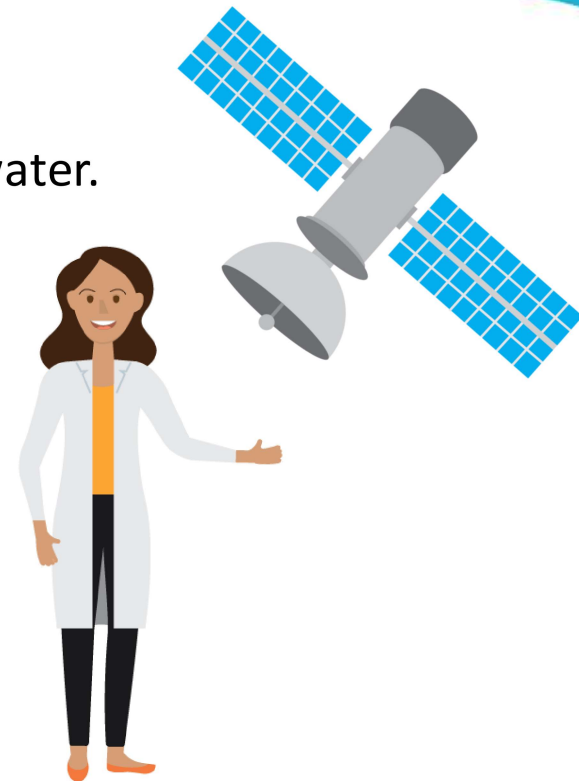


High concentrations of blue-green algae pictured in Lake Okeechobee in 2018.

Hotter colors represent higher concentrations.

Why use satellites to detect and track HABs?

- Benefits of satellite imaging:
 - Satellites cover larger areas than a person could on the water.
 - Satellite images are more sensitive than the human eye.
- Satellite images tell scientists how large a bloom is and what direction it is heading.



Limitations

- Satellite data does not identify what species of algae is responsible for the change in water conditions.
- Water conditions right along the coast are difficult to distinguish.
 - The first pixel in satellite images is a mix of land and water, which can distort information.
 - Smoke or smog on land can make accurate readings of the coast difficult.
- Satellite data alone cannot determine toxicity of a bloom.
- In order to determine if a bloom is harmful, scientists must combine satellite images with field samples.

Other ways scientists forecast blooms

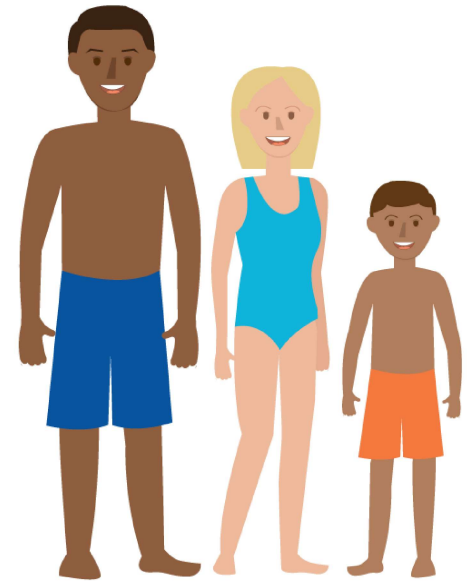
- Along the Gulf Coast of Florida, *K. brevis* red tide respiratory forecasts are produced using satellite imaging by the Gulf of Mexico Coastal Ocean Observing System (GCOOS).
- Forecasts are communicated to the public in near real-time, projected over 24 hours and updated with the latest wind models every 3 hours.

VISIT:

<https://habscope.gcoos.org>

How to use HAB forecasts

- HAB forecasts can be used the same way as weather forecasts— to plan beach walks, waterfront dining and other outdoor activities.
- Citizens can use HAB forecasts to make informed decisions when visiting an area experiencing a bloom.



HAB Resources

For more information and resources related to HABs in Florida, visit <https://www.flseagrant.org/habs/>



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