

# A satellite-based decision support service for the marine fisheries and aquaculture industry of southern Africa

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# Marine Aquaculture in South Africa

Marine Aquaculture in South Africa includes:

- Abalone
- Mussels
- Oysters
- Finfish

Depending on the cultured organisms these could include

- Land-based pump-ashore operations
- In-water cages or rafts

Each method of operation has different environmental risk

Aqunion Romansbaai



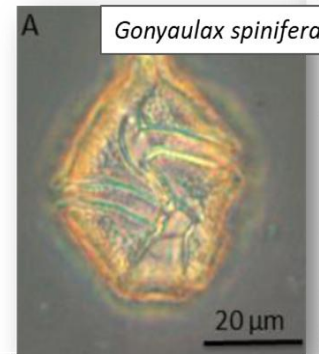
# Environmental risk: Harmful Algal Blooms (HABs)

Most HABs along South Africa's coastline are caused by dinoflagellates

They can discolour the water if they occur in "blooms" or high concentrations

Some can be harmful to farmed and wild organisms through:

- Toxicity
- Mechanical damage
- Hypoxia



Devastating farmed abalone mortalities attributed to yessotoxin-producing dinoflagellates

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# Marine Earth Observation

Satellites provide a synoptic overview of the system, with information over much greater space and time scales than possible with only in-water measurements

Operational use of satellite products enables

- Early detection of blooms
- Visualization of size and intensity of blooms
- Tracking the persistence of blooms over time

*Which allows for improved preparedness and the ability to mitigate negative impact*



# Oceans and Coastal Information Management System

NATIONAL OCIMS

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NATIONAL OCIMS

The National Oceans and Coastal Information Management System (OCIMS) was developed by the Department of Forestry, Fisheries and the Environment (DFFE) in partnership with the CSIR, SAEON and SAWS through Operation Phakisa

**Decision support tools for the effective governance of South Africa's oceans and coasts**

- ✓ Incorporating satellite-derived, in situ, and modelled information
- ✓ Providing operational decision-support services



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# Fisheries and Aquaculture Decision Support Tool

- ✓ OPEN and FREE
- ✓ Mapped satellite products over South Africa's EEZ
- ✓ Bloom analytics
- ✓ Chl-a time series charts
- ✓ Updated twice daily



<https://ocims.csir.co.za/habs/#/viewer/new>

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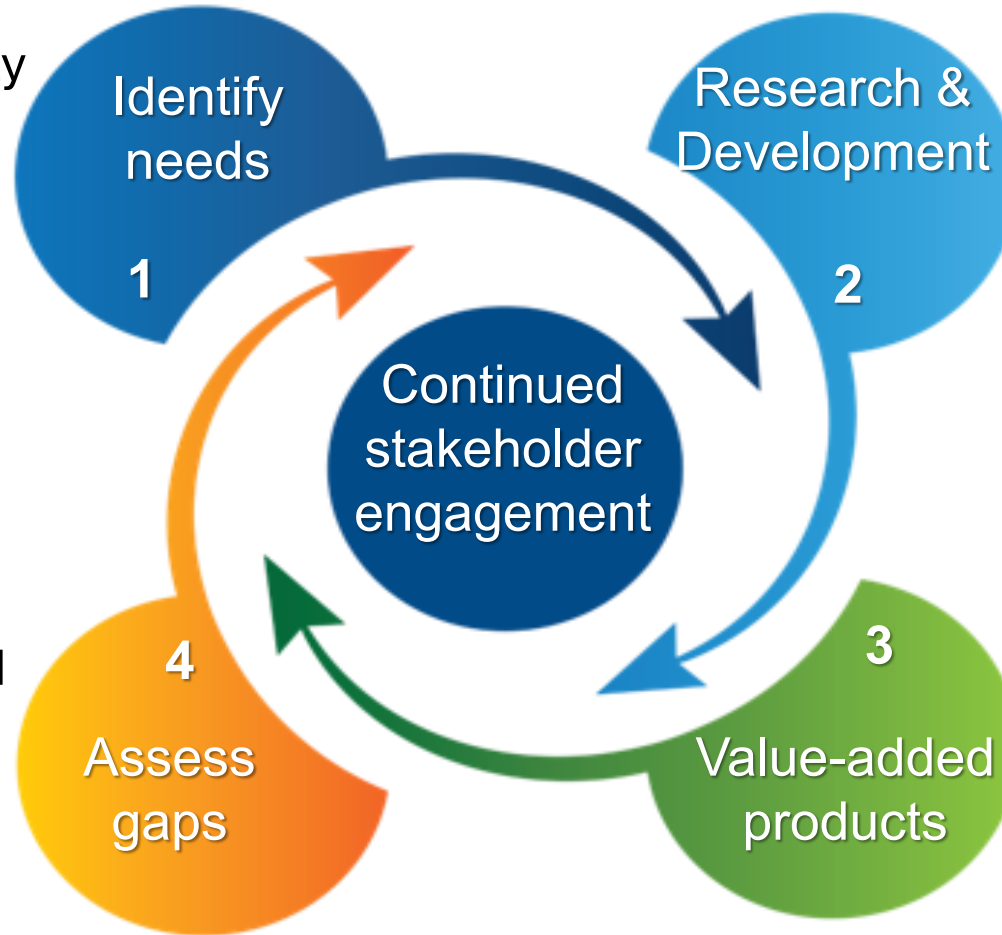


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# Development process of an operational system

- ✓ Example: Fisheries and Aquaculture community need to detect HAB presence, bloom size and persistence over time



- ✓ Assess most appropriate satellite products, algorithms, and data providers

- ✓ Service releases and updates
- ✓ Technical Advisory Groups provide feedback

- ✓ Operationally provided maps and useful indicators
- ✓ Free, open, easy to use online information service

# Fisheries and Aquaculture Decision Support Tool

Latest available date

Data products selector & legends

Date selector

Help contents

Product descriptions

**Filter layers**

- Scene Footprint 100%
- Habs Area 100%
- HAB features
- Near-Real-time\_products

**Time Selection**

Select Date: 2025-09-03T00:00

**Harmful Algal Bloom**

- Harmful algal
- No harmful algal
- No Data

Select Hab Area

Area	2025-09-04	2025-09-03	2025-09-02
Algoa Bay	●	●	●
De Hoop	●	●	●
Elephant Coast	●	●	●
False Bay	●	●	●
Garden Route	●	●	●
Hessequa	●	●	●

**Navigation tools**

**Analytics panel**

- Algoa Bay
- De Hoop
- Elephant Coast
- False Bay
- Garden Route
- Hessequa
- Jeffreys Bay
- Kzn Bight
- Namaqua
- Northern Cape
- Overberg
- Saldanha
- South Coast
- St Helena
- Sw Cape
- Tsitsikamma
- Walker Bay
- Wild Coast



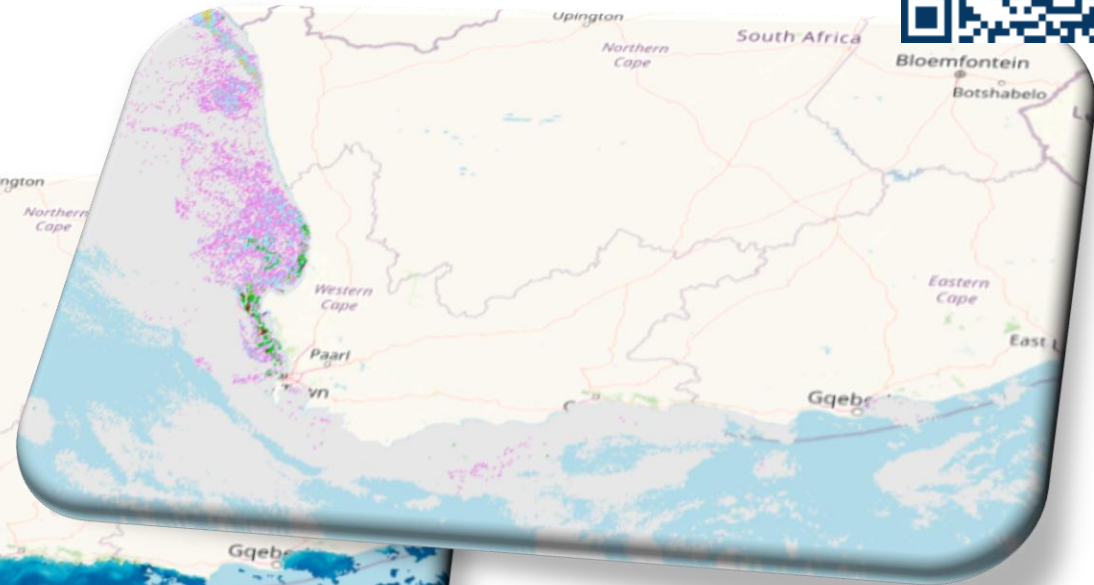
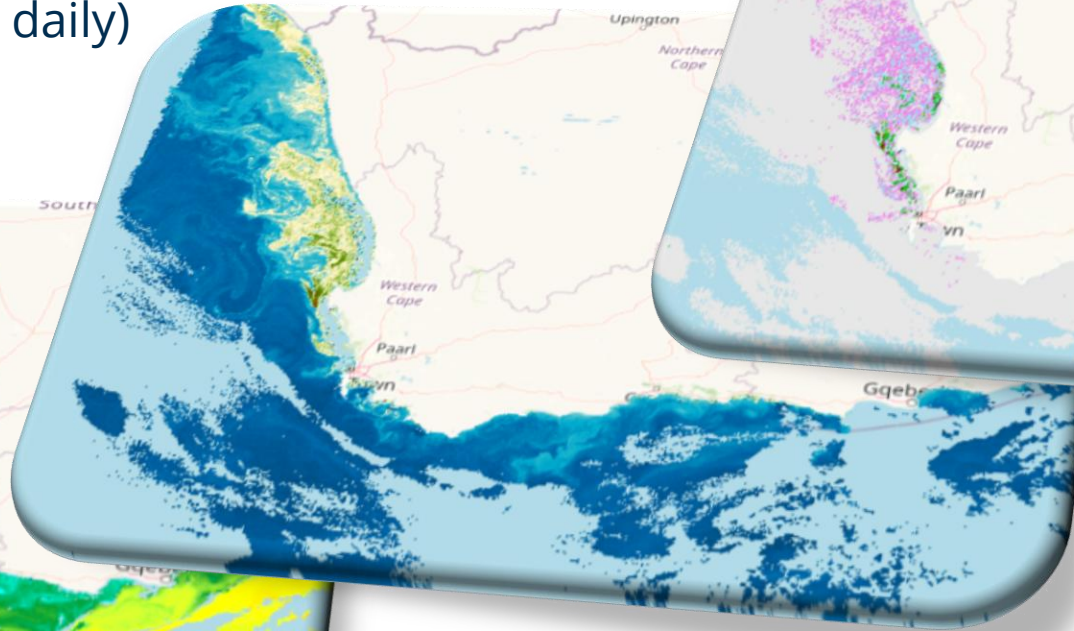
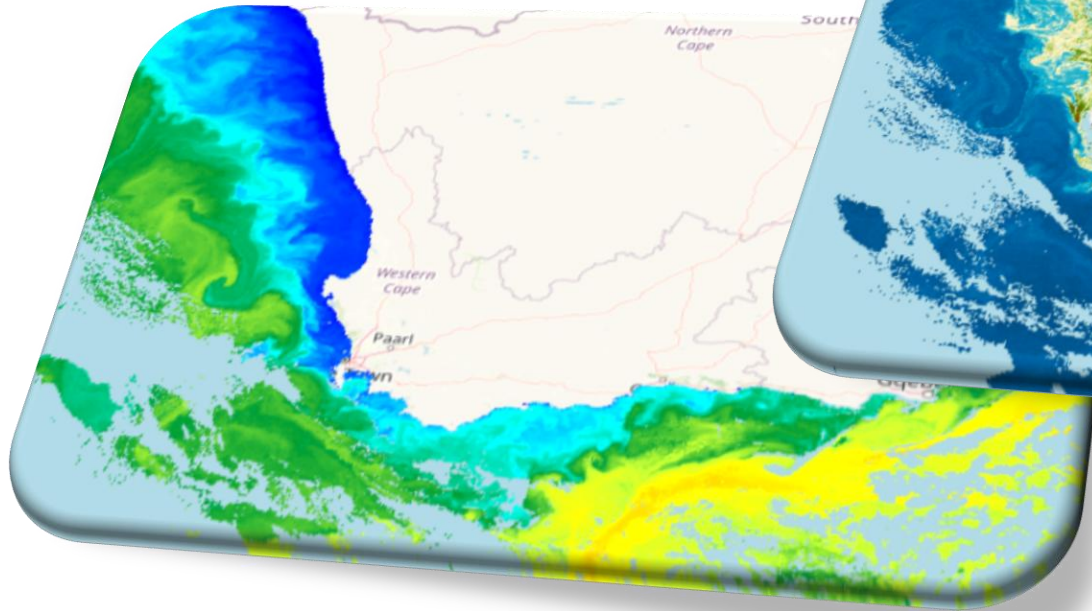
<https://ocims.csr.co.za/habs/#/viewer/new>

# Mapped satellite products : near real time



## Sea Surface Temperature

- ✓ AM and PM products (twice daily)
- ✓ 1km spatial resolution
- ✓ SST gradients ( $>0.5^{\circ}\text{C}$ )



## Ocean Colour

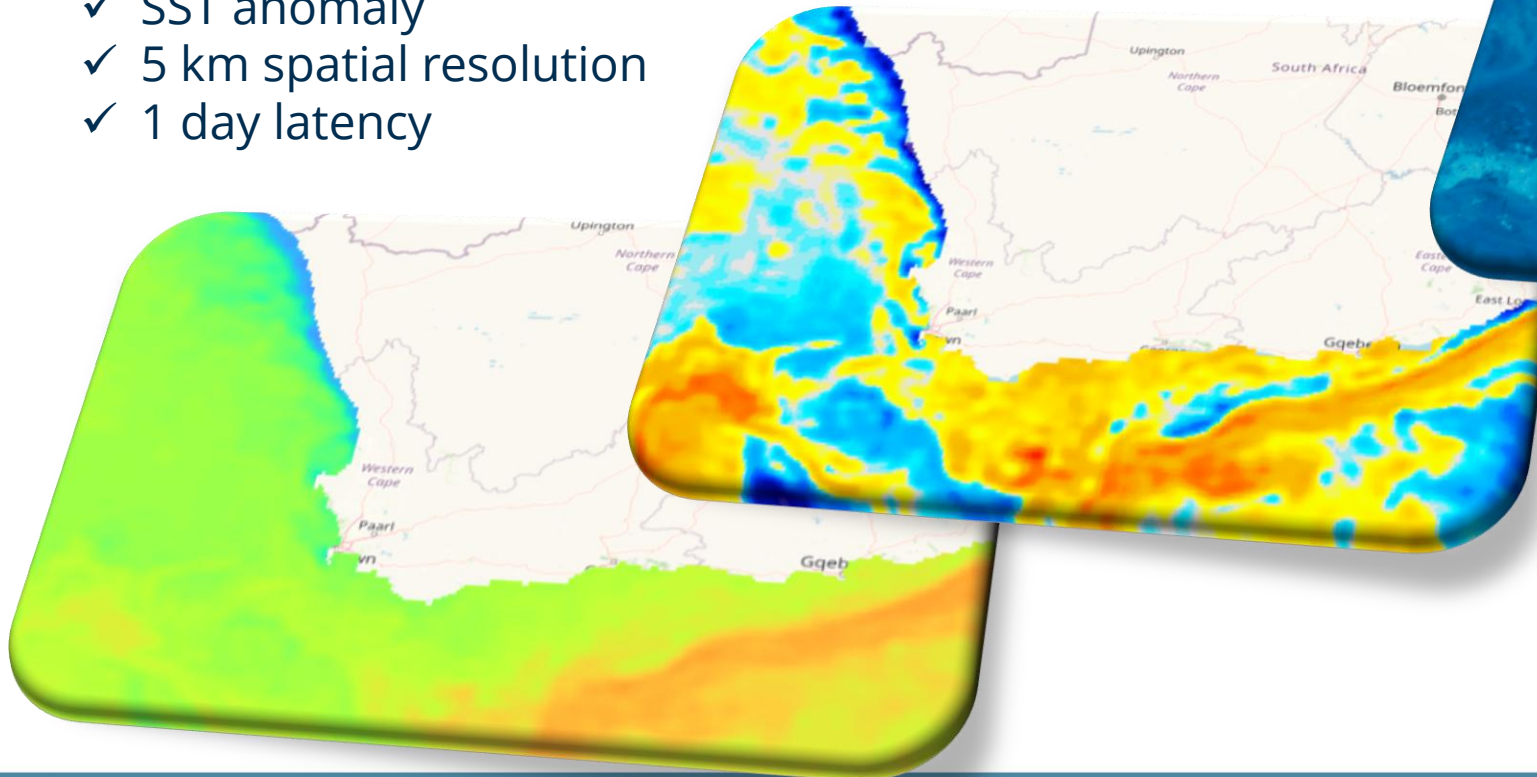
- ✓ Chl-a concentration
- ✓ Phytoplankton type
- ✓ 300m spatial resolution
- ✓ Available 3h after overpass (~2pm)

# Mapped satellite products : Gap-free data



## Sea Surface Temperature

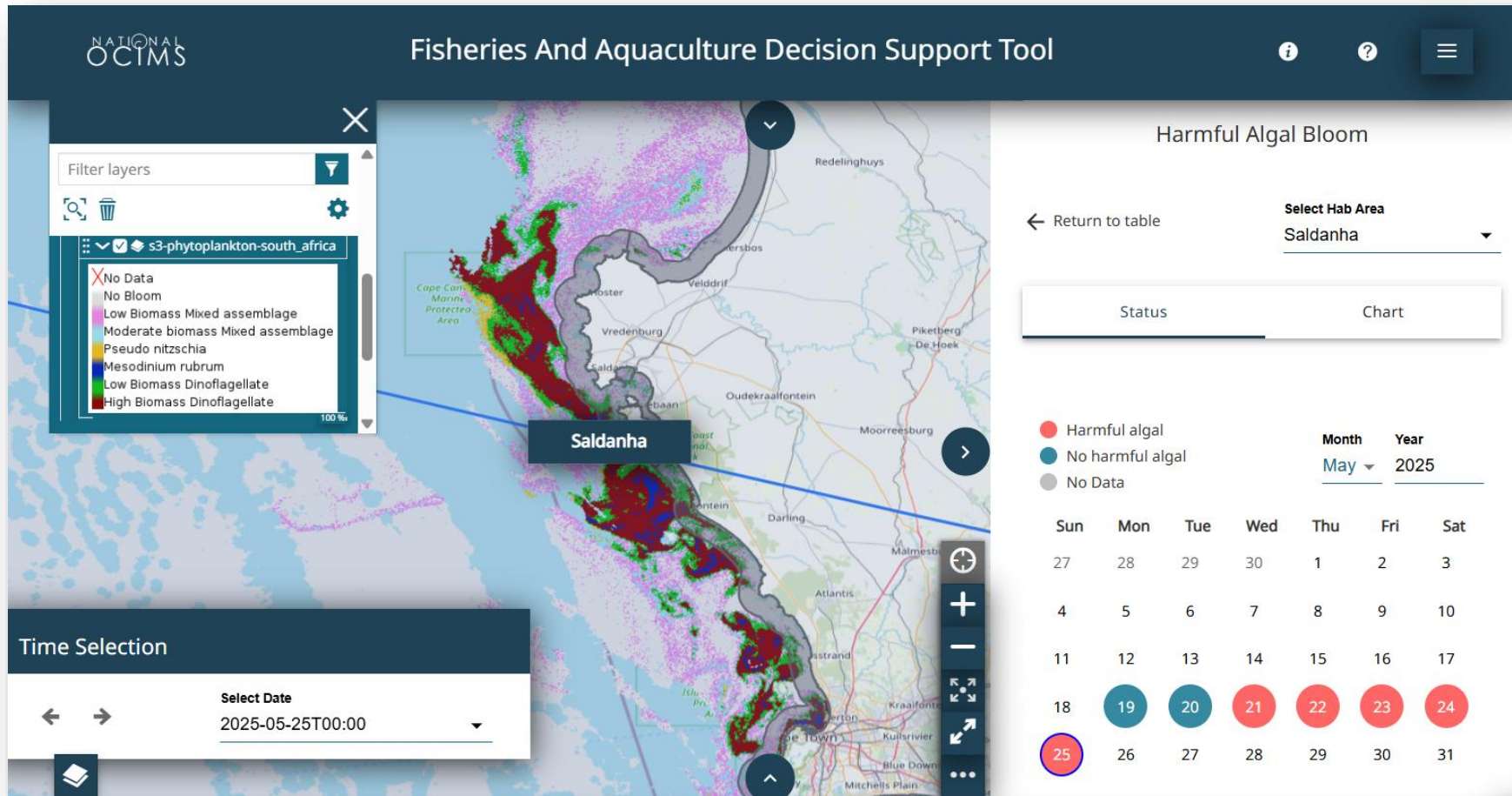
- ✓ OSTIA Foundation SST
- ✓ SST anomaly
- ✓ 5 km spatial resolution
- ✓ 1 day latency



## Ocean Colour

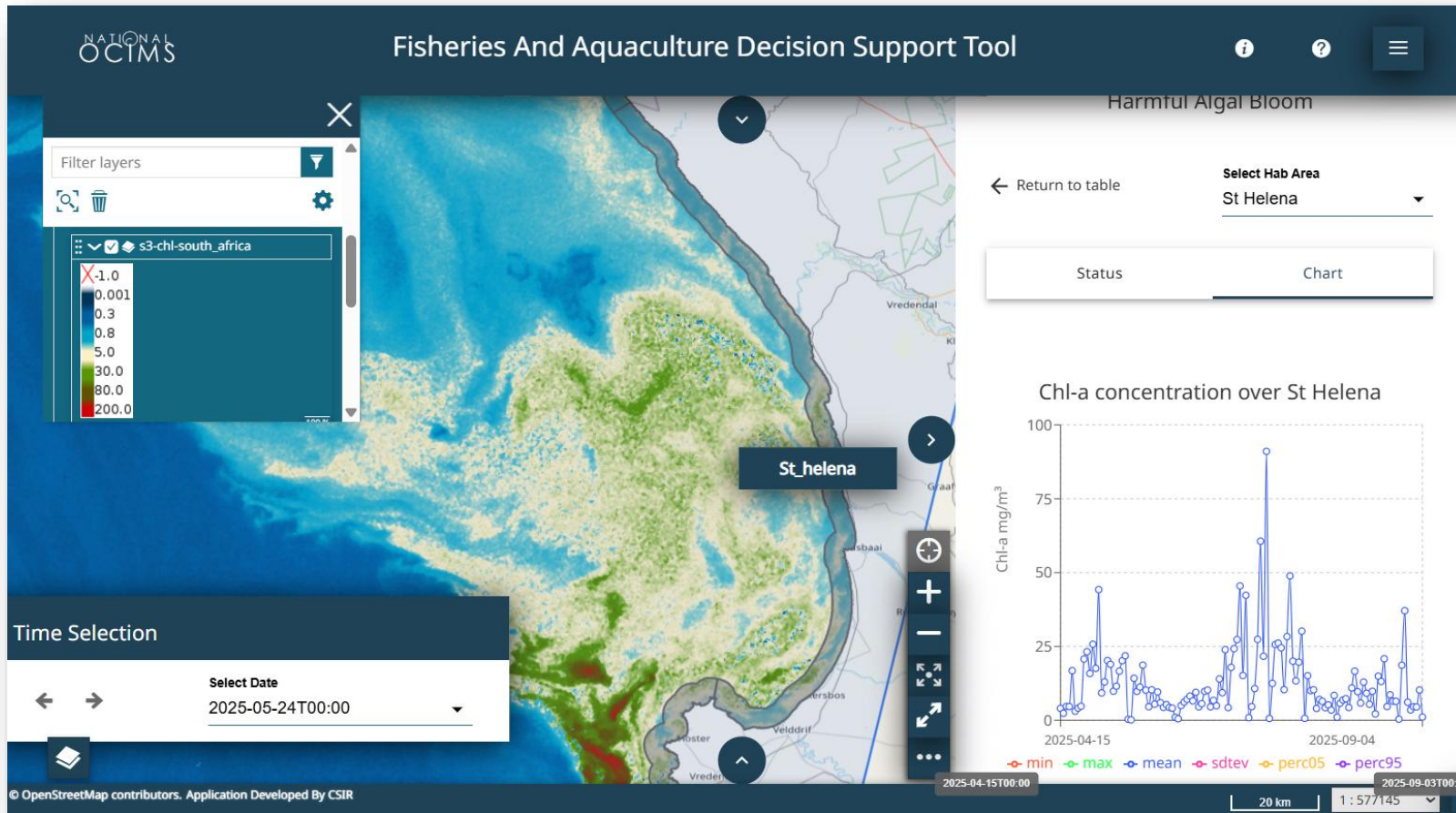
- ✓ GlobColour Chl-a concentration
- ✓ 4km spatial resolution
- ✓ 2 day latency

# Analytics: weekly bloom status



- ✓ 18 Coastal regions to select from
- ✓ *Weekly bloom status* indicates how many times in the past week a “high biomass dinoflagellate” bloom has been detected within a specific coastal area

# Analytics: Chl-a timeseries chart



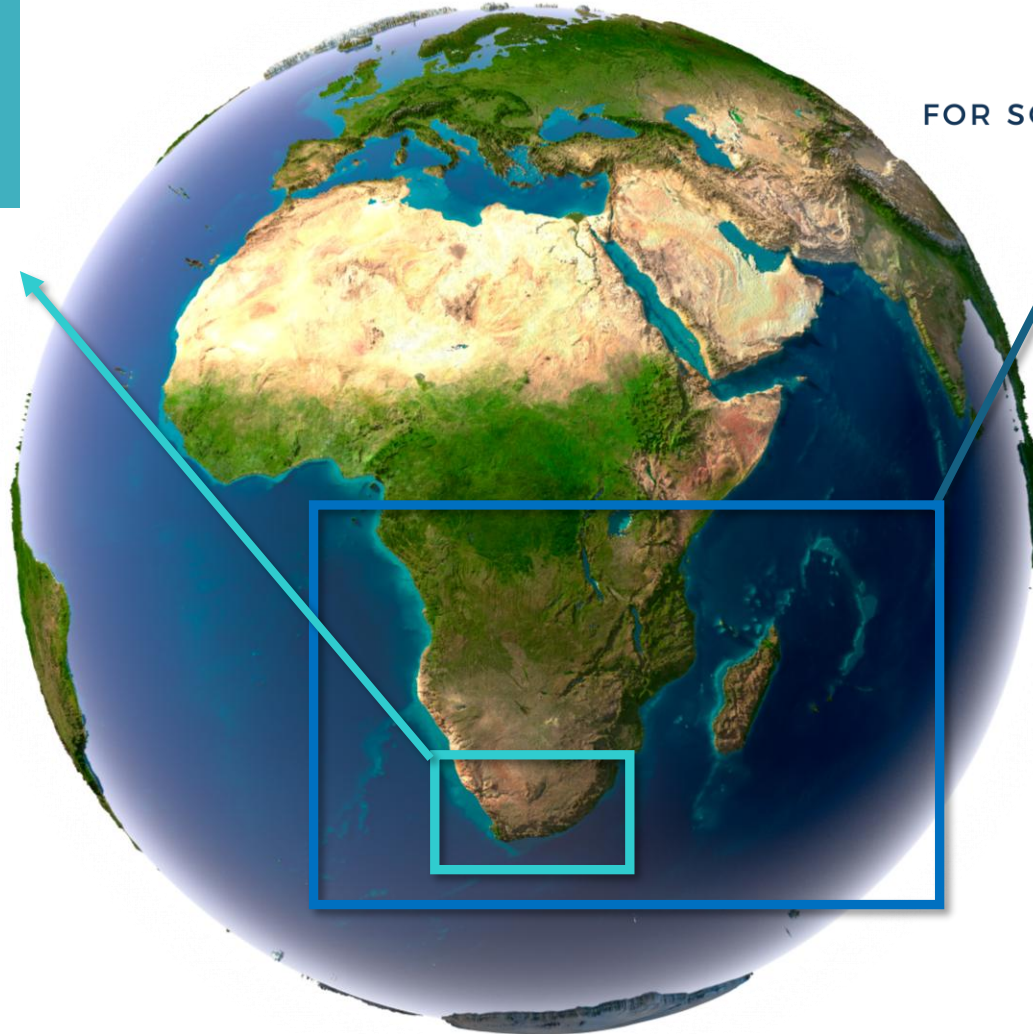
- ✓ 18 Coastal regions to select from
- ✓ *Timeseries chart* shows the statistics for Chl-a concentration over a specific coastal region

# Marine Earth Observation service development and delivery in Africa



MarCOSIO

●●● MARINE AND COASTAL OPERATIONS FOR SOUTHERN AFRICA AND THE INDIAN OCEAN



- ✓ Developed by the Department of Forestry, Fisheries and the Environment in partnership with the CSIR, SAEON and SAWS through Operation Phakisa
- ✓ Decision support tools for the effective governance of South Africa's oceans and coasts

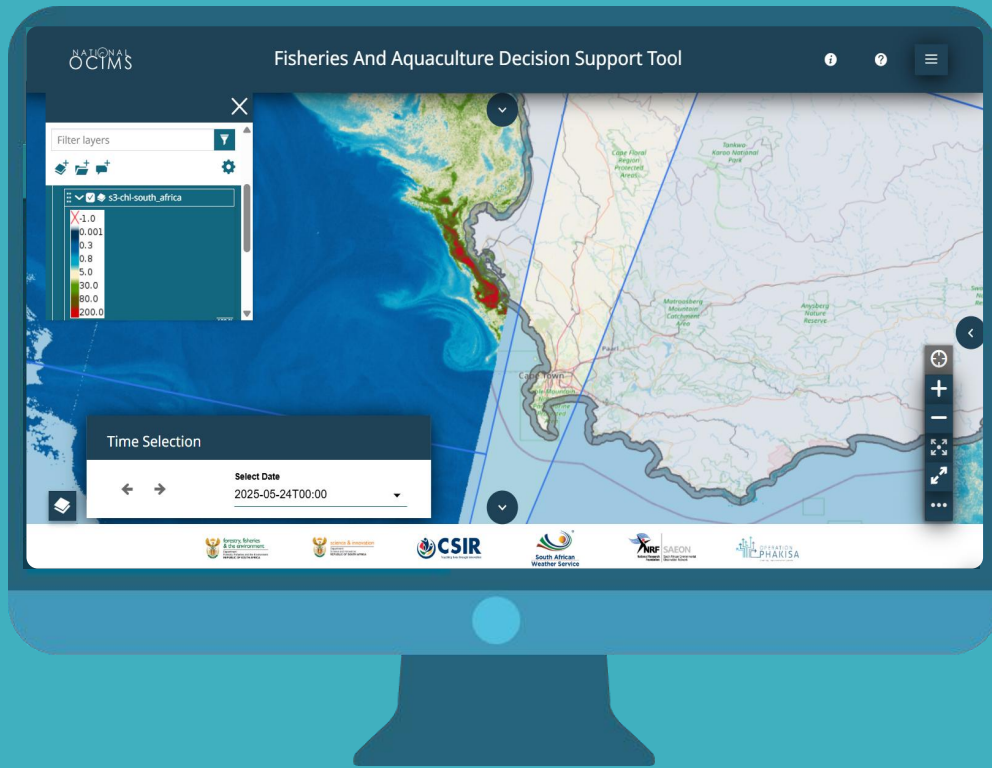
- ✓ One of two Marine Thematic area consortia GMES & Africa programme. Represents the southern African and Indian Ocean partners.
- ✓ Mechanism for regional upscaling of OCIMS



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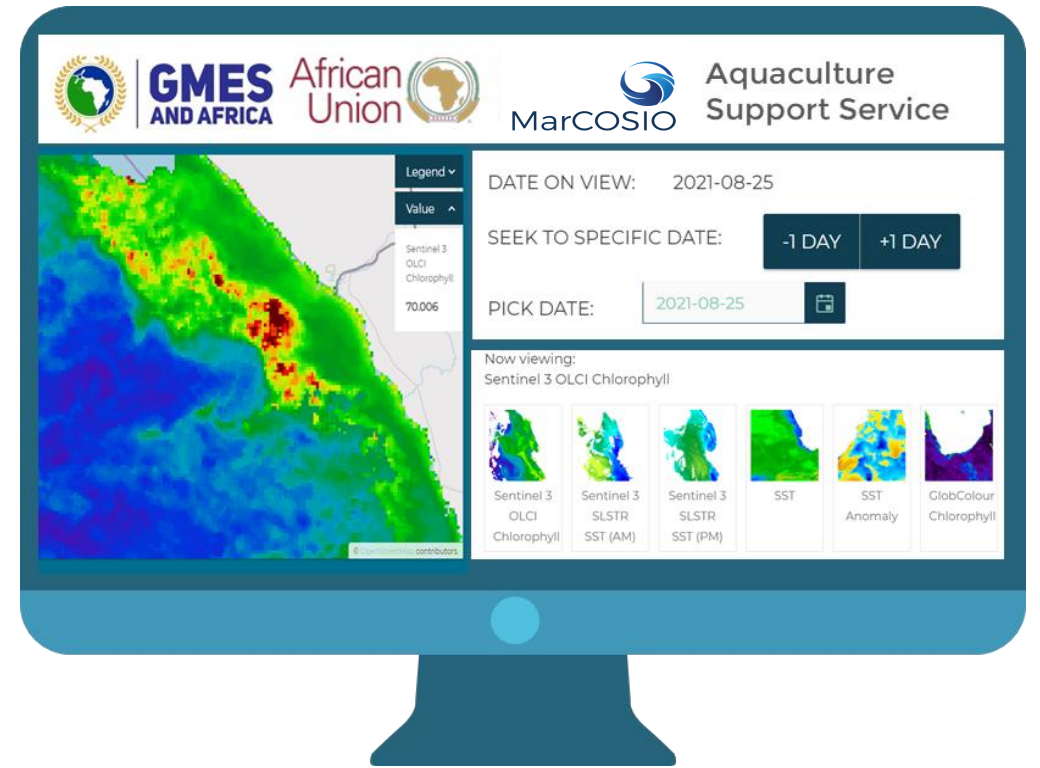
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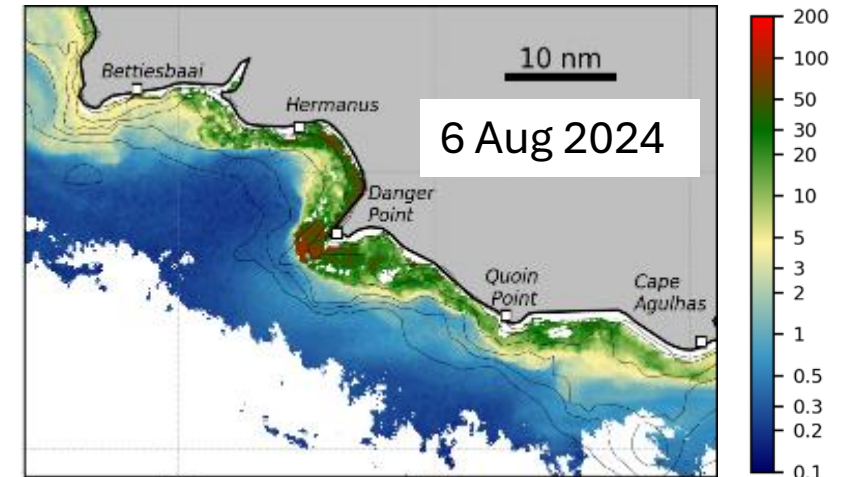
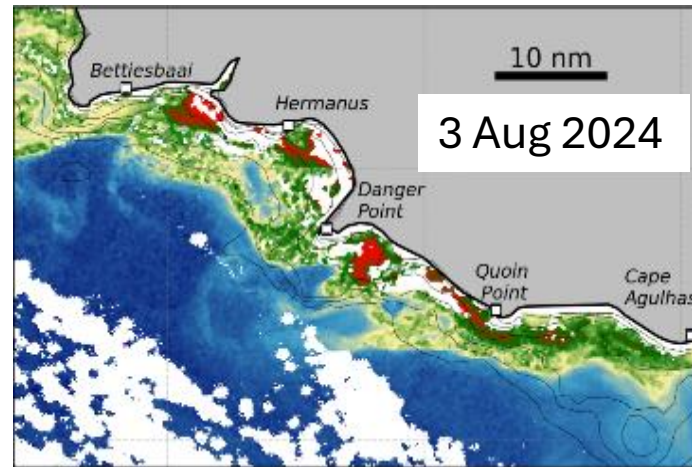
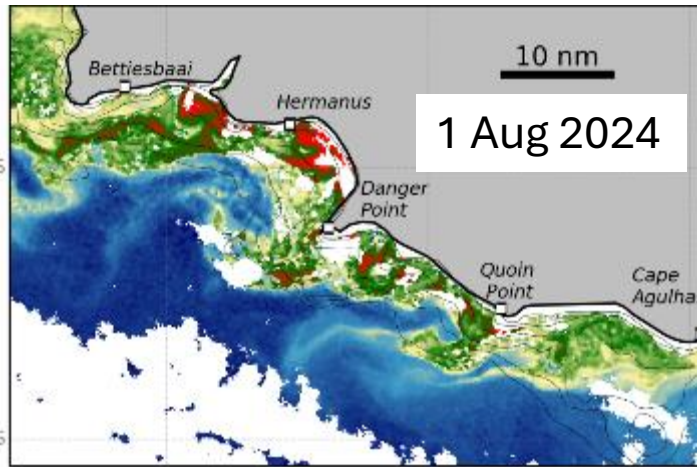
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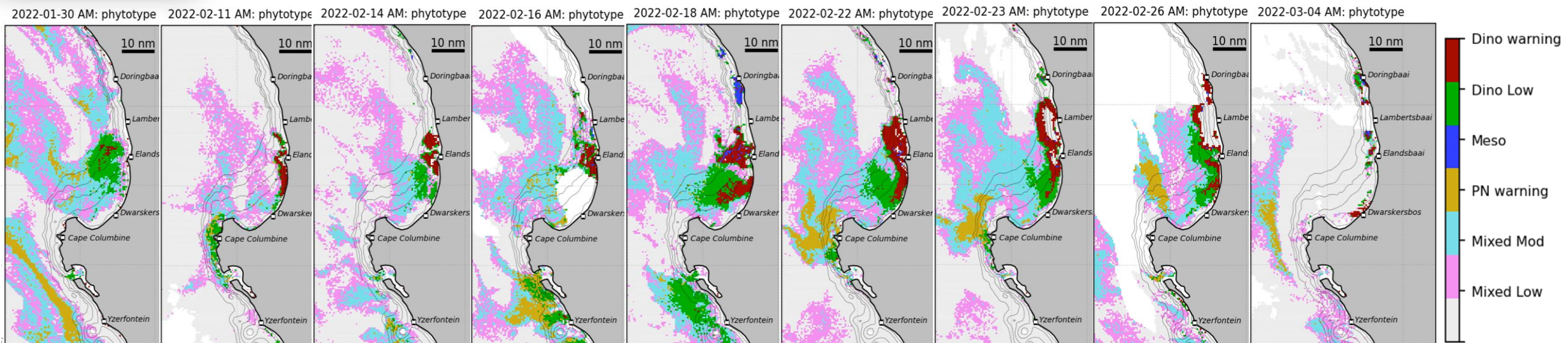
# Support examples: Walker Bay *Akashiwo sanguinea* bloom

- Never bloomed before in Walker Bay
- Red tide forming marine dinoflagellate, can inhibit growth of coexisting phytoplankton and affect red blood cells of marine life
- Wide temperature and salinity range, potentially formed after heavy rains and freshwater input from the Klein estuary
- ✓ No significant impacts to aquaculture operations



# Support examples: West Coast Rock Lobster walkout

- High biomass dinoflagellate bloom was present inshore in St Helena Bay during most of Feb 2022.
- Because of satellite imagery, coastal monitors and DFFE had advanced warning to provide timely response
- 500 tons of crayfish walked out after 1 March
- ✓ ~30 tons were safely returned to the sea



# Future additions to the service

- ✓ Regional summaries for *in situ* phytoplankton information
- ✓ Improved data and image downloads
- ✓ Forecast products focussing on modelled temperature-related indicators

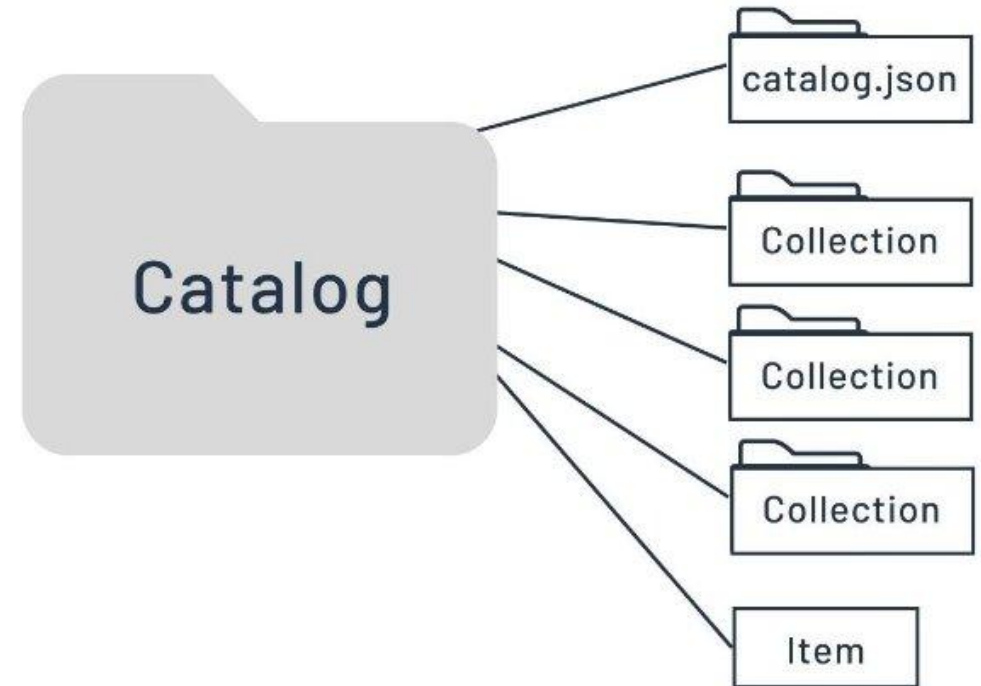
## We are always under development and happy to engage

- ✓ Reach out if these type of data, information or analytics might be useful for fisheries-related management or research
- ✓ Join the technical advisory group to help drive the datasets, analytics and functionality of the service

# The OCIMS Spatio-Temporal Asset Catalog (STAC)

- Provides a standardized framework for exposing our catalog of spatiotemporal records – through REST API.
- Enables the publishing and discovery of OCIMS geospatial assets in a consistent and interoperable manner.
- OCIMS catalog process
  - Automated metadata extraction from items
  - Categorize into items into collections based on themes. e.g. s3olci, s3tsm, s3phytoplankton
- Allows for automated indexing of datasets into DataCubes

➤ <https://www.ocims.gov.za/stac/v1>



# Thank you for your attention

**Contact :** [MSmith2@csir.co.za](mailto:MSmith2@csir.co.za)



*Scan for access to the OCIMS Fisheries and Aquaculture Decision Support Tool*