

STREAM: SATELLITE-BASED ANALYSIS TOOL FOR RAPID EVALUATION OF AQUATIC ENVIRONMENTS

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**NASA GODDARD SPACE FLIGHT CENTER / CODE 619
SSAI, FRESHWATER SENSING GROUP**

**UN WATER CONFERENCE SIDE EVENT
EARTH OBSERVATION IN SUPPORT OF WATER ACTION
20 MARCH 2023**

Landsat-8/OLI
Lake Erie; Sister Island, USA

“What’s Water Worth? It Is Priceless and Essential to Survival”



- **Water Resources are Under Threat**

- Wildfires, flooding
- Food Production, mining, recreation

- **Impacts**

- Water Pollution
- Harmful Algal Blooms (HABs)

- **Consequences & Implications**

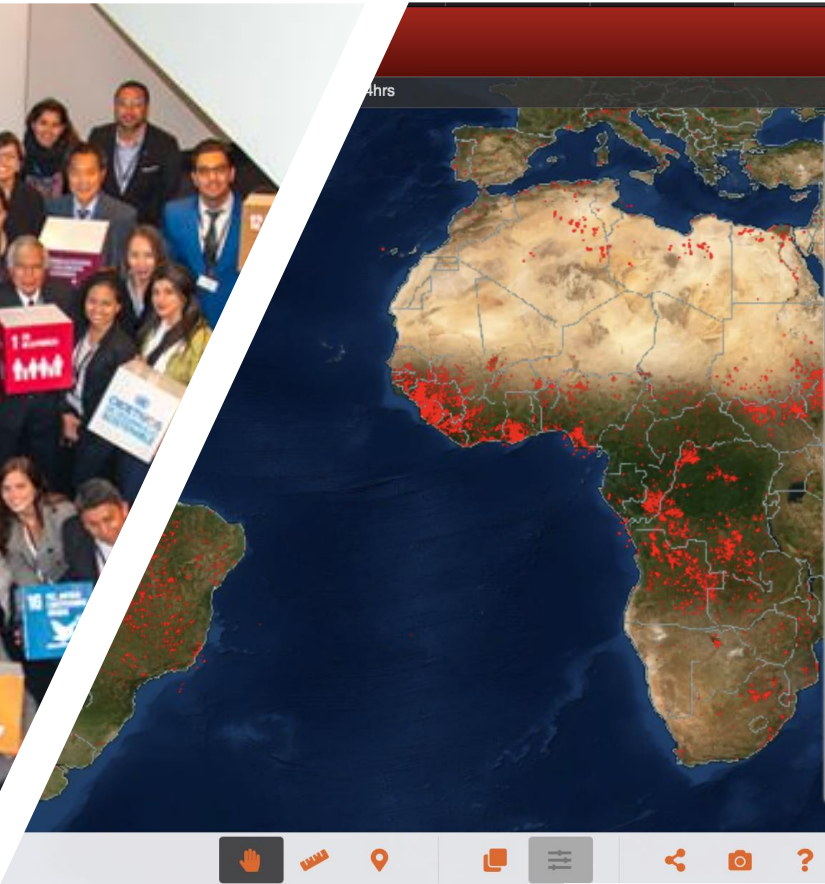
- Public Health
- Economy





STREAM: Its Inception and Evolution

- **NASA's water quality workshop in 2017**
- **Supported by NASA HQ Applied Sciences**
- **Improve water-quality monitoring**
 - Near-real time
 - Visualization and analysis (SDG 6)
 - Built on FIRMS
- **Aquatic ecosystems > 150 m wide**
 - Complement other similar systems
- **Engage and interact with end-users and UN Environment Program (UNEP)**





Decision-making Process

1. Identify hotspots
2. Action
 - Conduct field surveys
3. Decision-making
 - Shut off drinking water intakes
 - Advisories

SATELLITE | IN SITU

2021-01-20

River

Site: Rio Negro

Chlorophyll-a [mg/m³]

Range: 0 – 20

TOXIC ALGAE PRESENT
Lake is CLOSED

Until further notice:

- DO NOT swim or recreate in water
- DO NOT water ski, jet ski, or paddle board
- DO NOT drink water
- Keep all pets, livestock, and horses away from water
- Fishing not advised
- Boating not advised

Call your doctor or veterinarian immediately if you or your animals have sudden or unexplained sickness or signs of poisoning

Report new algae blooms to: hab.mt.gov or 1-888-849-2938
Sign posted by: DEQ

WARNING
HARMFUL ALGAE PRESENT

PEOPLE AND ANIMALS SHOULD AVOID SWIMMING AND WADING UNTIL FURTHER NOTICE

EXPOSURE TO ALGAL TOXINS MAY CAUSE ILLNESS

Call your doctor or veterinarian if you or your animals have sudden or unexplained sickness or signs of poisoning.

While fish consumption is not affected by toxic algae, thoroughly cleaning the fish, discarding the carcass & guts, & washing hands & surfaces afterward with soapy water is advised.

Report suspected Harmful Algae Bloom-related illnesses to the HAB hotline at: 888-238-6154

50 km



PAN



IDENTIFY



POLYGON



BASEMAPS

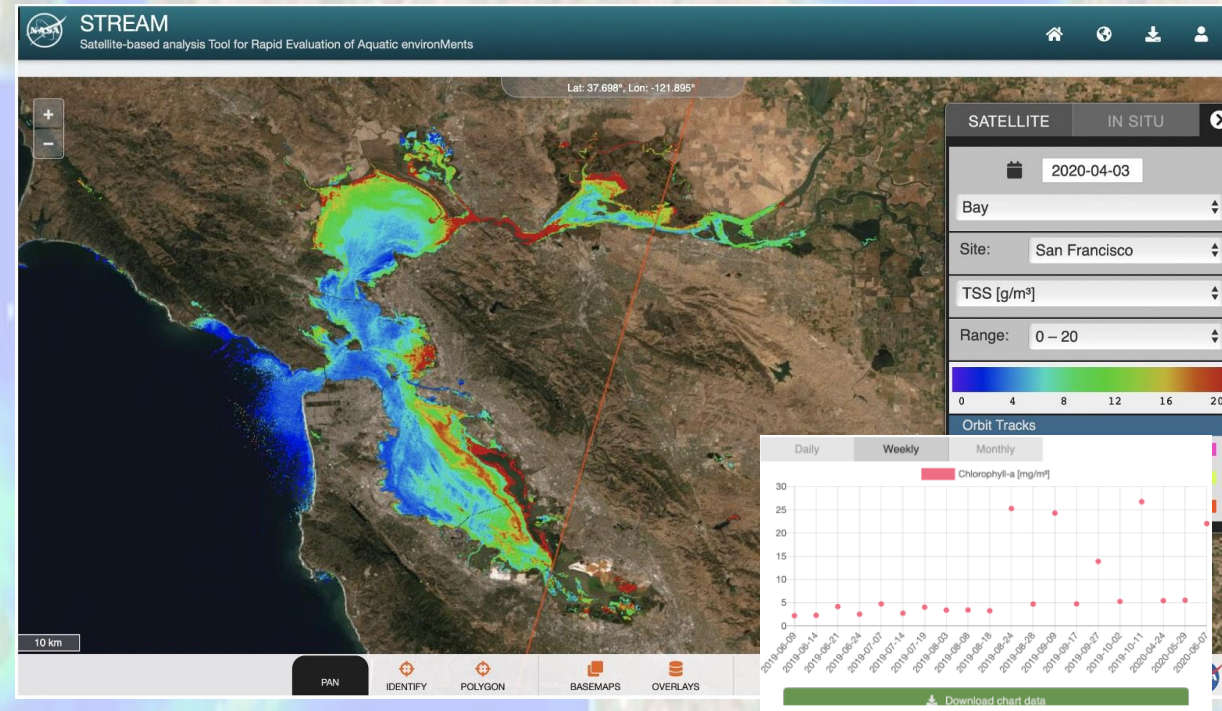
OVERLAYS

MAXIMIZE

SHARE

Functionalities

- NRT image processing
- Products: chlorophyll-a, Total Suspended Solids (TSS), and RGBs
- Downloadable maps (Geotiff)
- Visualization
- Time-series analysis (daily/weekly/monthly)
 - Per-pixel queries
 - Lake-wide (area-based) queries
- Notification system
- End-users (beta)
 - Accessible to the Water Authority of **Peru** and **Uruguay** via EarthData
 - SDG 6.3.2 reporting



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Methodology Development and Validation

• Validation exercise in Uruguay

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Monitoring Uruguay's freshwaters from space: An assessment of different satellite image processing schemes for chlorophyll-a estimation

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ABSTRACT

Uruguay's freshwater network is threatened by widespread Harmful Algal Blooms (HABs) known to be triggered by human-related stressors such as land-use change and urban/industrial effluents. Existing field-based monitoring practices are limited due to their sparse spatial and tempo-

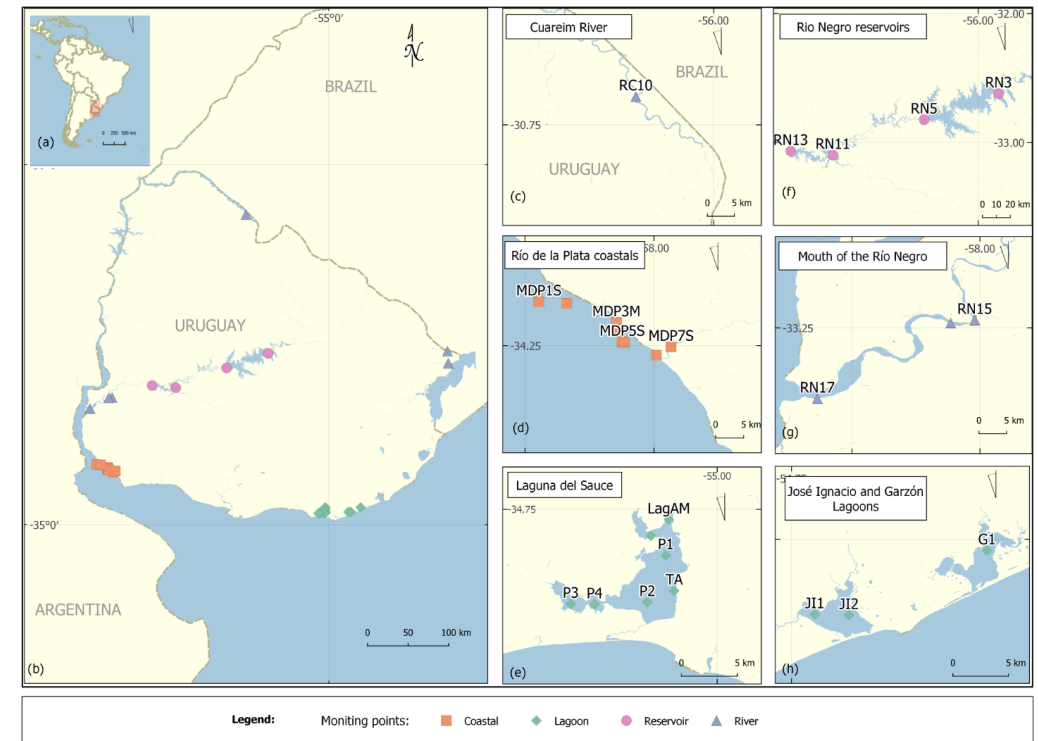


Figure 1. Geographic distribution of field monitoring sites. A) Location of Uruguay in South America. B) Location of monitoring sites according to the type of water body. C) Cuareim River. D) Río de la Plata coasts. E) Laguna del Sauce. F) Río Negro reservoirs. G) Mouth of the Río Negro. H) José Ignacio and Garzón Lagoons.

Next Steps

- Maintenance/updates
 - Algorithm
 - Continued validation
 - Other products
- Provide access to other countries (beta users)
- Identify a host for data archiving
- Extend the processing capability to other missions

