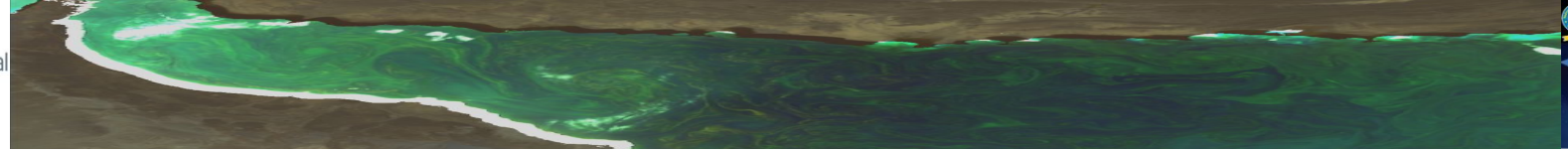
International Ocean Colour Science Meeting 2023

Advancing Global Ocean Colour Observations



Ocean Colour Science and Applications at ISRO

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National Remote Sensing Centre
Indian Space Research Organisation
Hyderabad

Payloads

- Ocean Color Monitor (OCM-3)
- Sea Surface Temperature Monitor (SSTM)
- Ku-Band Scatterometer (SCAT-3)
- ARGOS

Mission Objectives

- To ensure the data continuity of Ocean colour and wind vector data to sustain the operational applications.
- To improve the applications, some additional datasets such as SST & more number of bands in Optical region for florescence and in IR region for atmospheric corrections.
- To develop / improve related algorithms and data products to serve in well- established application areas and to enhance the mission utility.

Band No	OCM-3		Potential Applications
	Central wavelength (nm)	Band width (nm)	
1	412	20	Yellow Substance absorption
2	443	10	Low Chl-a concentration
3	490	10	Medium Chl-a concentration, Diffuse attenuation coefficient
4	510	10	High Chl-a concentration
5	555	10	Chl-a reference, turbidity
6	566	10	Trichodesmium identification
7	620	10	Suspended sediments, cynobacteria, turbidity in case-2 waters
8	670	10	Baseline for Chl fluorescence
9	681	08	Chlorophyll fluorescence
10	710	10	Baseline for Chl fluorescence, red edge
11	780	10	Atmospheric correction
12	870	20	Atmospheric correction, spectral scattering
13	1010	40	Atmospheric correction for turbid waters, aerosol-white foam discrimination

Operational, Science and R&D Products using EOS-6, OCM

Operational Products

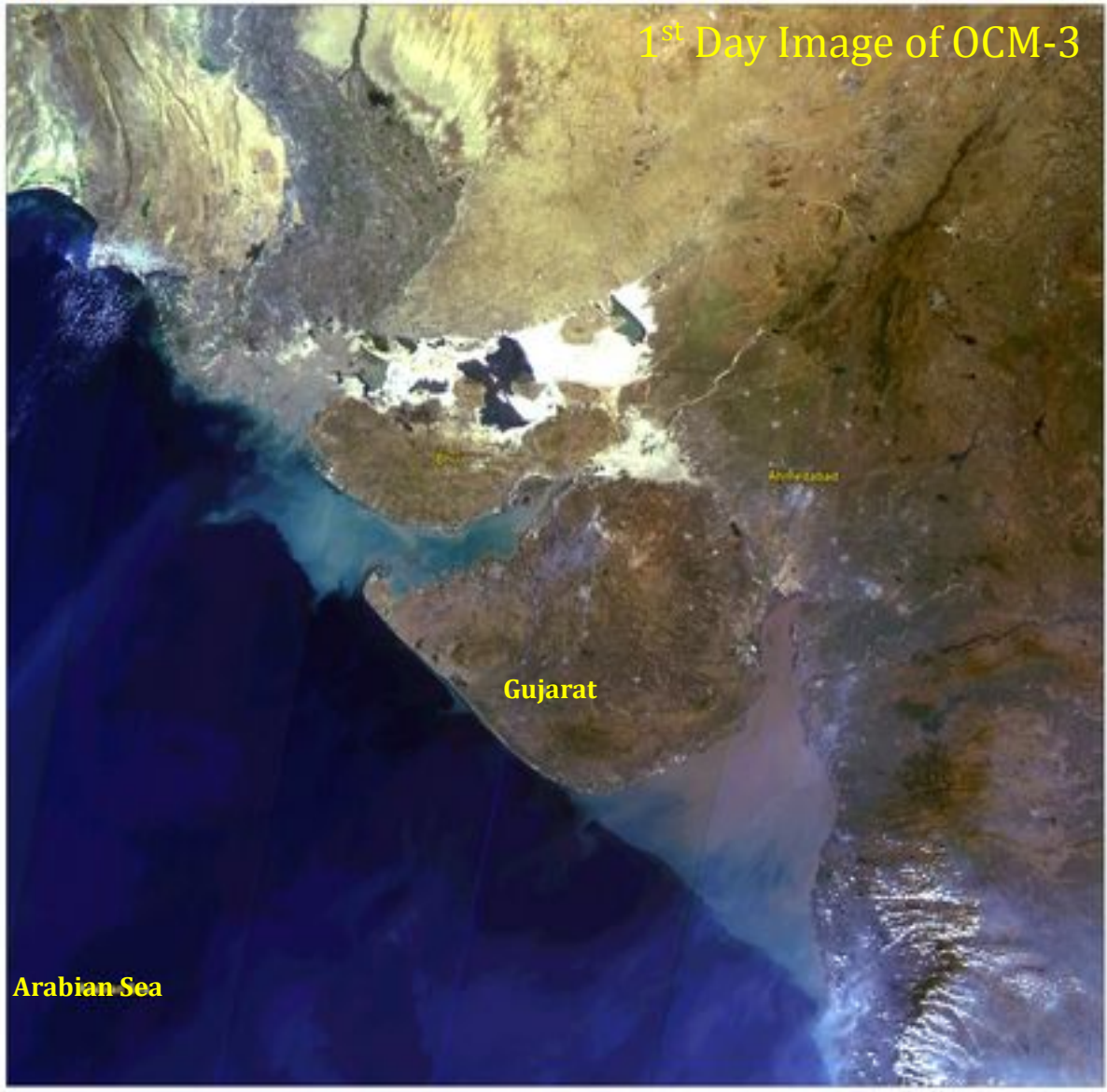
- Chlorophyll Concentration (Chl-a)
- Diffuse Attenuation Coefficient (DAC)
- Total Suspended Matter (TSM) , Rrs *

New Science Products

- Colored Dissolved Organic Matter (412nm)
- Inherent Optical Properties (total absorption and total backscattering)
- Upwelling Indices (Ekman transport/Ekman Pumping)
- Surface Nitrate Maps

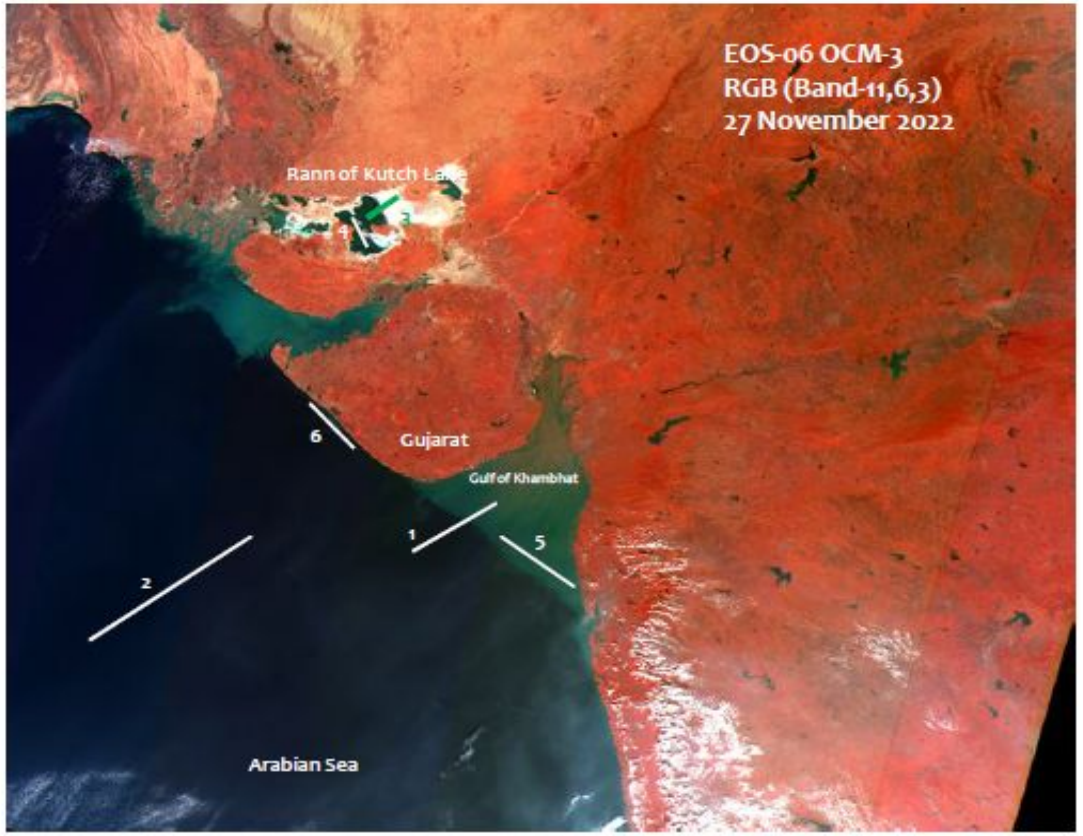
R&D Products

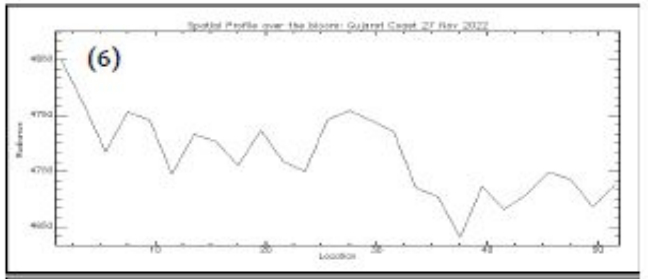
- Normalized Fluorescence Line Height (nFLH)
- Algal Bloom Detection Index (ABI)
- Phytoplankton Size Class (PSC)
- Particulate Organic Carbon (POC)

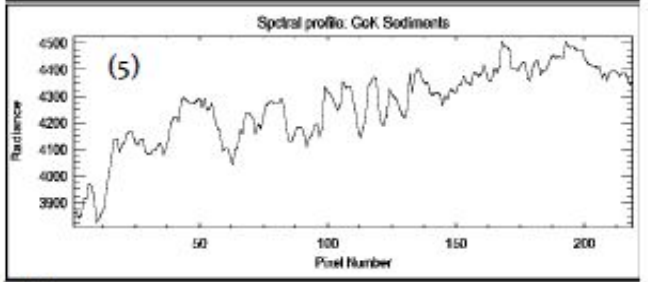


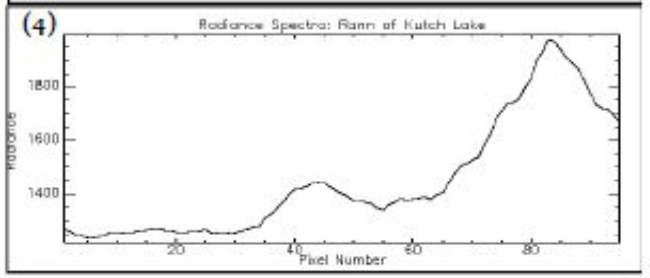
Spatial Variability over Different Classes

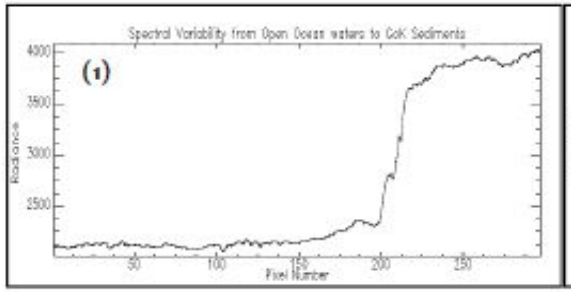
- Processing LAC & GAC through SeaDAS
- Very good spectral signatures to delineate
  - Open Ocean
  - Coastal Ocean
  - Blooms
- Flags & masks as per the OBPG guidelines
- Able generate the standard products for
  - LAC
  - GAC
- Generated L2, L3 binned products
- Validation using in-situ observations are being carried out.
- The operational algorithm of OCM3 (geo-physical products retrieval & atmospheric correction) is validated with OLCI.

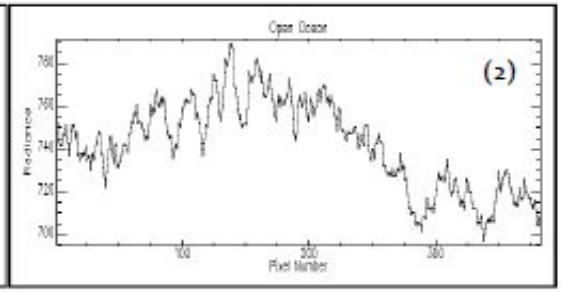


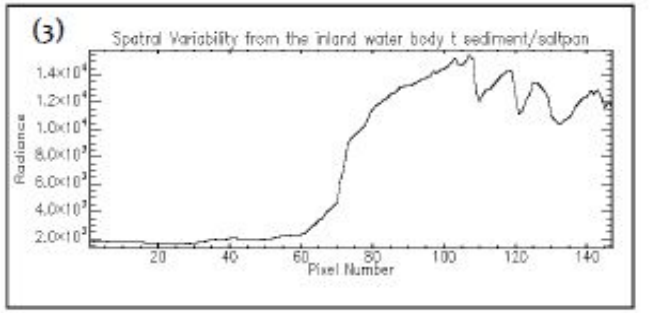




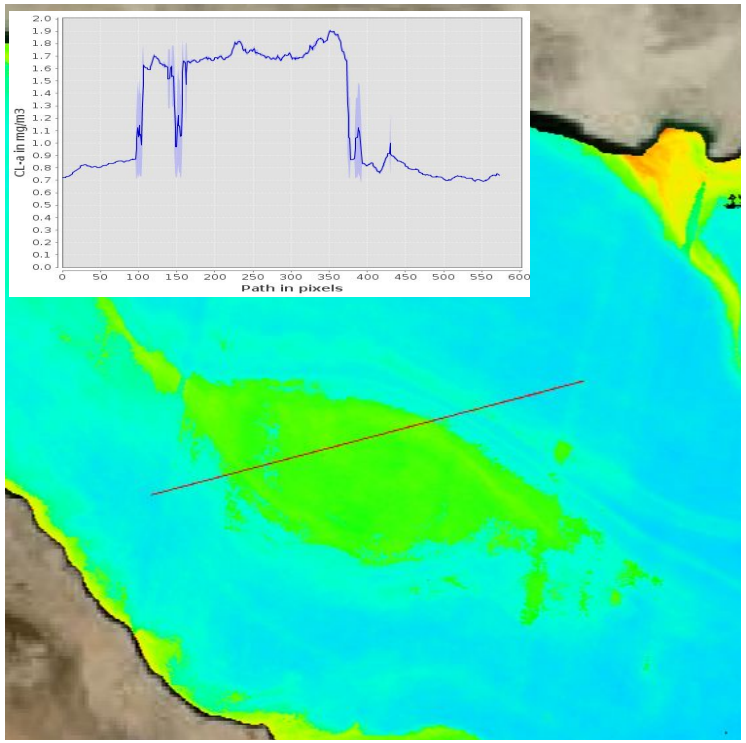


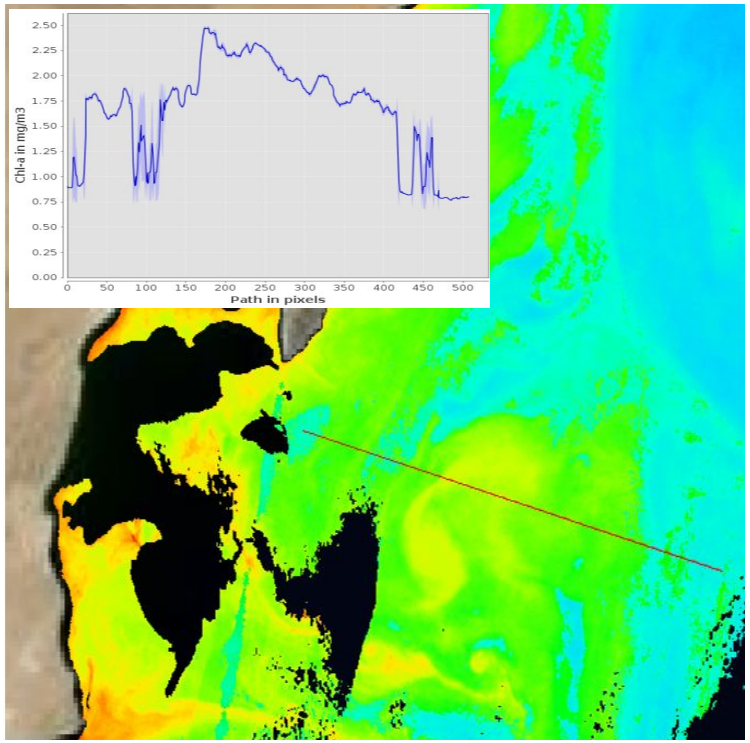


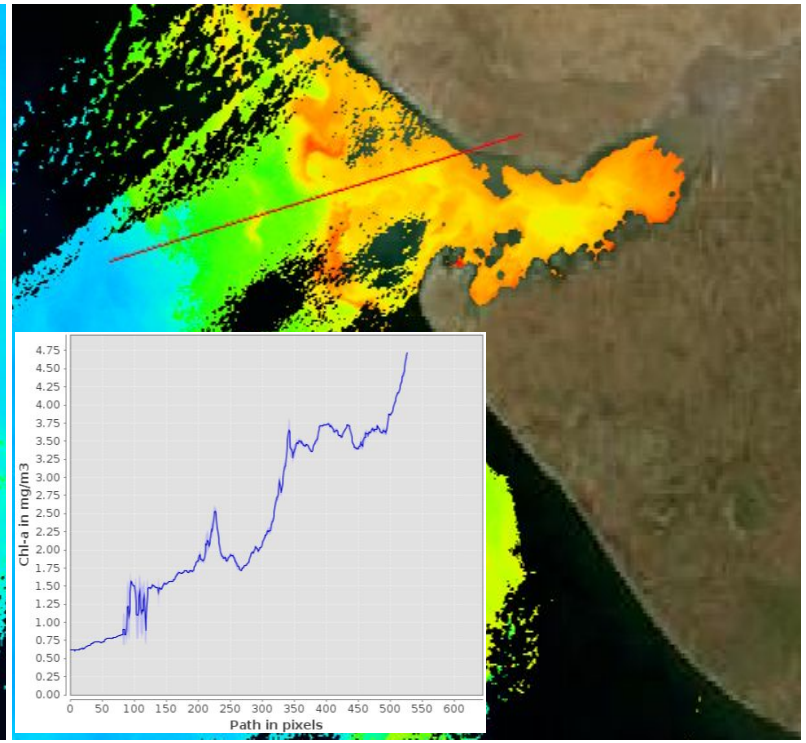




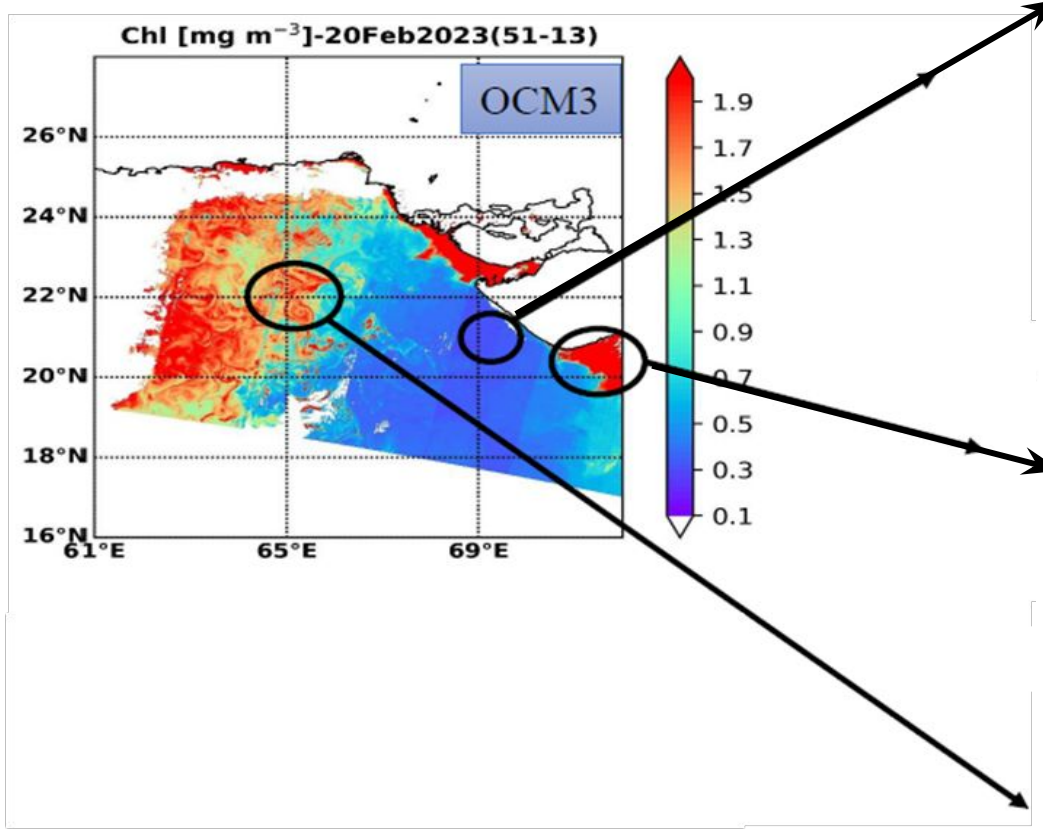
Spatial Variability: Eos-06 OCM



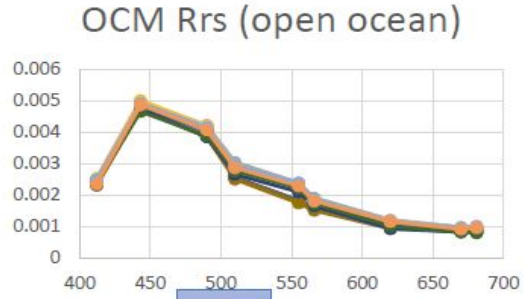




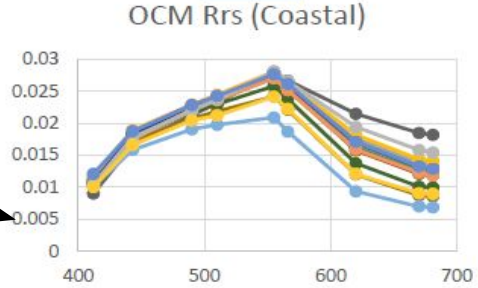
Spectral Variability: Eos-06 OCM



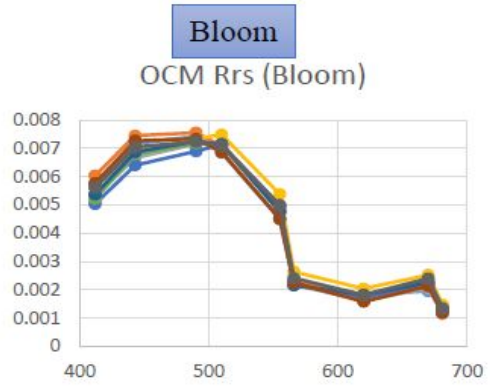
Open Ocean



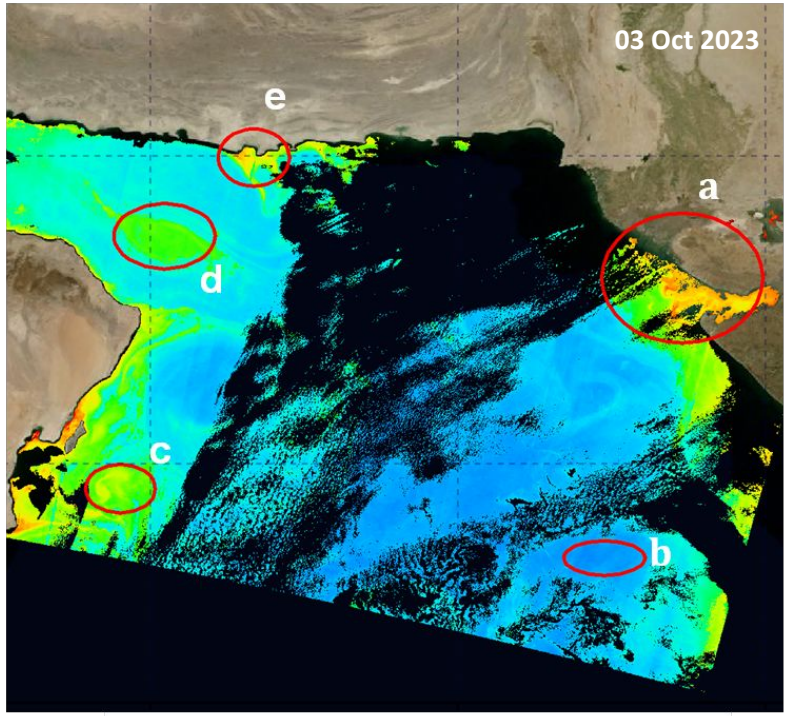
Gulf

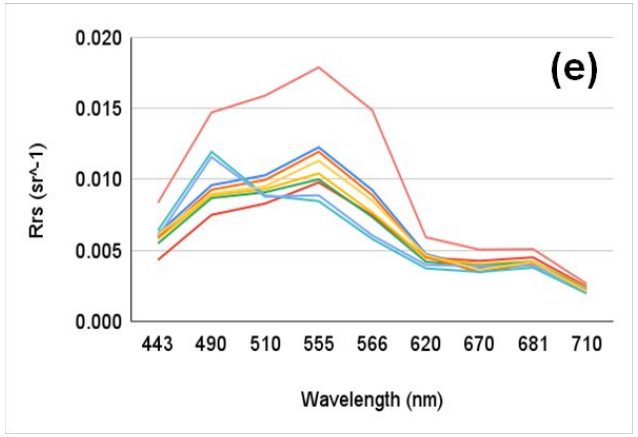


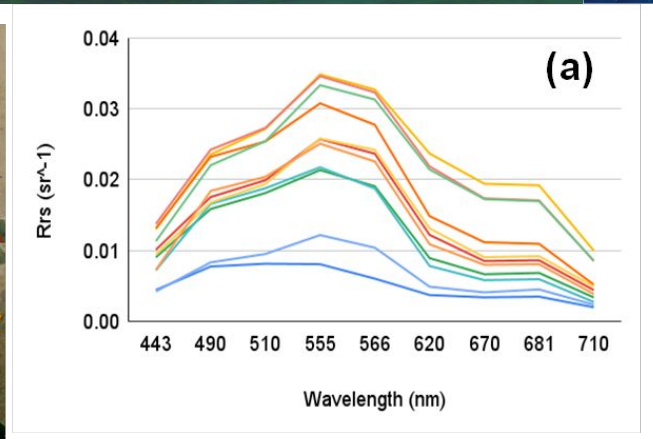
Bloom

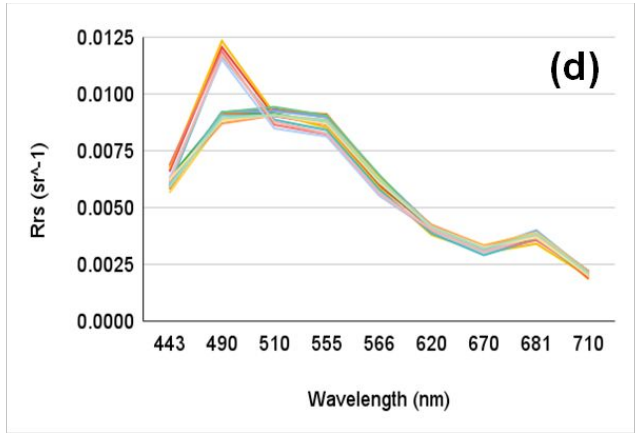


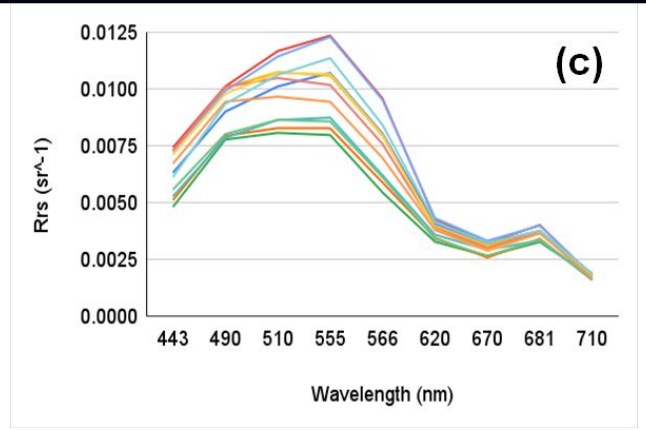
Spectral Variability: Eos-06 OCM

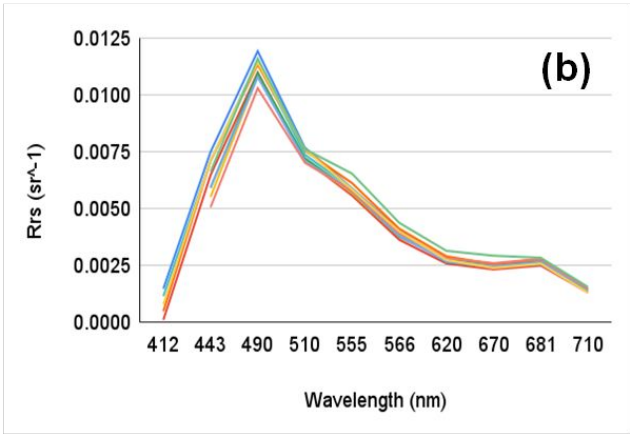




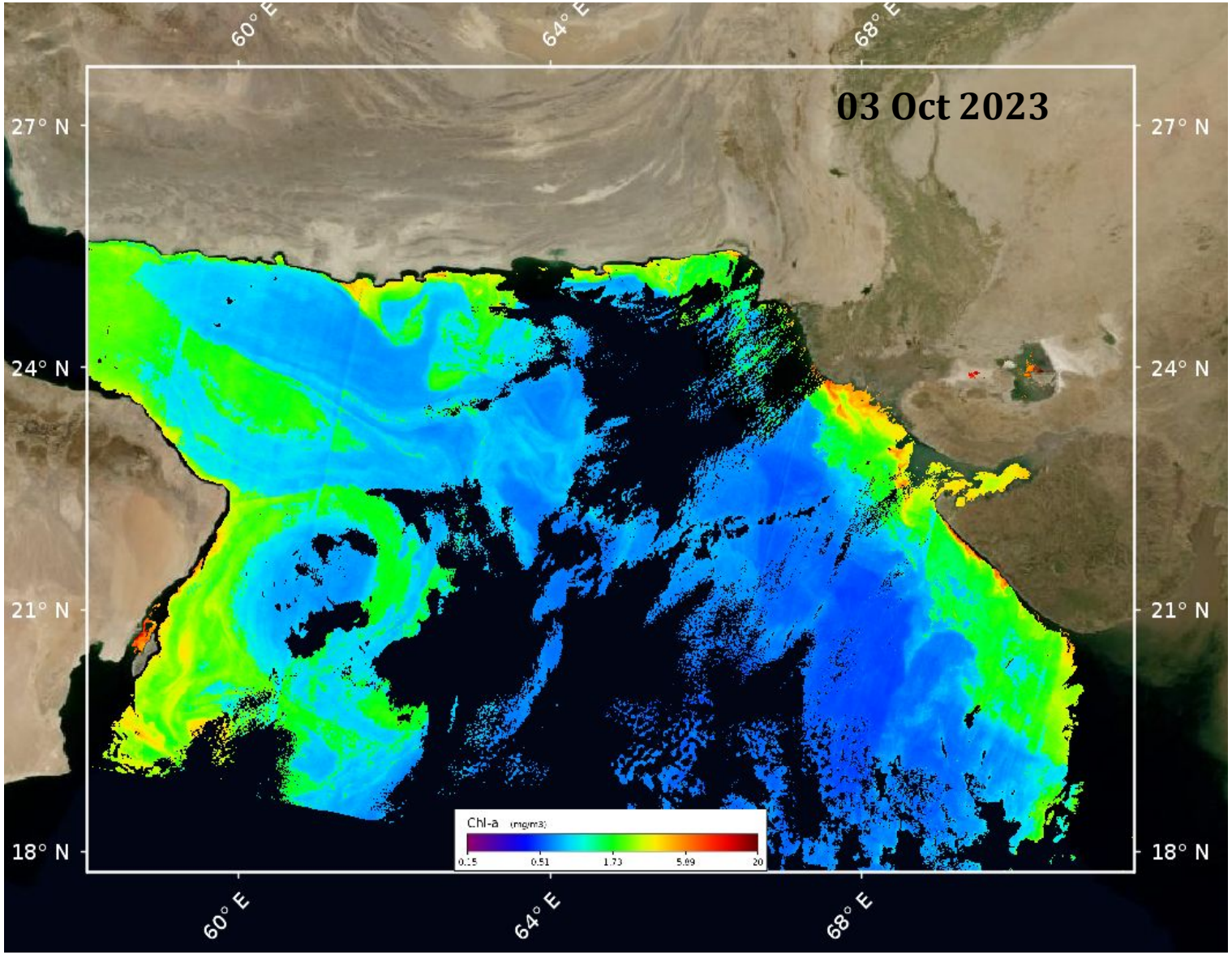








Phytoplankton Blooms: Northern Arabian Sea



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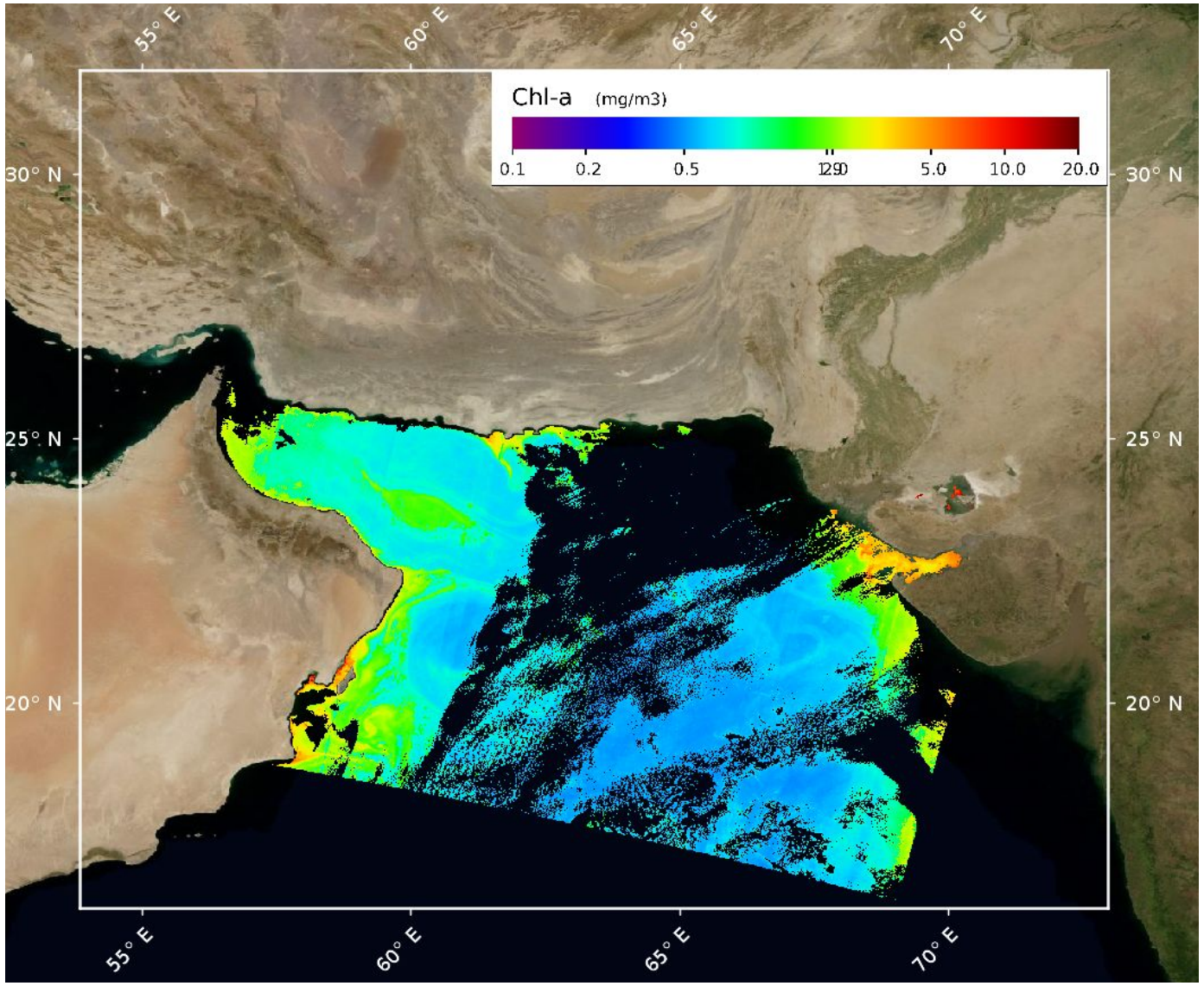
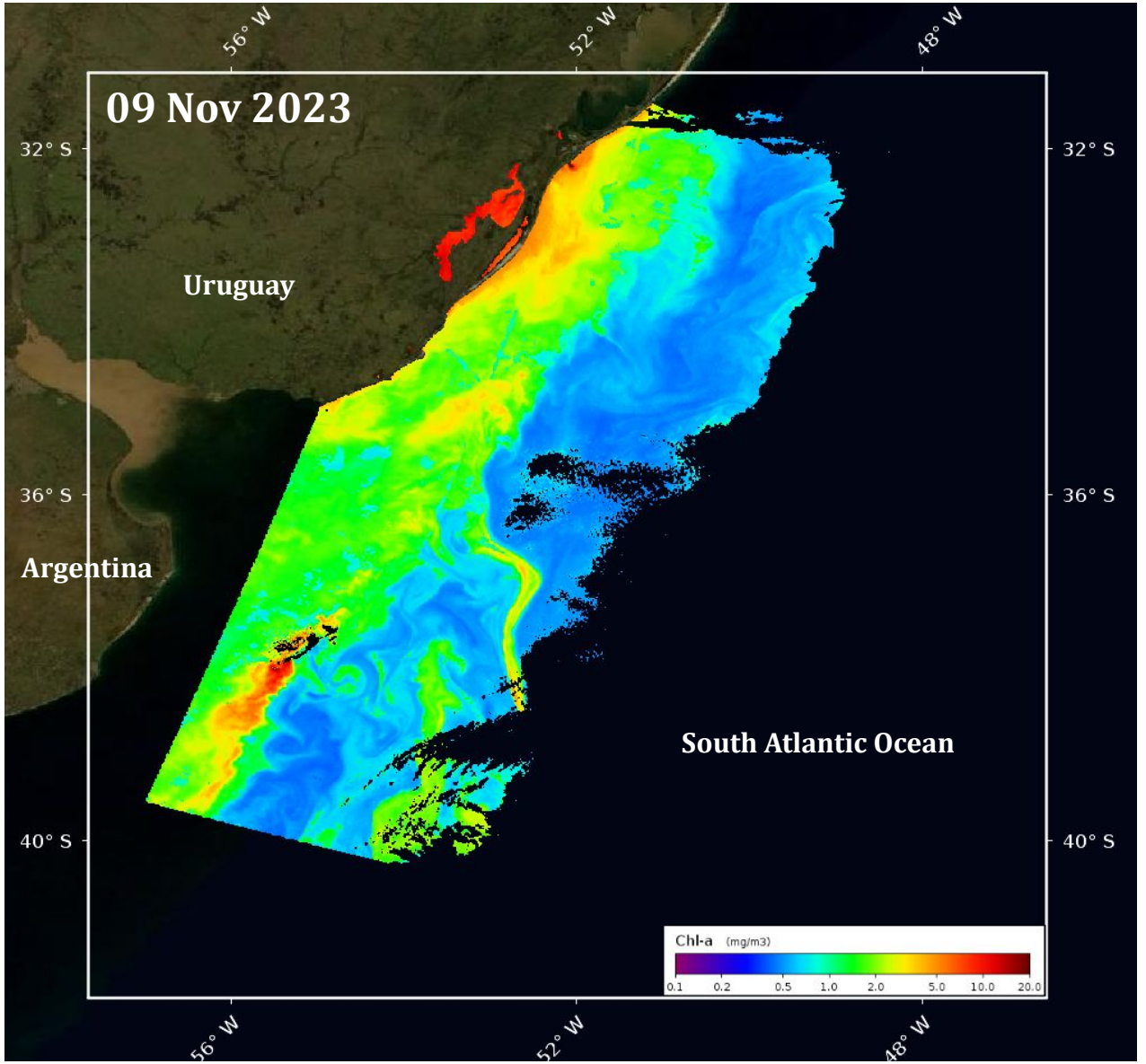
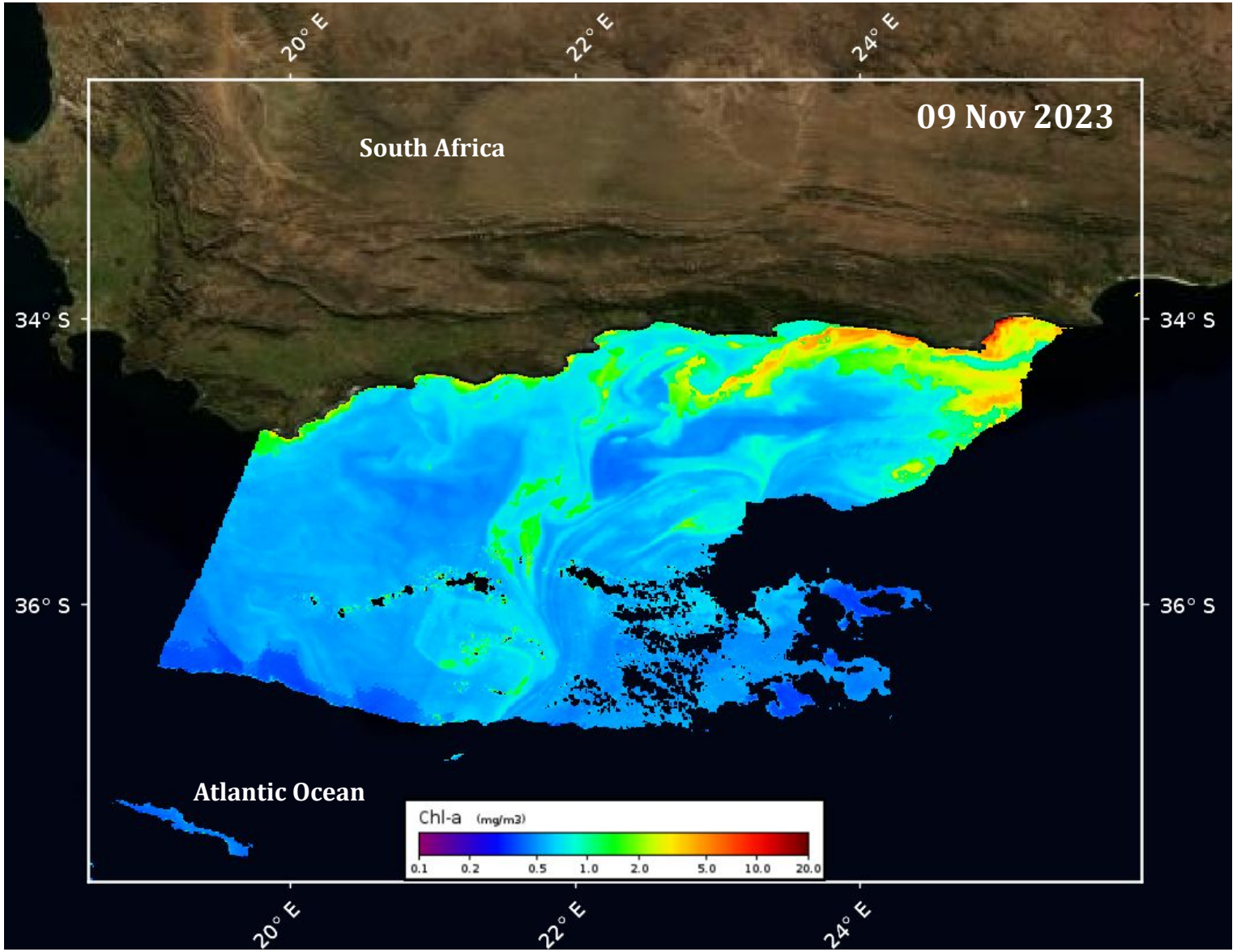


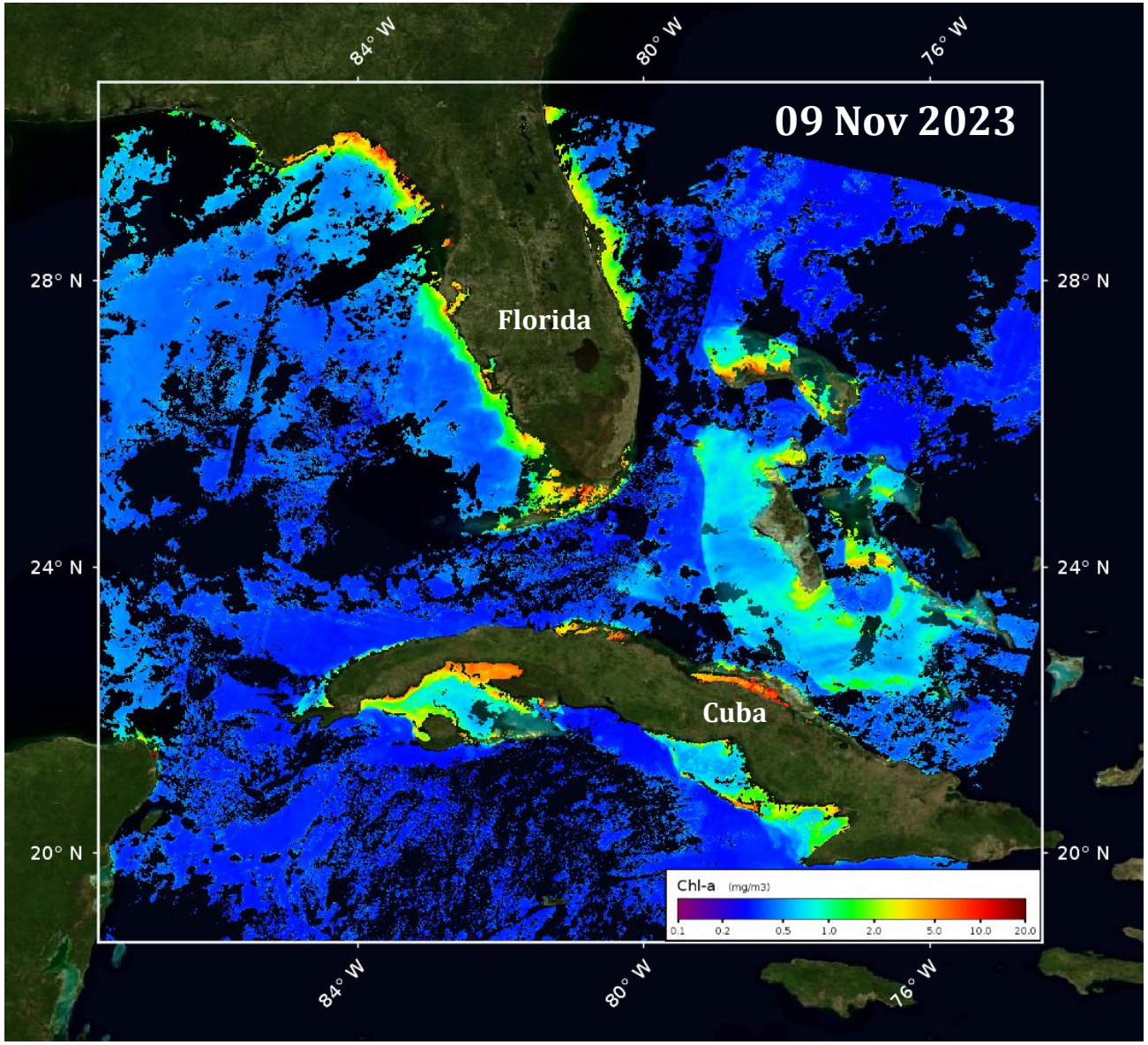
Phytoplankton Blooms: Argentina Coast



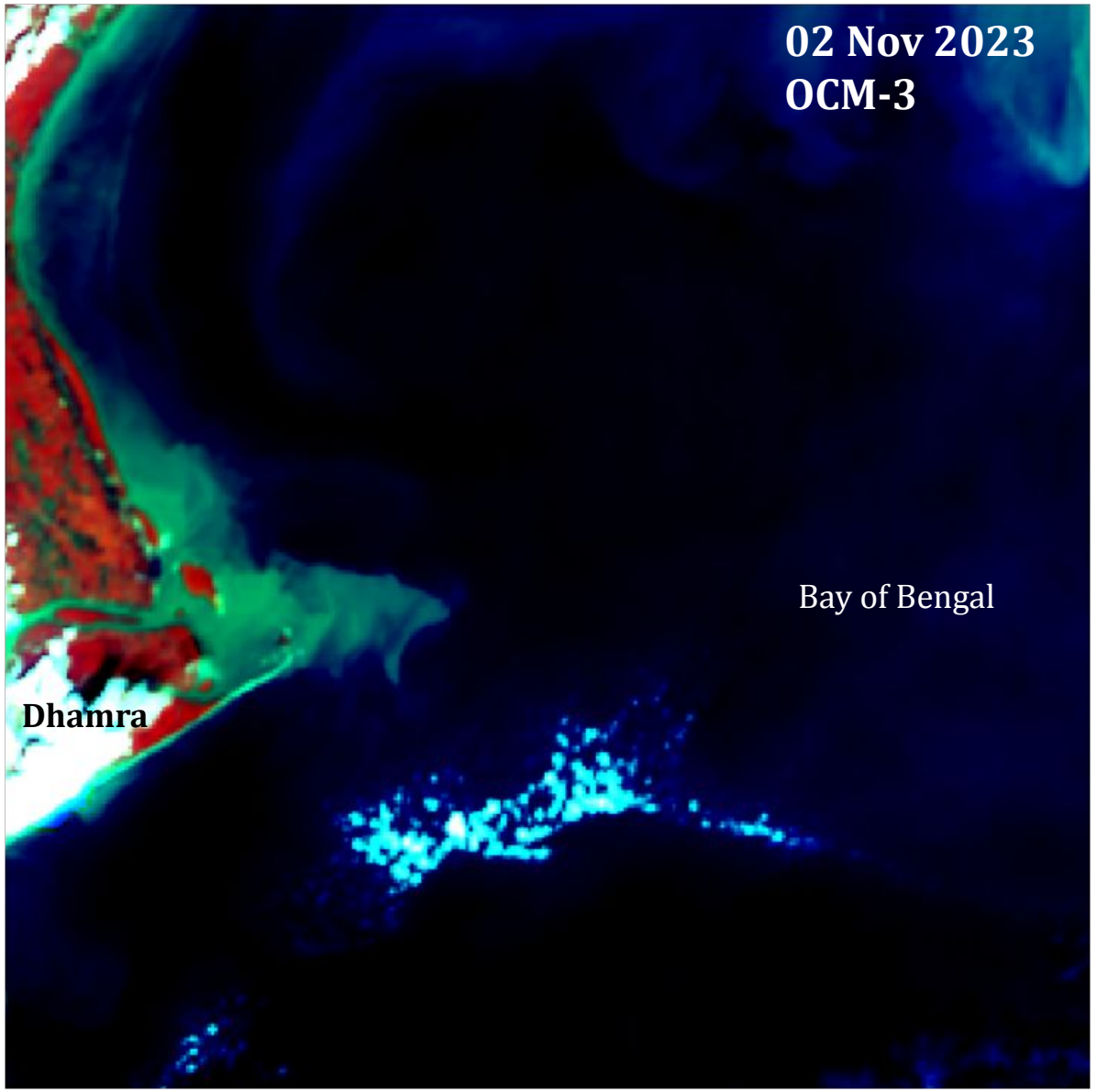
Phytoplankton Blooms: South African Coast



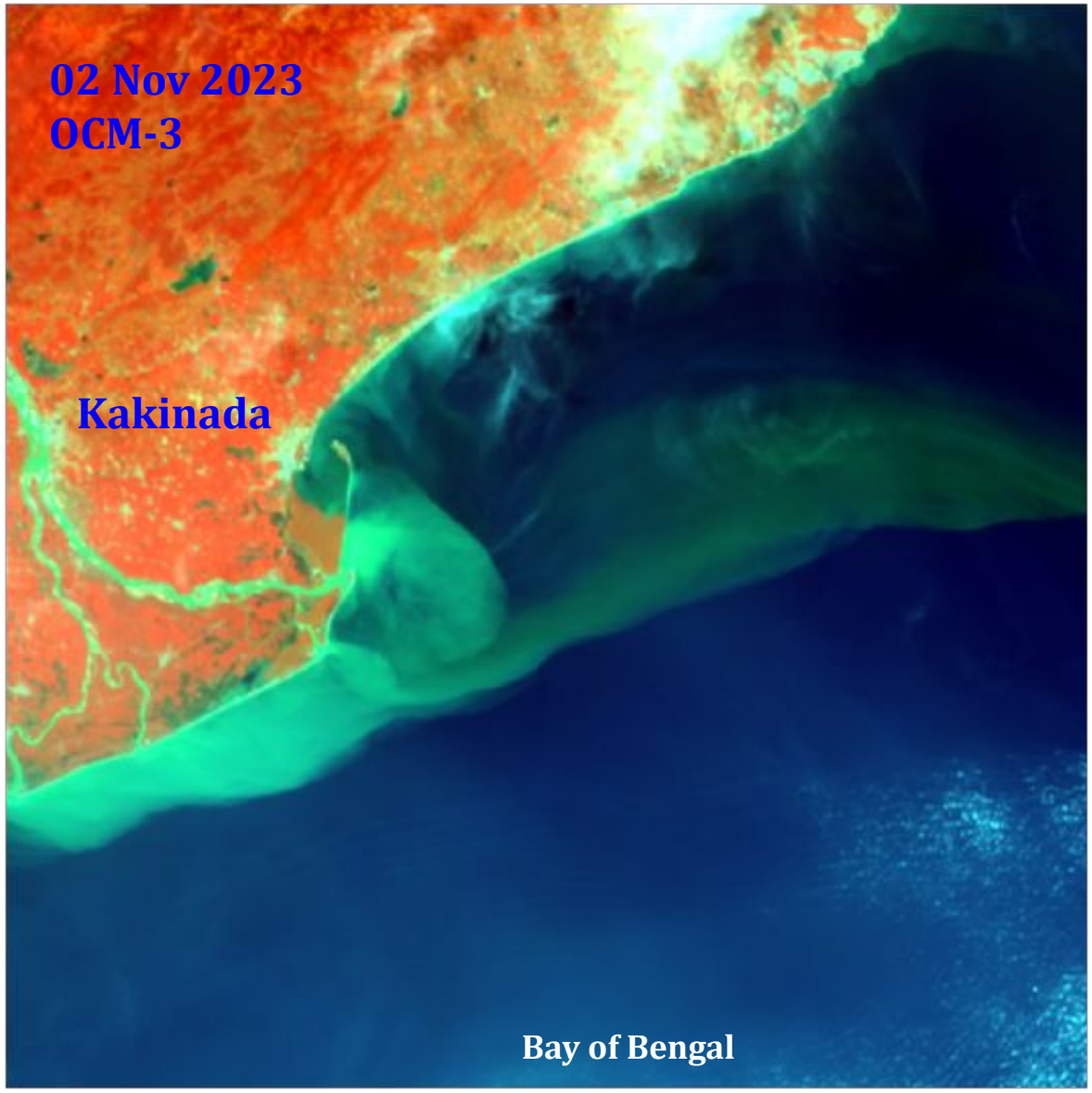
Phytoplankton Blooms & Coral Islands



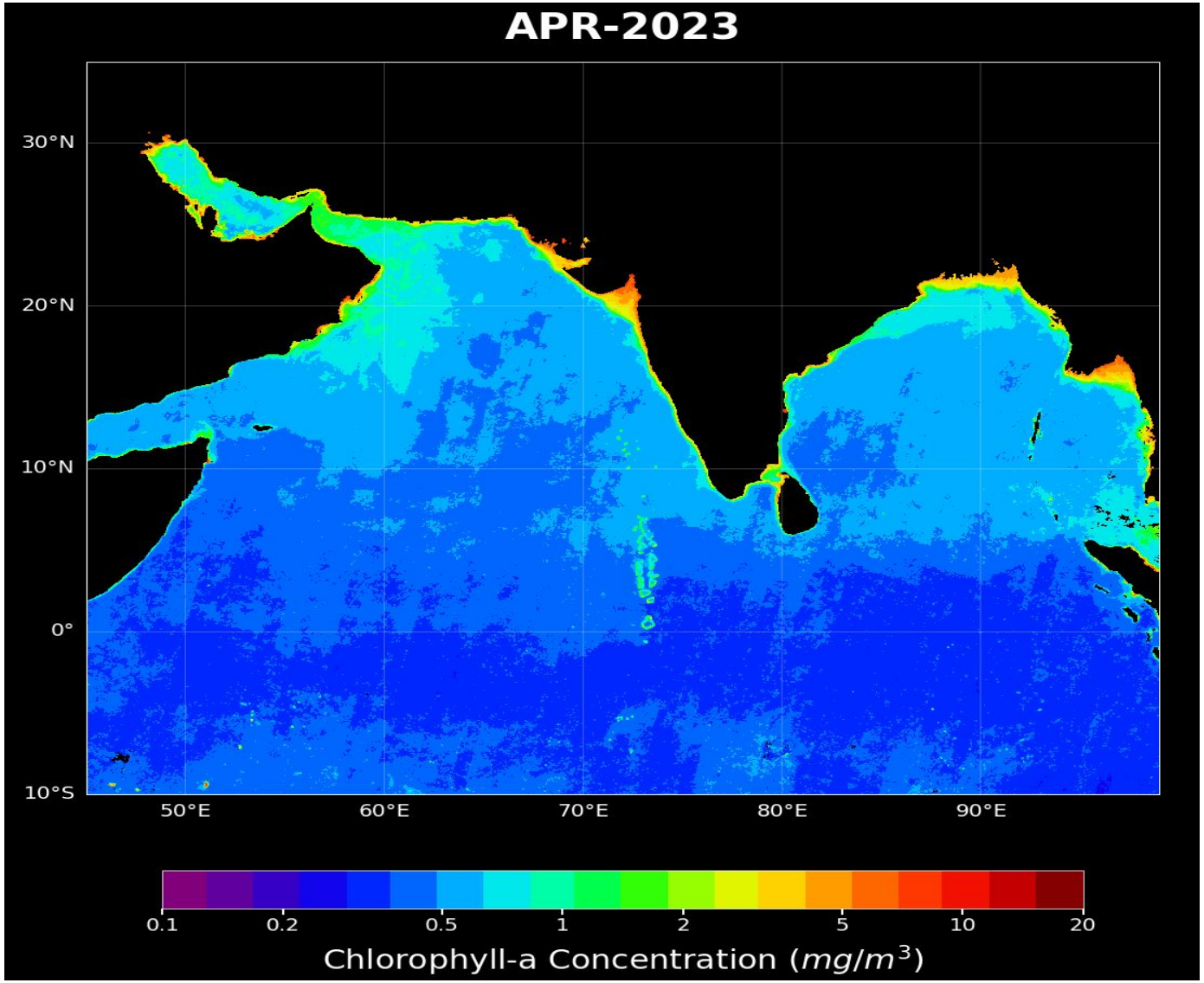
Sediment Plume: Odisha Coastal Waters



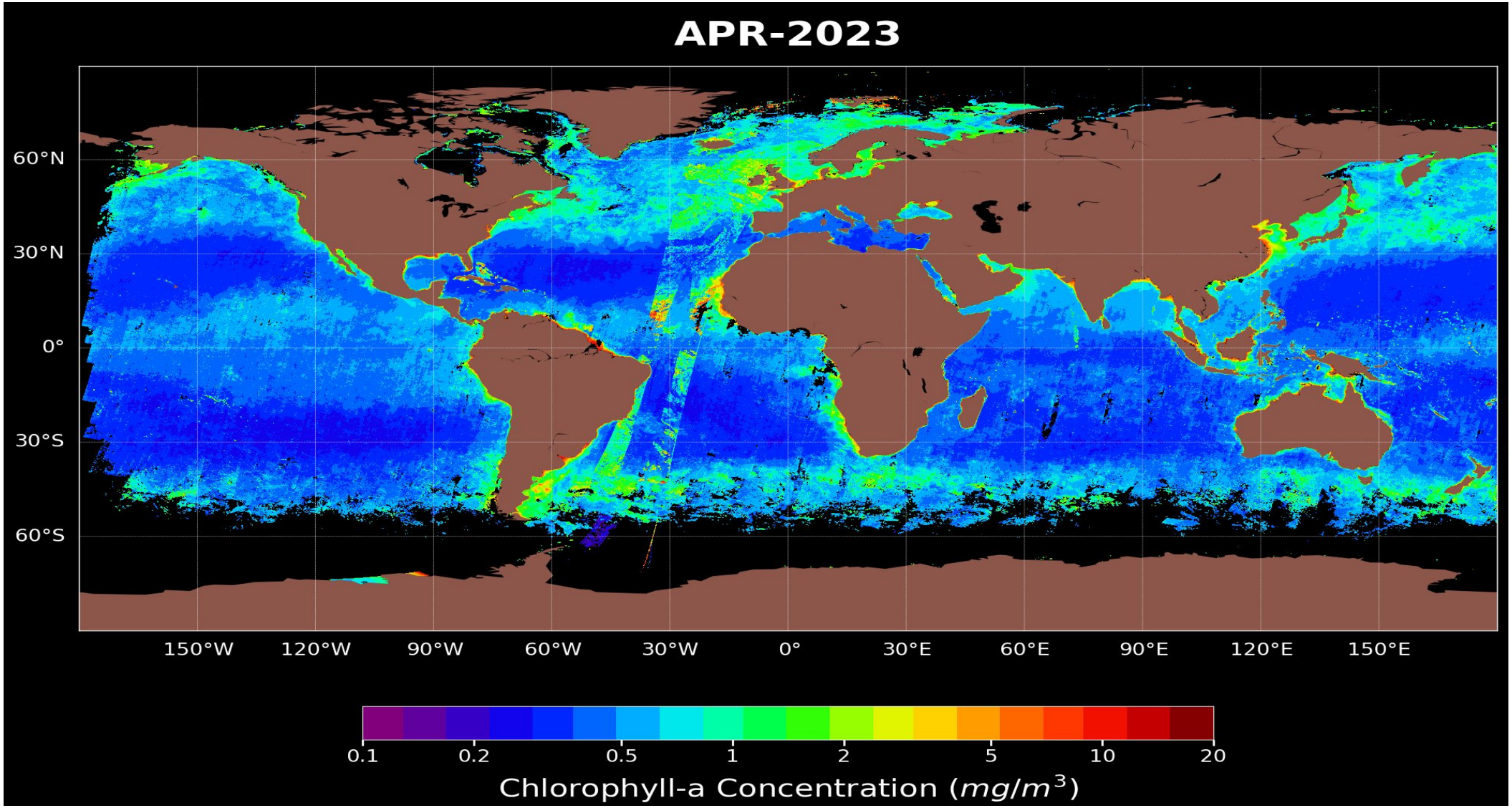
Sediment Plume: Off Godavari



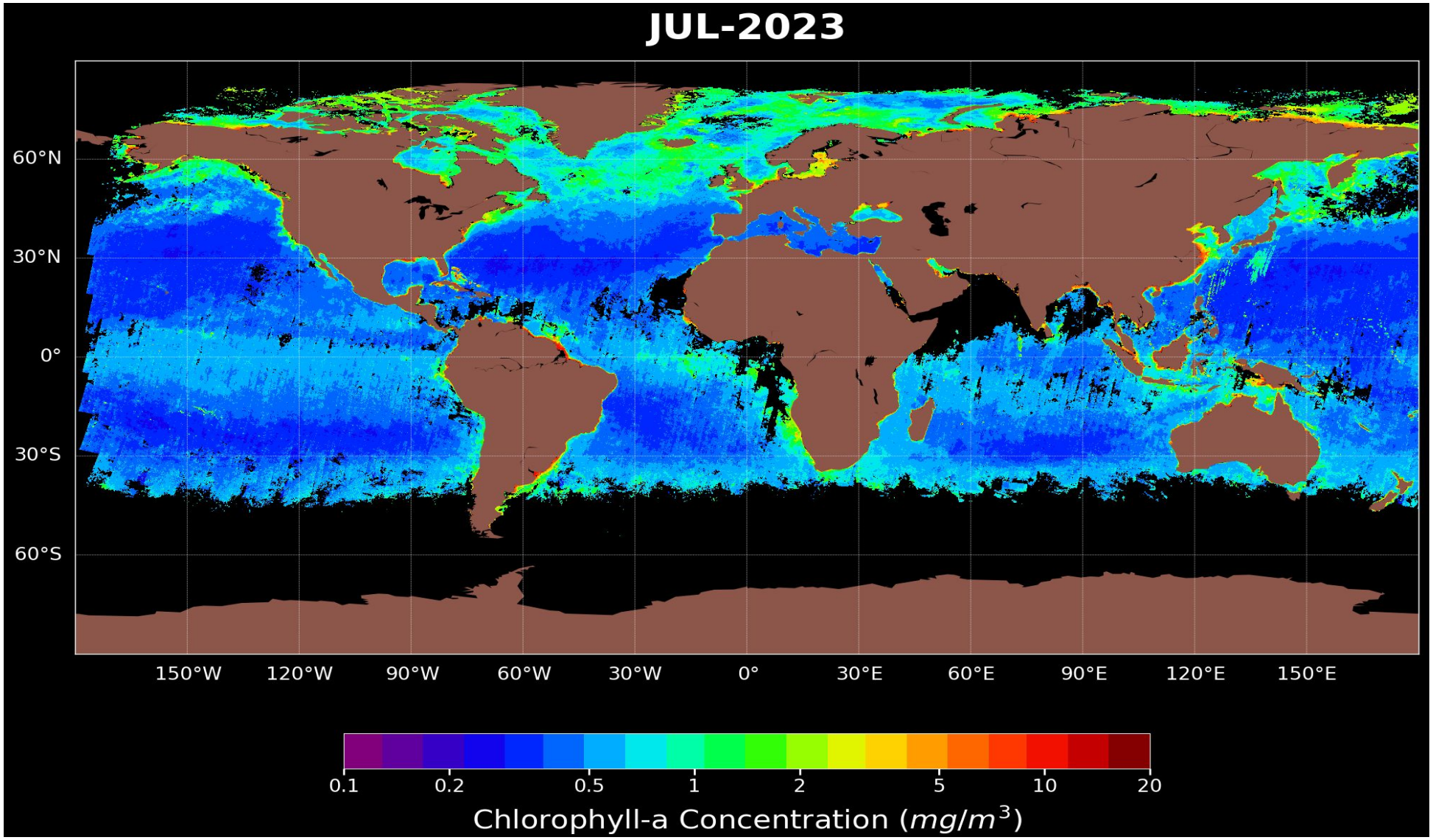
Level-3 Binned Products: Eos-06 OCM



Level-3 Binned Products: Eos-06 OCM

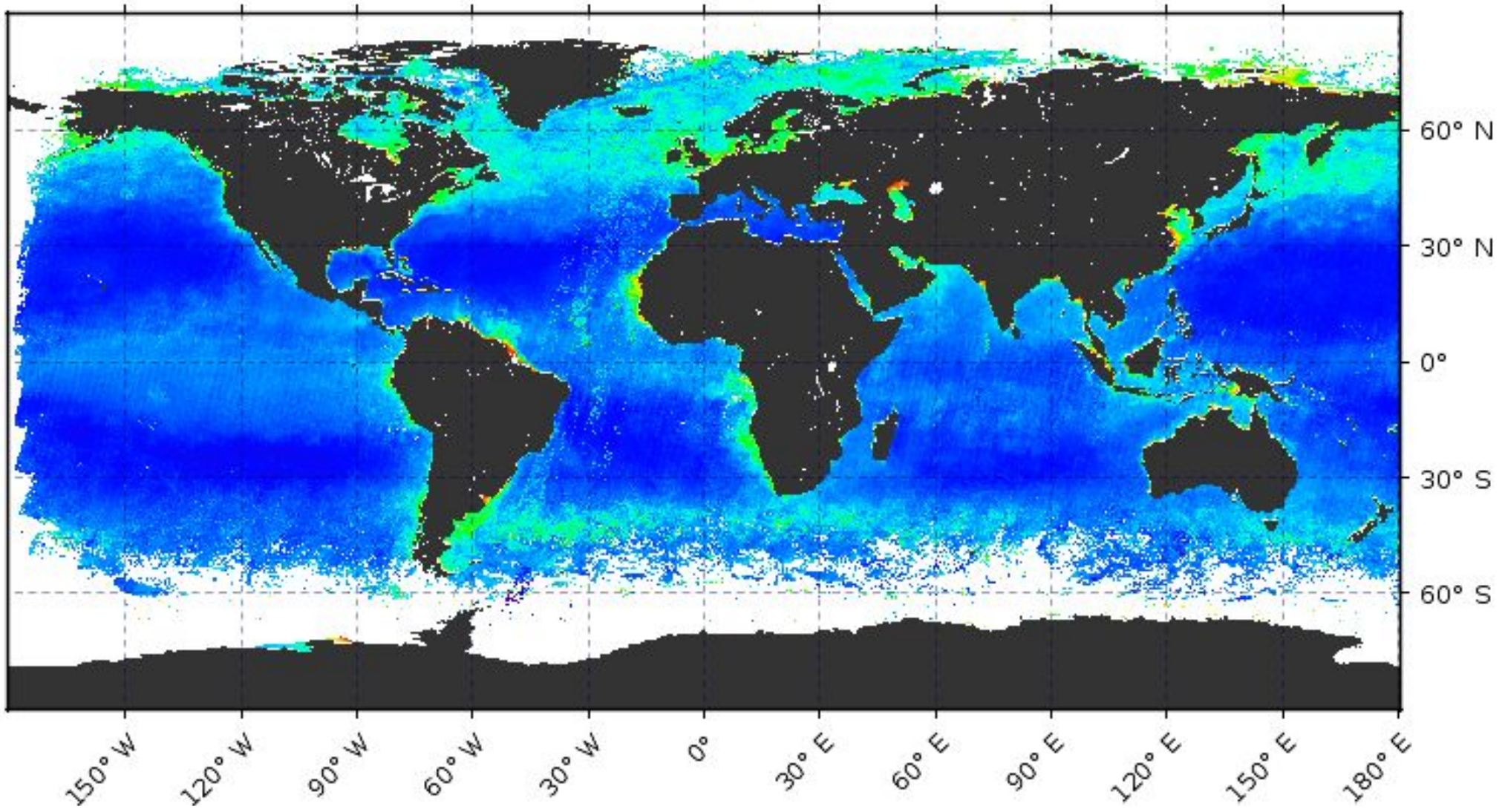


Level-3 Binned Products: Eos-06 OCM

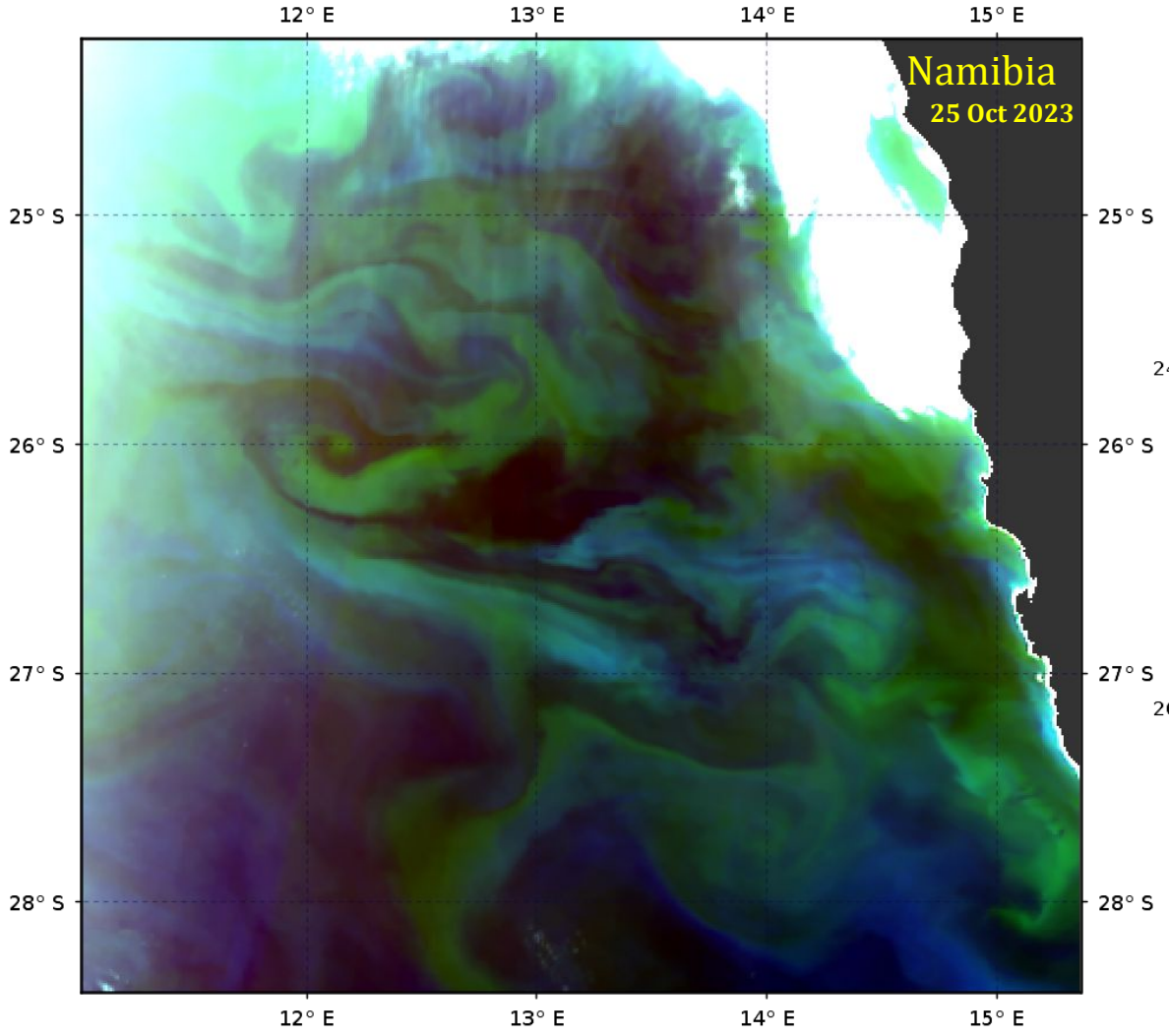


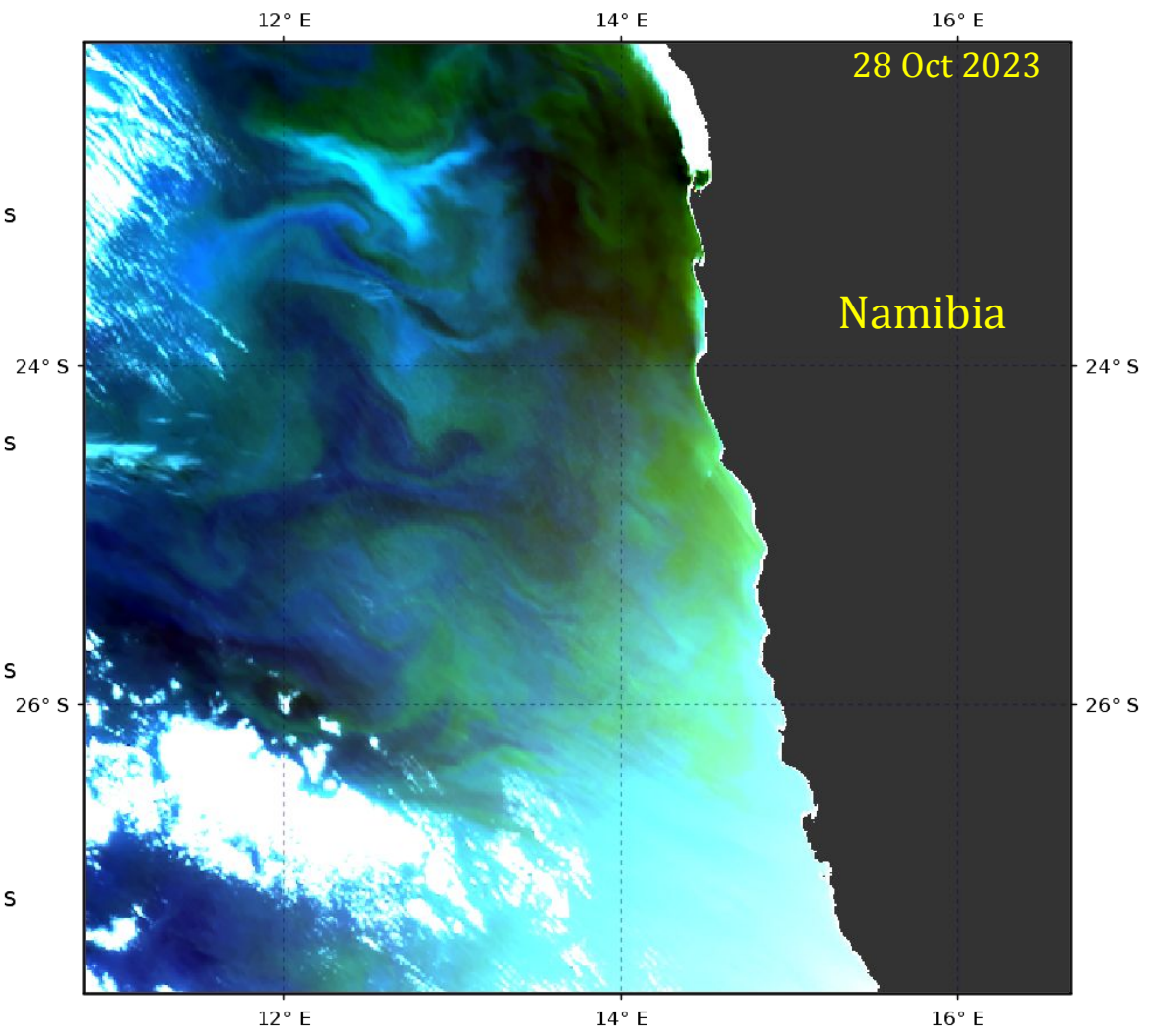
Level-3 Binned Products: Eos-06 OCM

Apr_May_Aug_Sep_2023

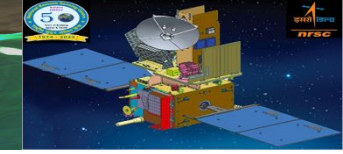


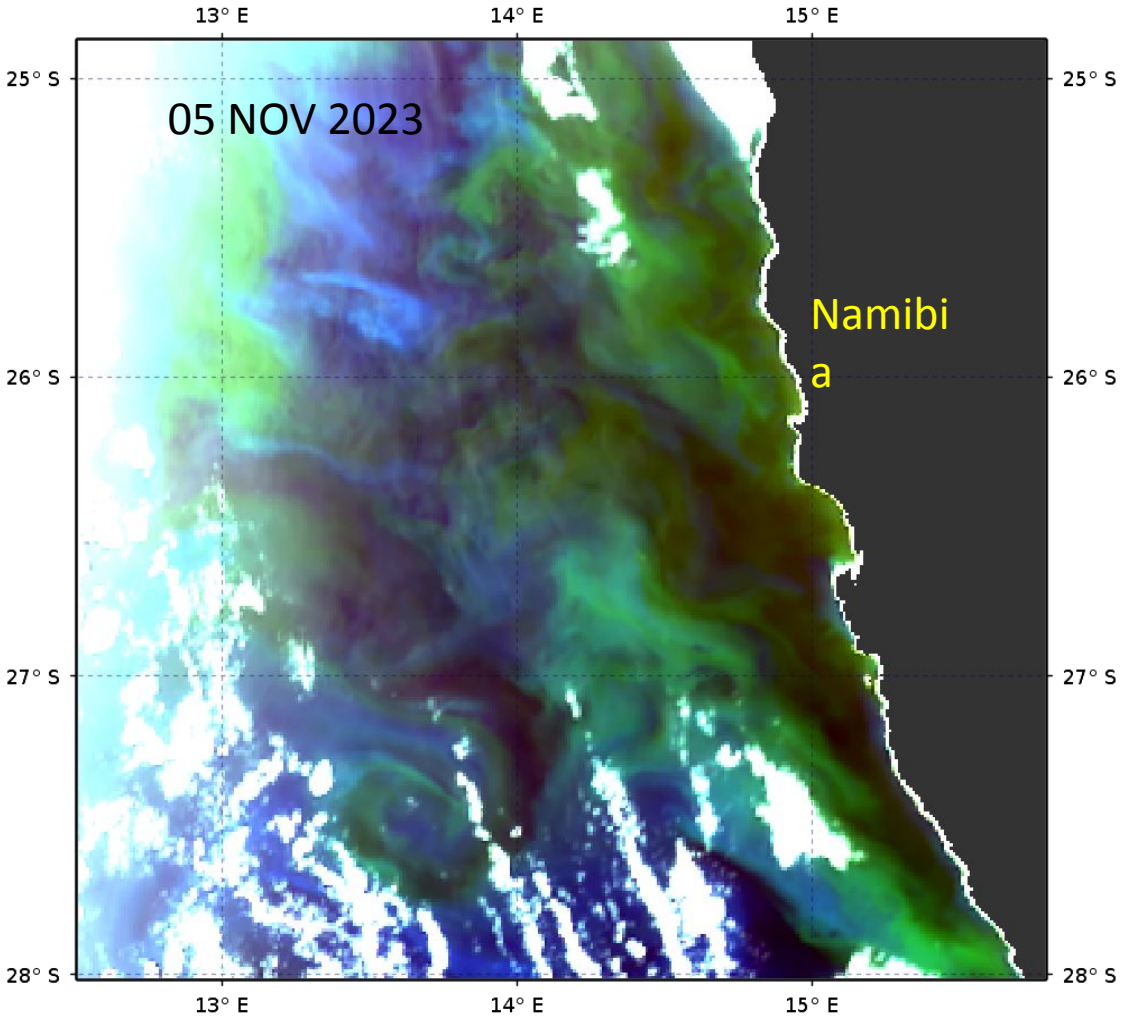
Phytoplankton Blooms: Eos-06 OCM

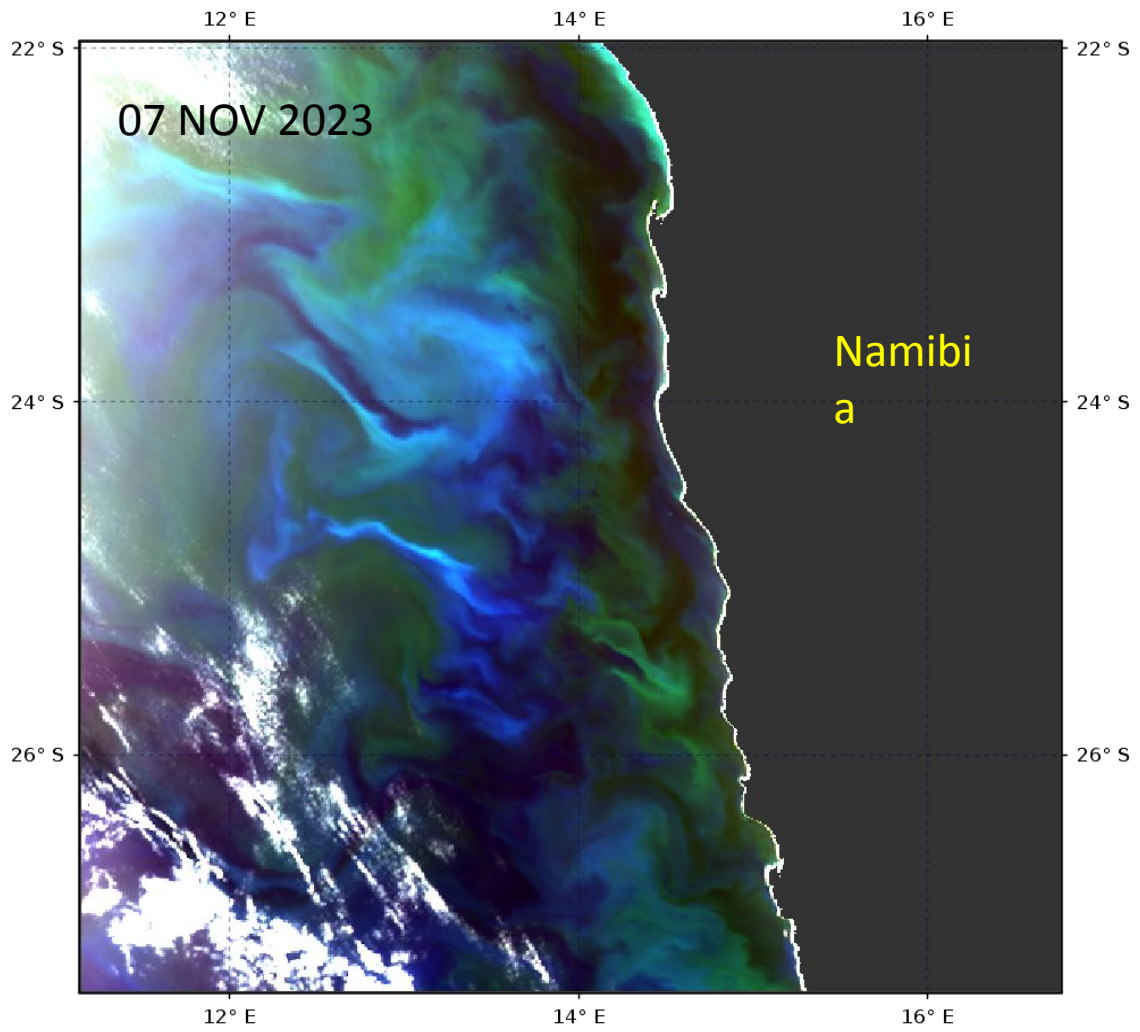




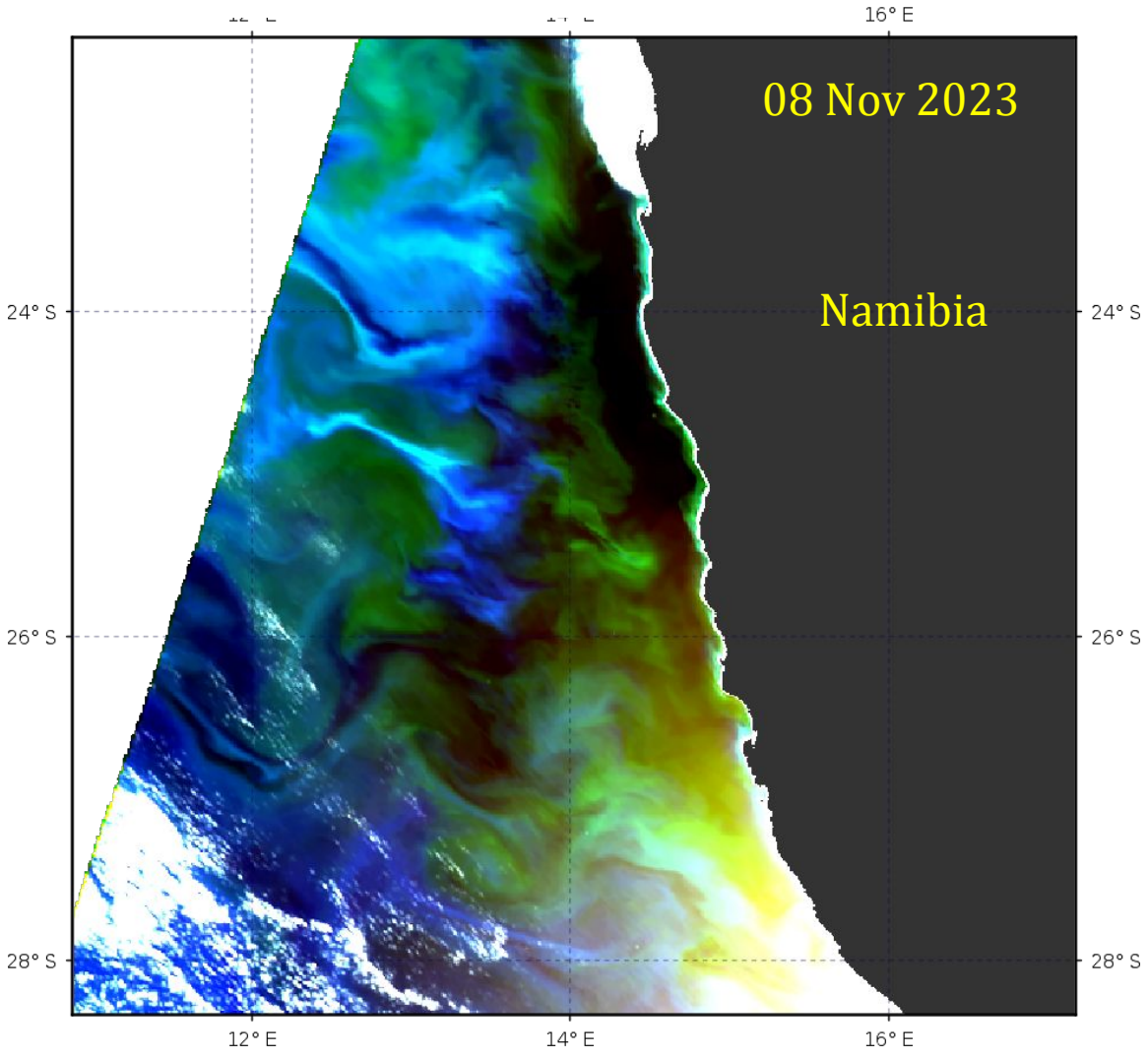
Phytoplankton Blooms: Eos-06 OCM

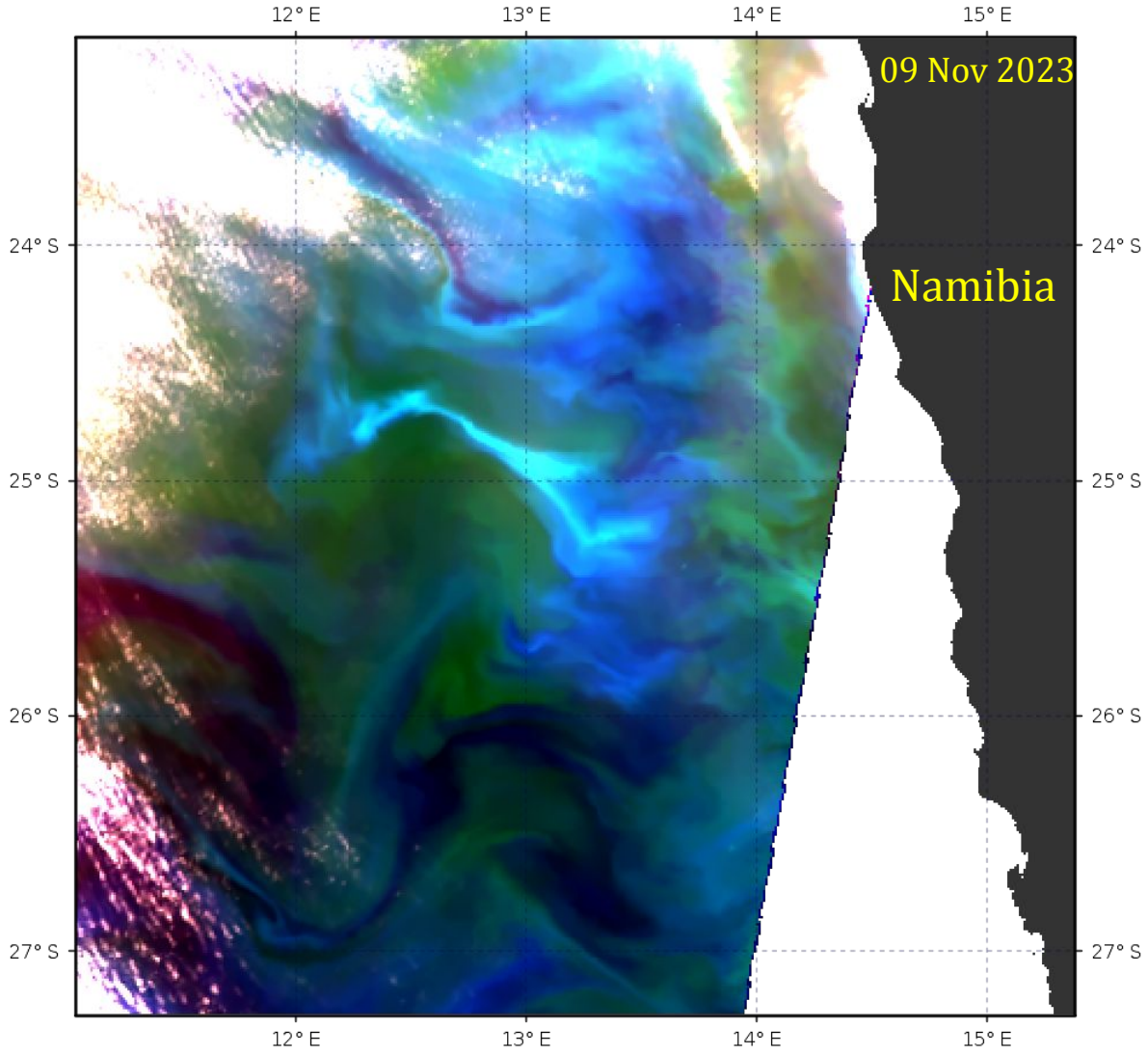




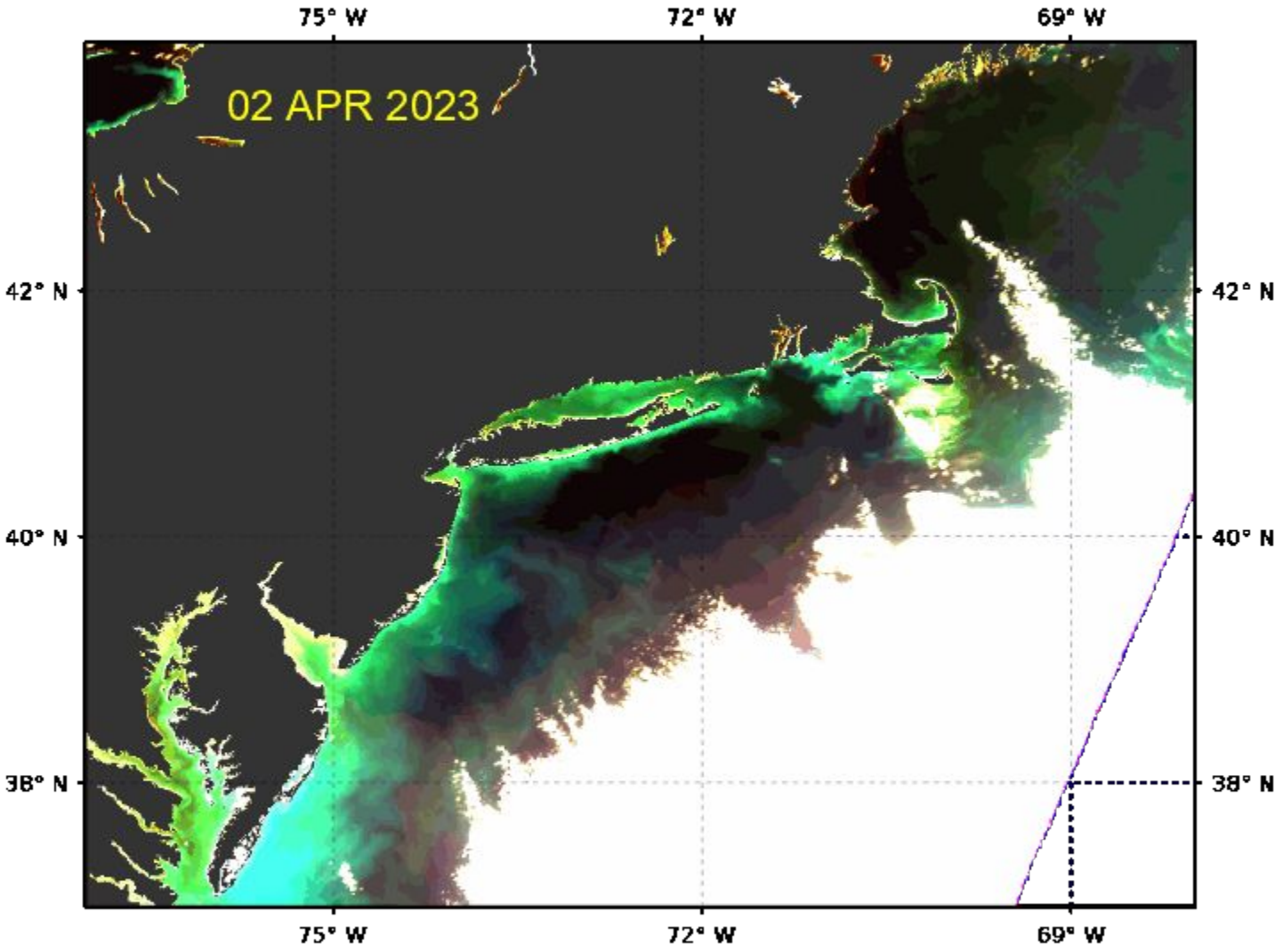


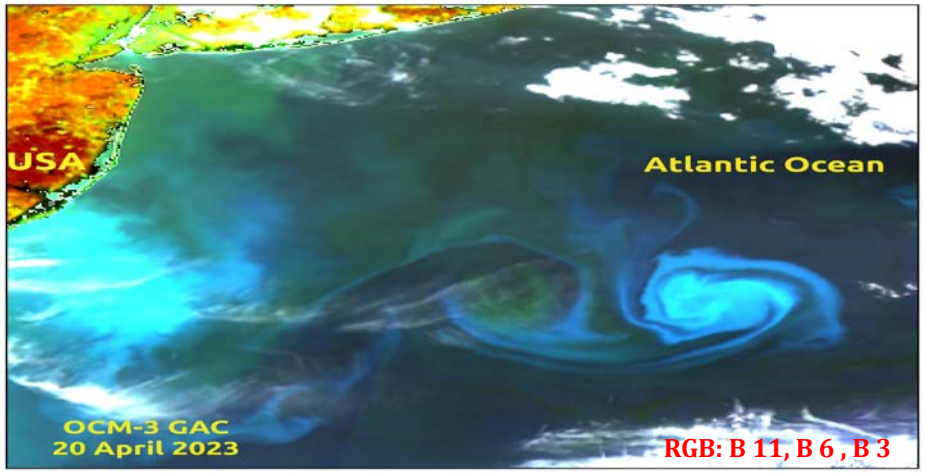
Phytoplankton Blooms: Eos-06 OCM

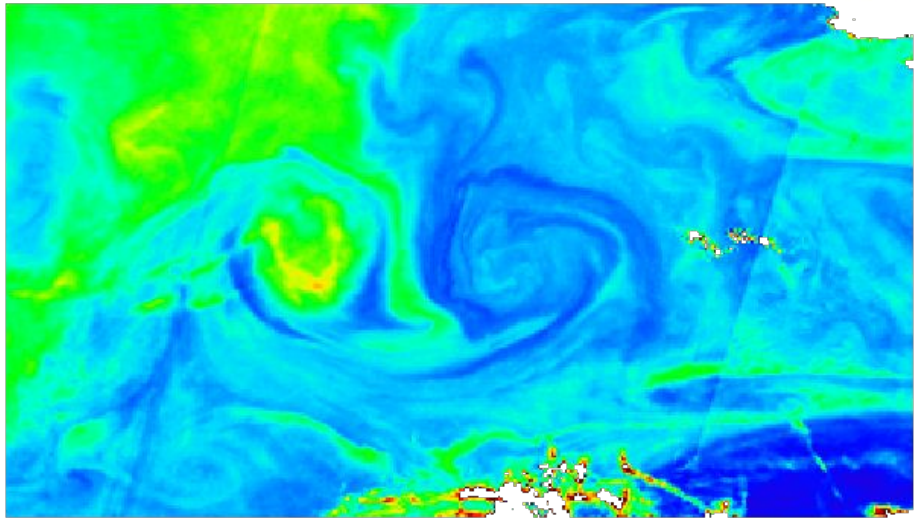




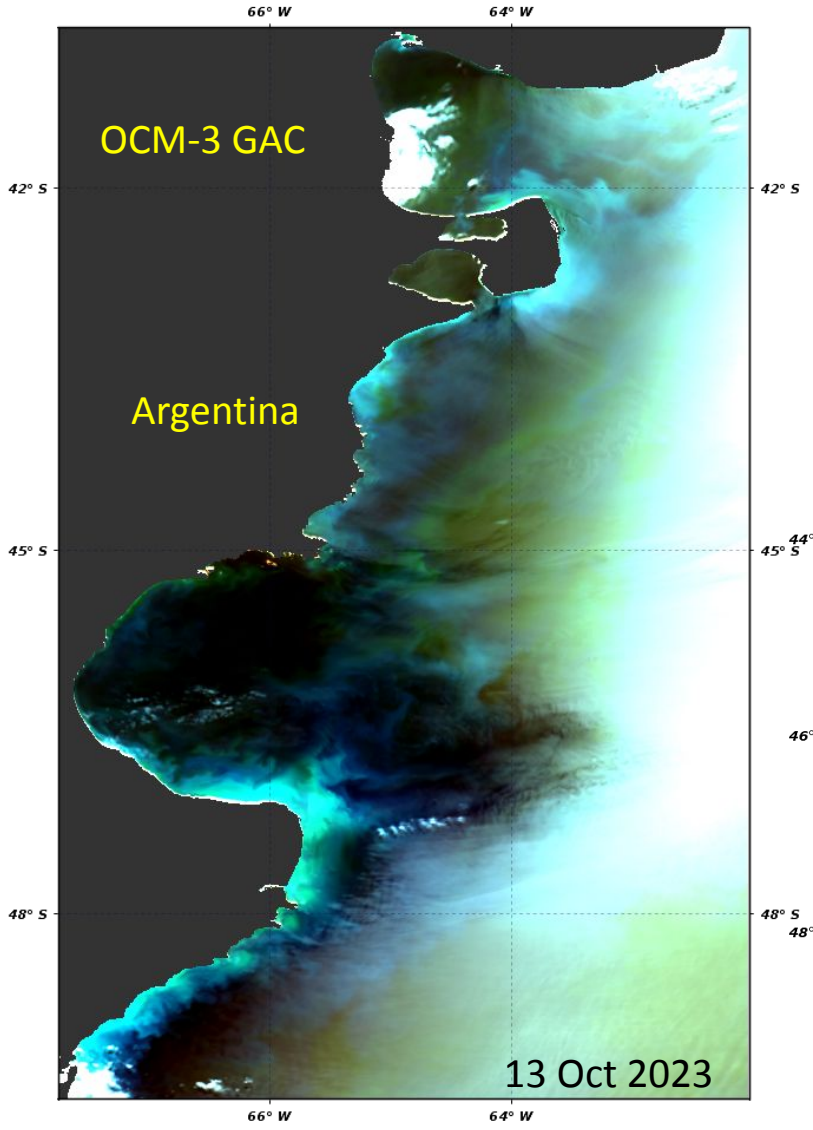
Evolution of Phytoplankton Bloom off the US East Coast



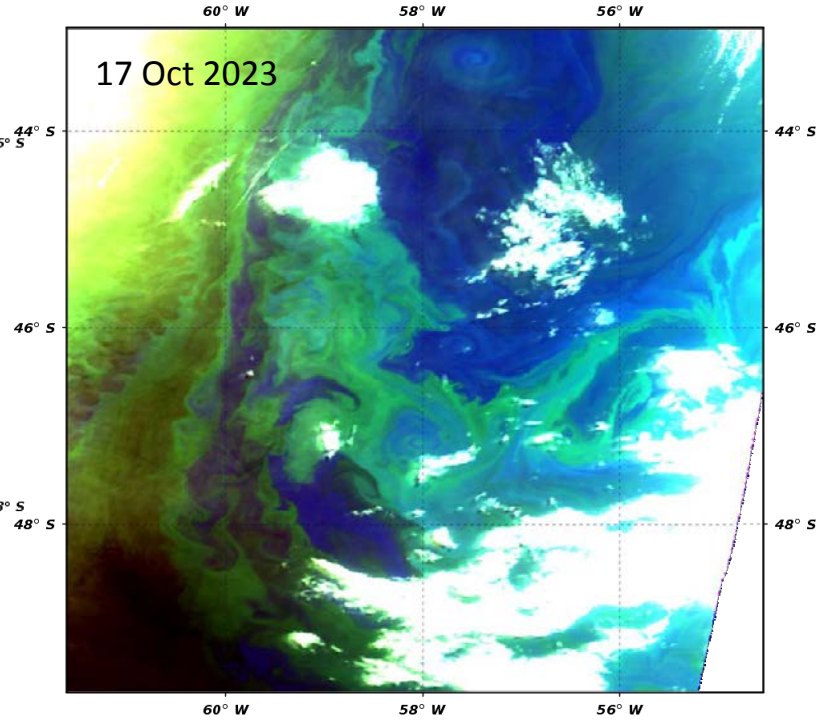


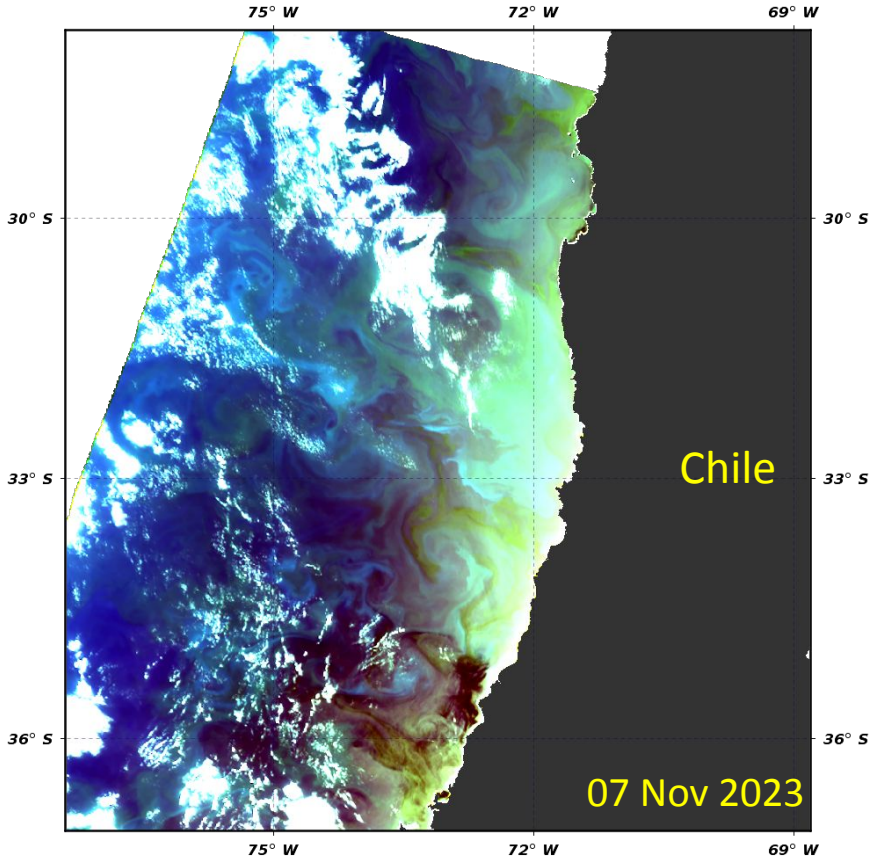


Phytoplankton Blooms & Services: Global

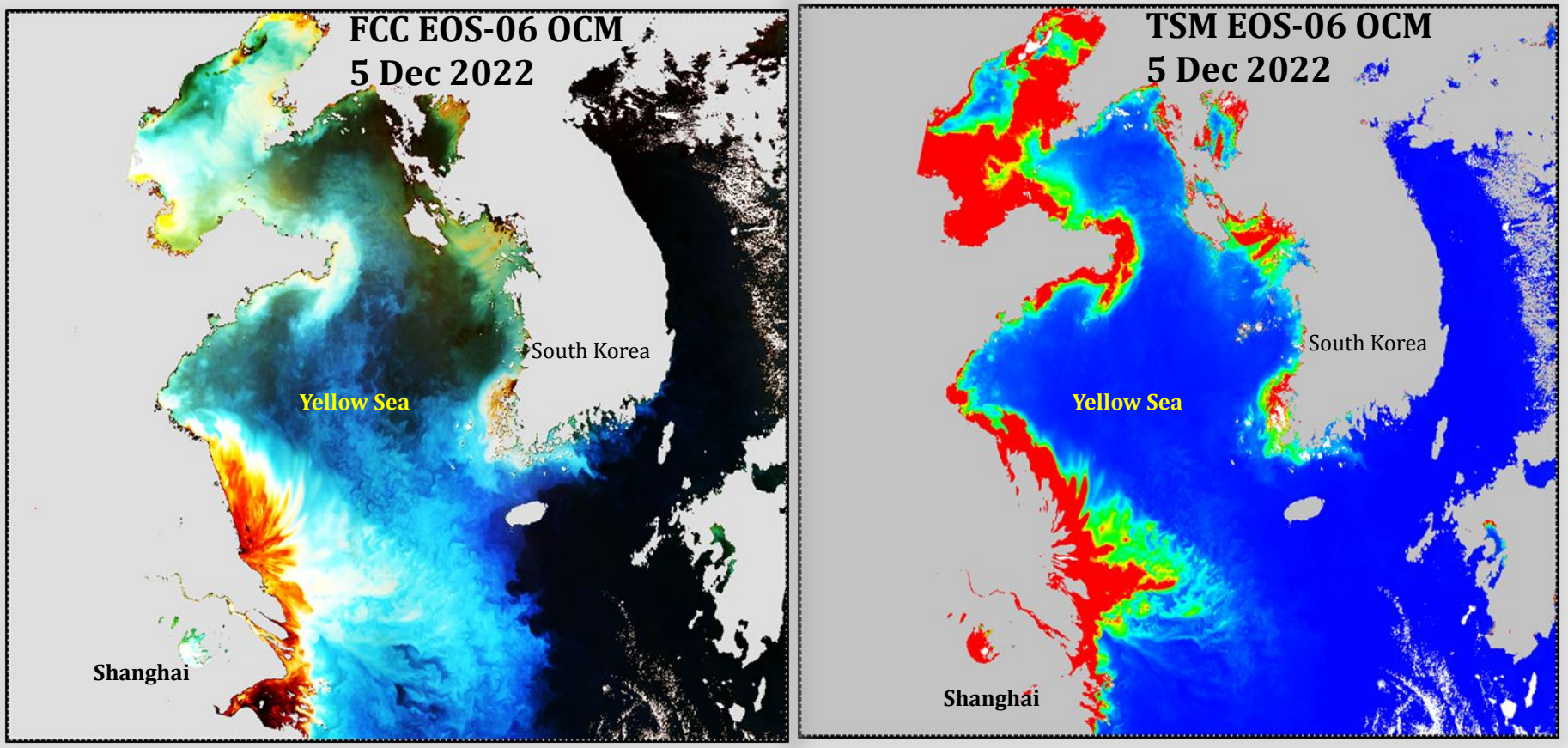


Recent Phytoplankton Bloom off the coast of Argentina and Chile

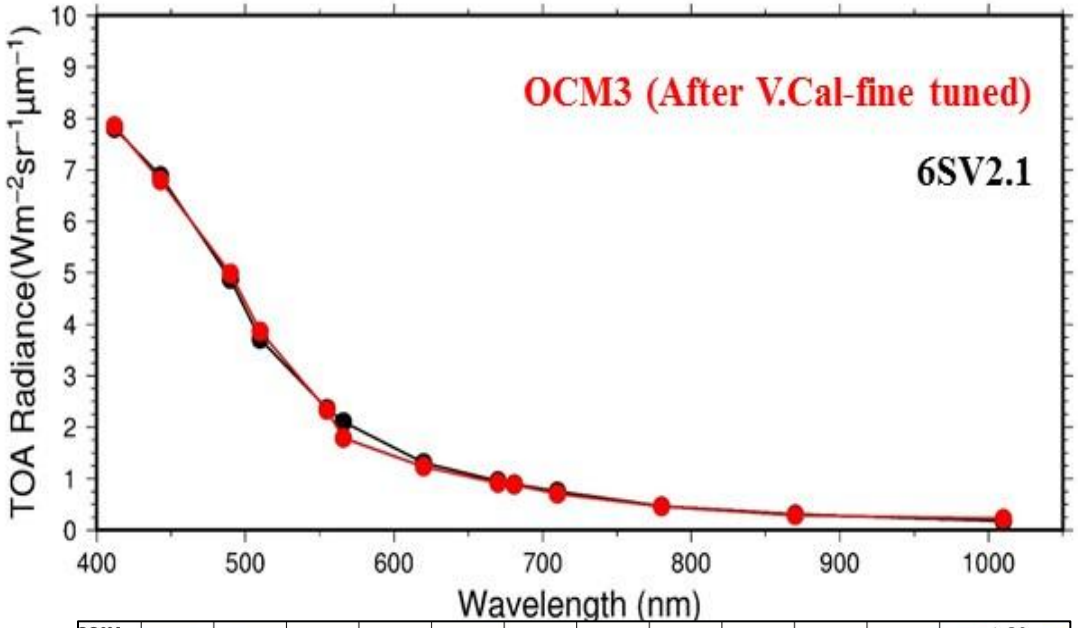


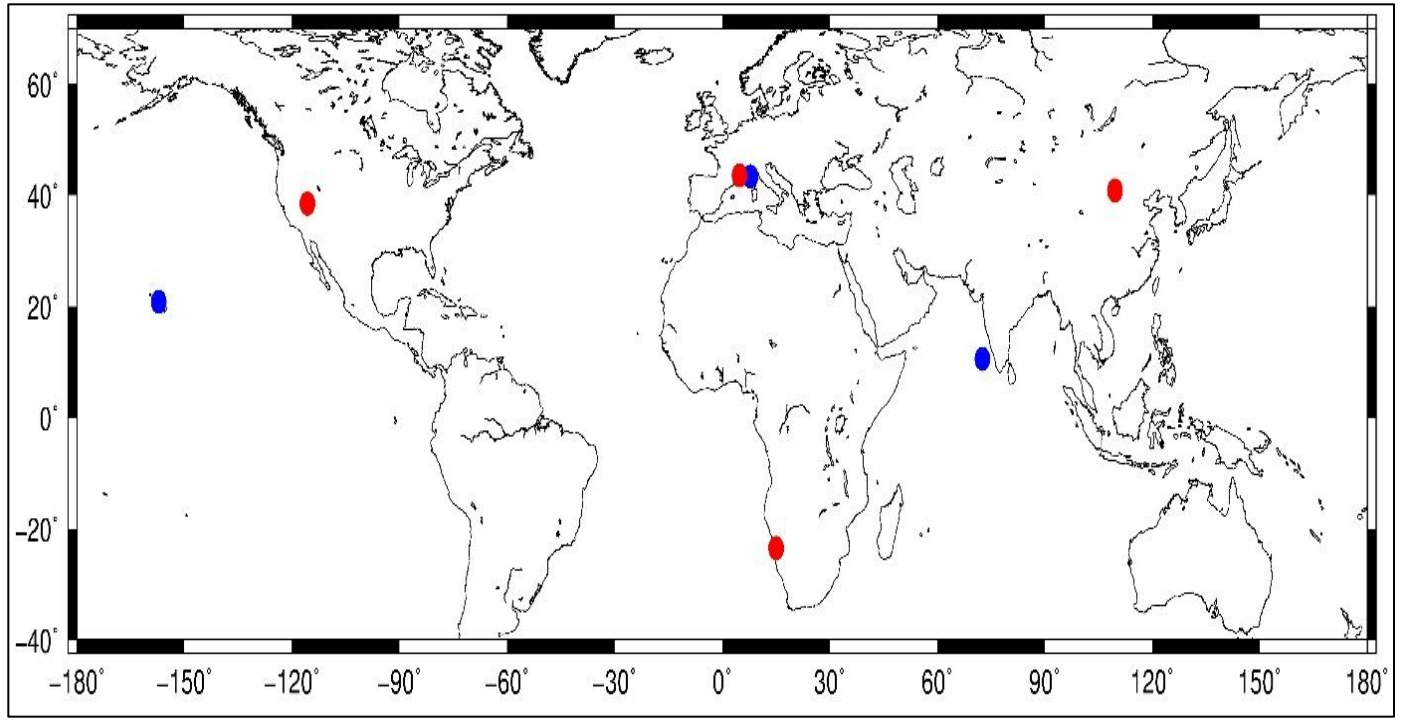


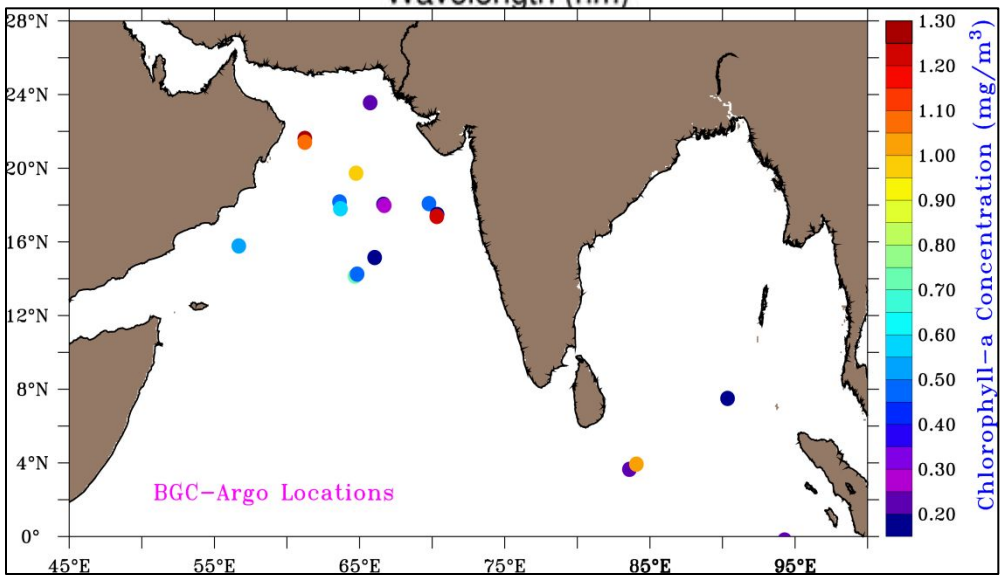
Sediment Plume Dynamics by EOS-06 OCM



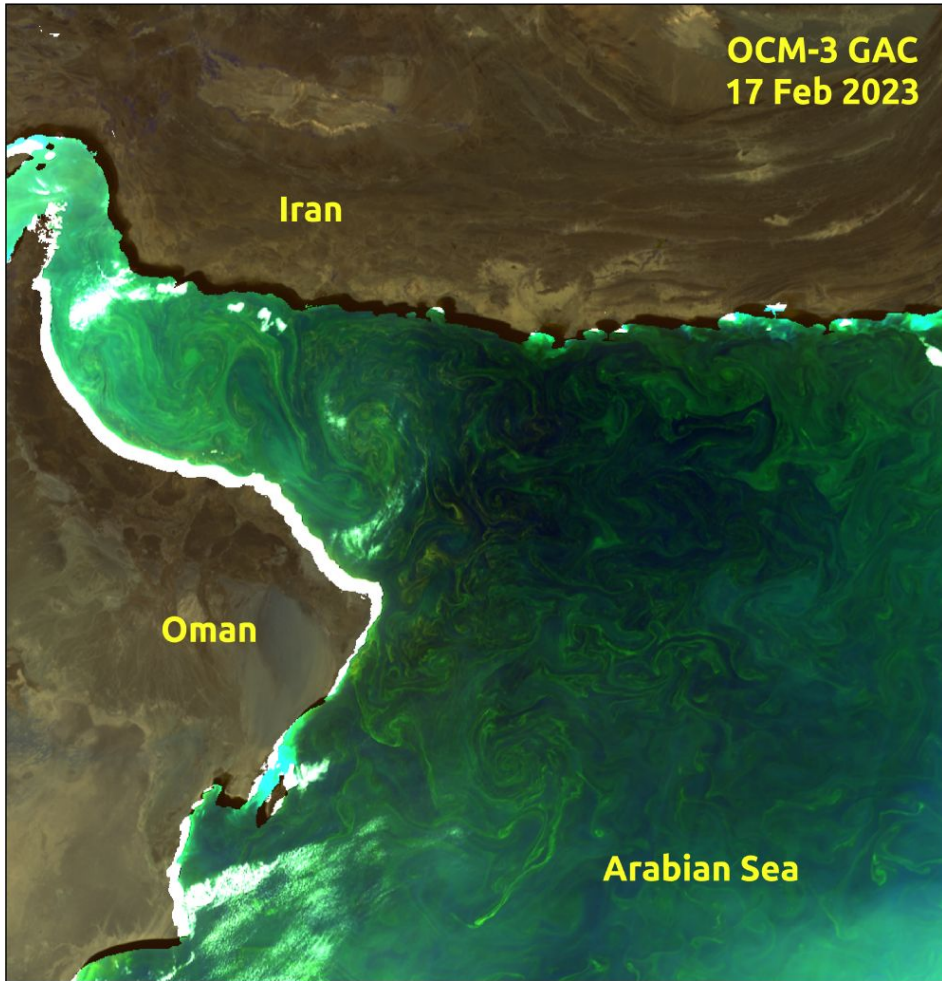
Validation Program: Overview





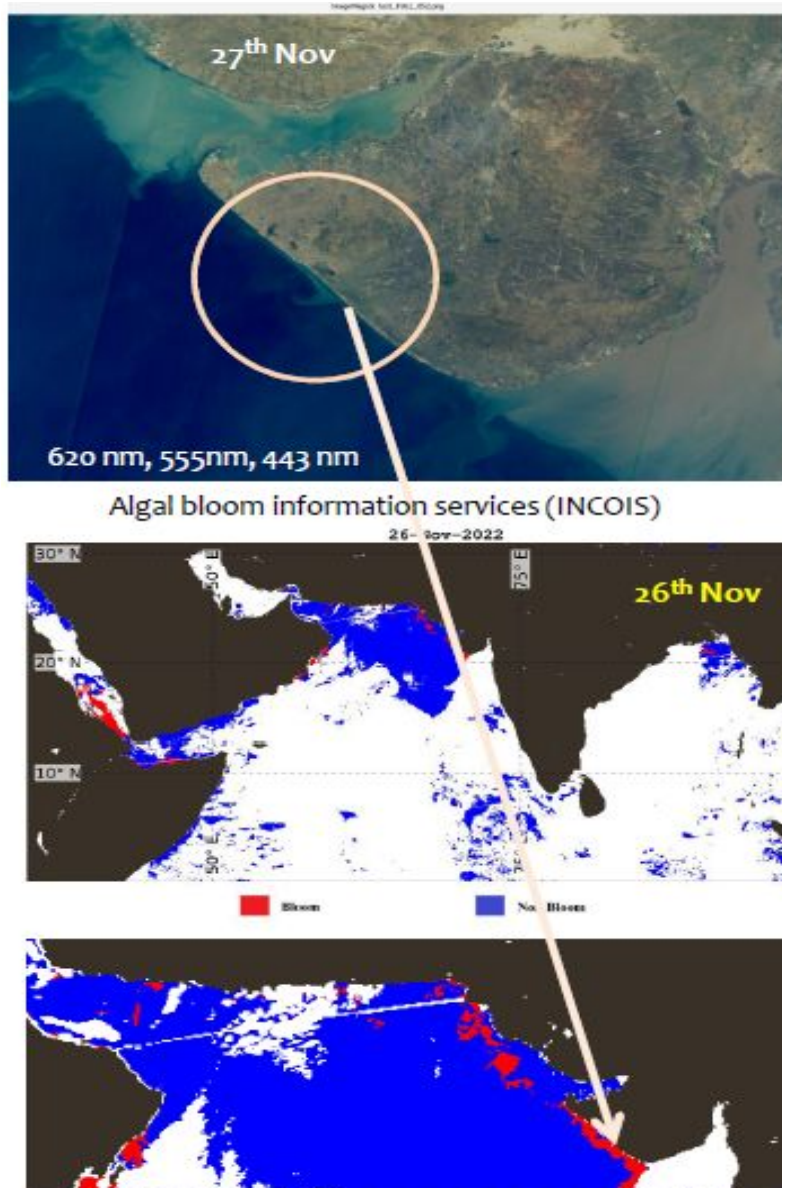


Phytoplankton Blooms & Services: NIO

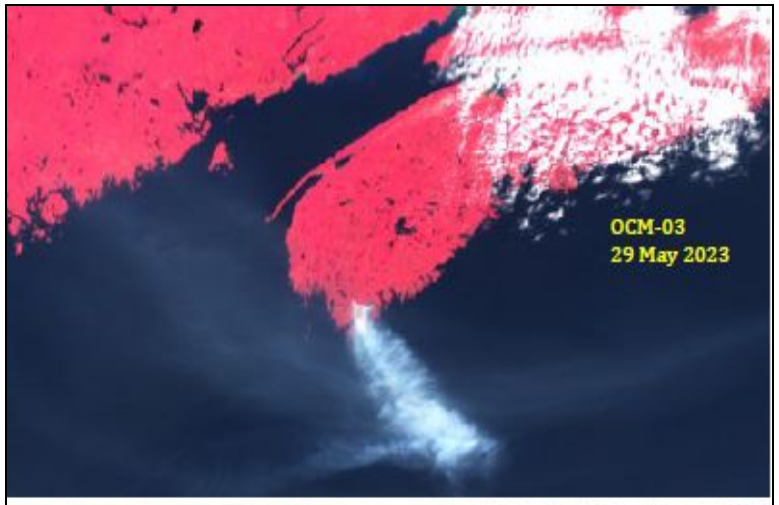


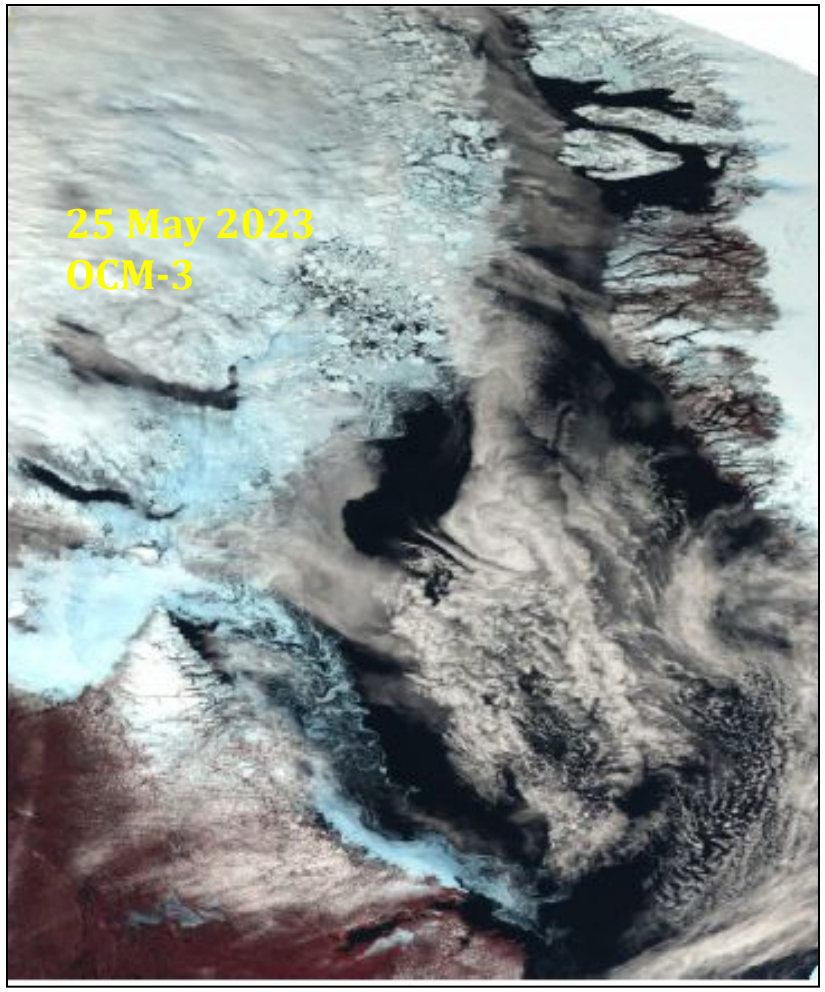
Noctiluca Scintillans bloom: Arabian Sea

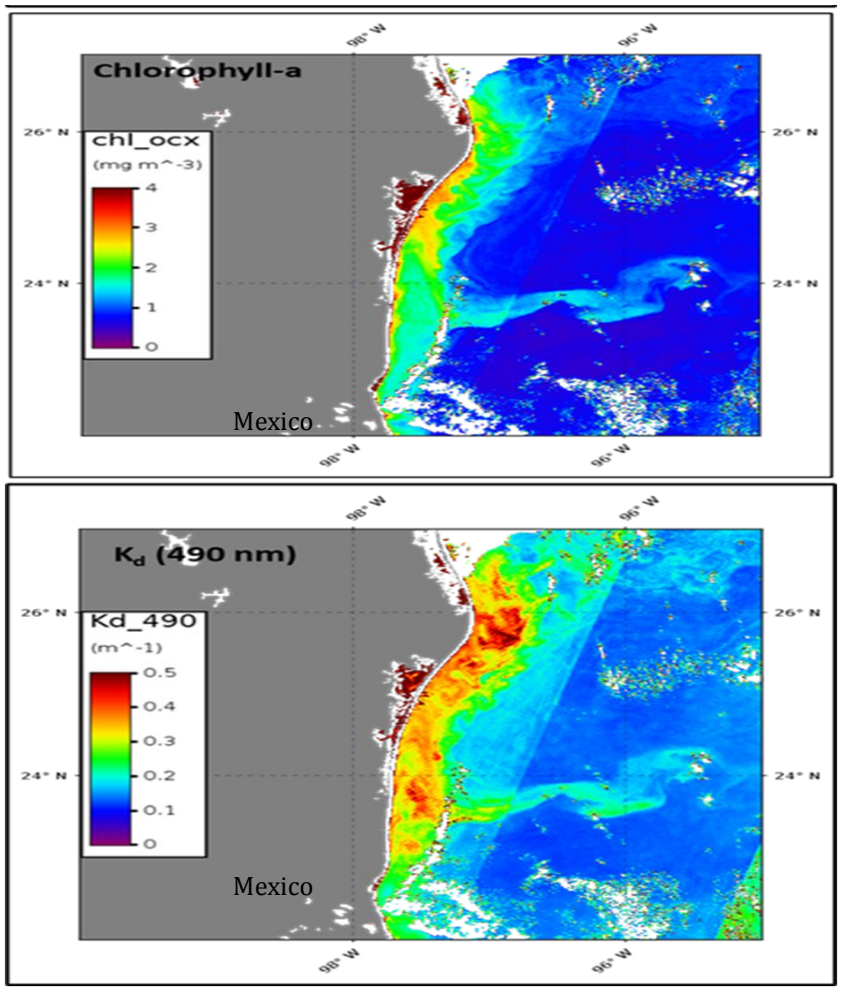
Patch of Algal Bloom is identified from OCM3 corresponding to Algal Bloom Advisory by INCOIS



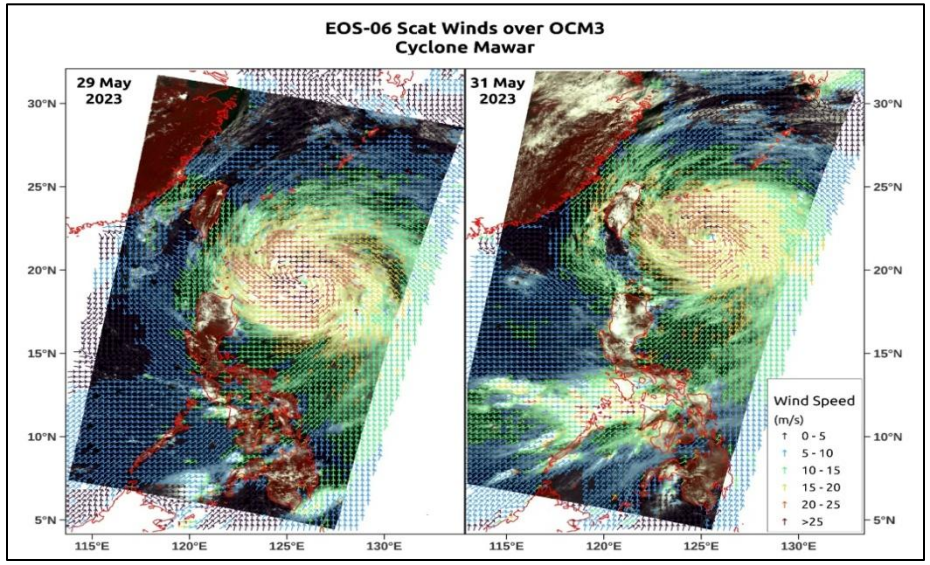
Extended Applications of EOS-06 OCM

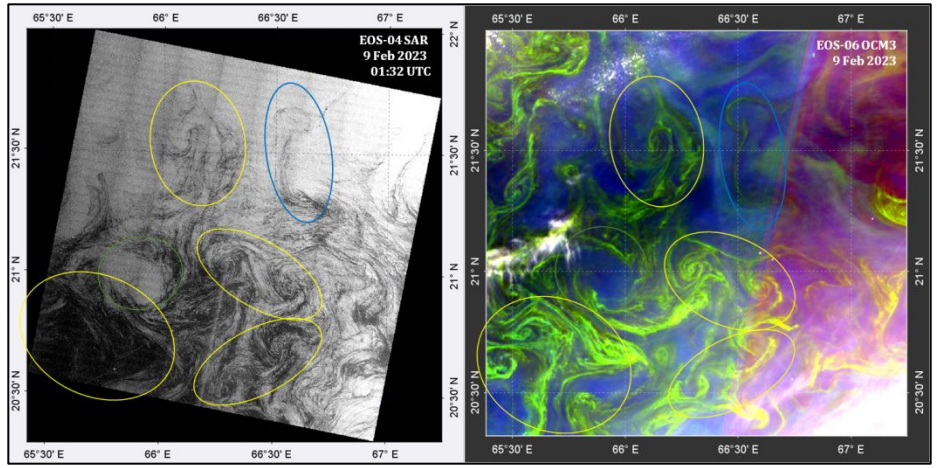


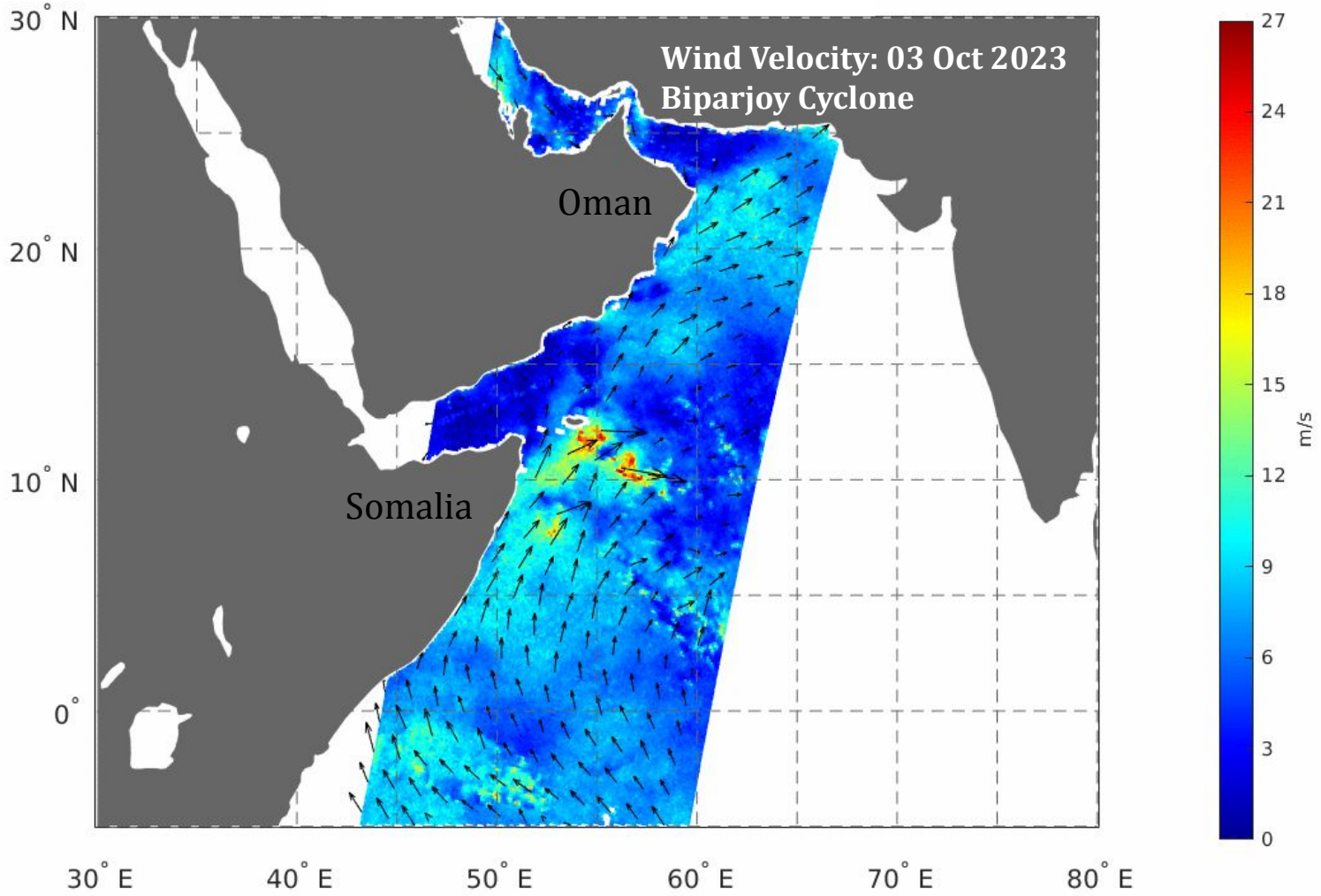




Specific Applications of EOS-06: OCM & Scat







Ocean Surface Winds from ScatterometerEOS-06

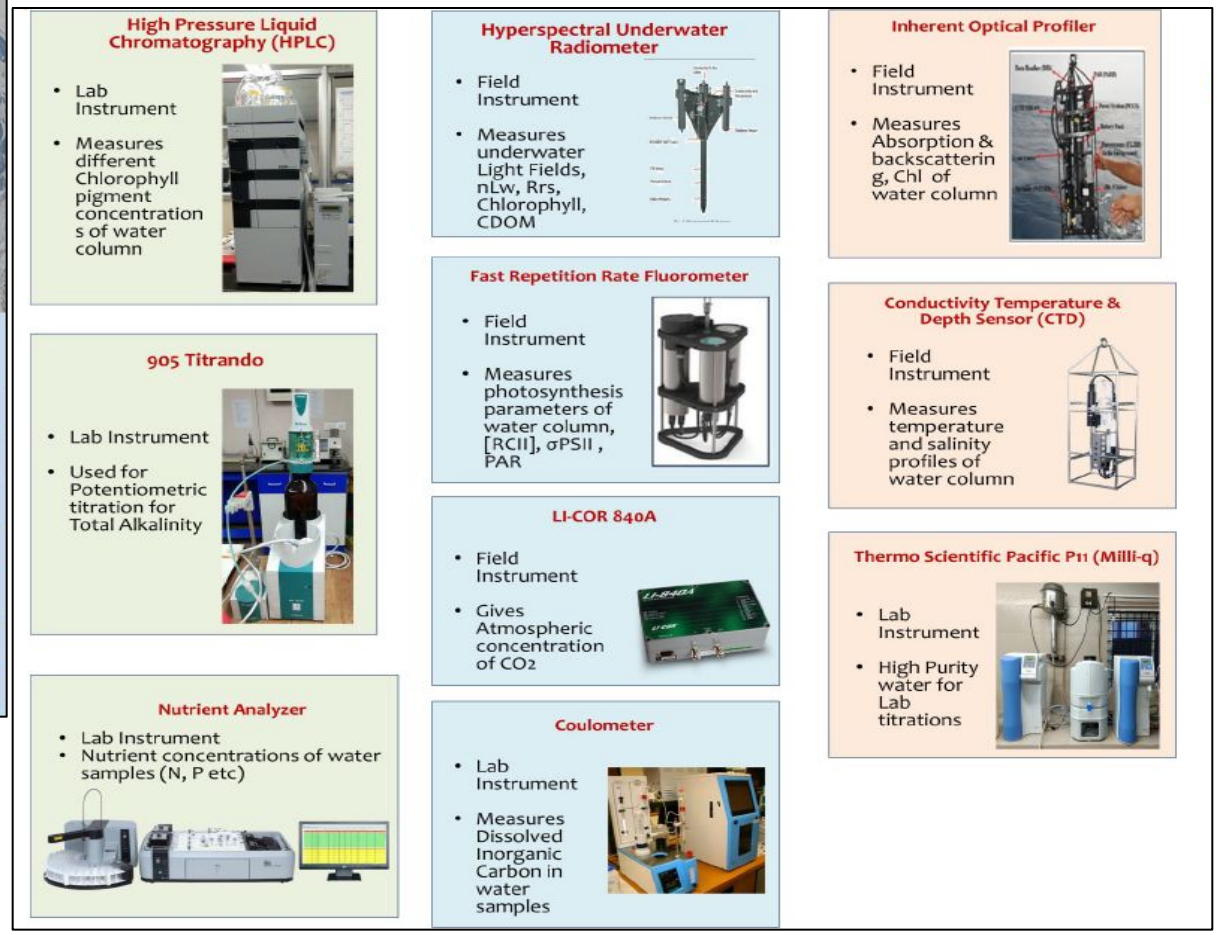
Operational Applications :

- Cyclone Forecasting
- Ship Routing
- Shoreline Management Studies
- Harbor and port management
- Oil spill management
- Search and rescue
- Ship Detection in coastal waters
- Pollution Dispersion studies

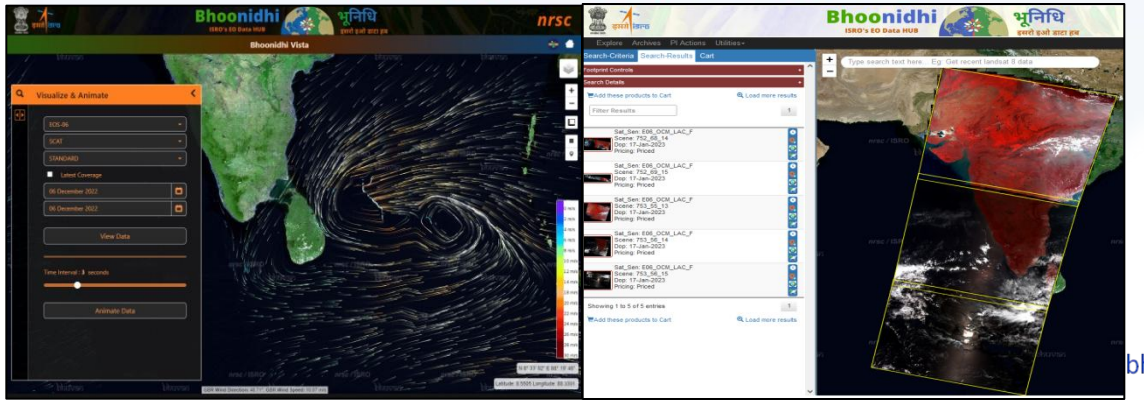
Scientific Studies:

- Designated as ECV- Climate studies of ocean circulation variability, Heat Transport etc.,
- Wind-Wave-Current Interaction studies
- Understanding Coastal Ocean circulation
- Air-Sea interaction studies
- PFZ Forecast studies

Infrastructure & Outreach



Bhoonidhi: ISRO Earth Observation Data Hub



EOS-06 – LAC, GAC , SCAT-3

Bhoonidhi

Browse & Order

Search, View and Download ,

FREE&OPEN

Paid CART Interface

PRICED

Proforma (PI) ,

Place work order

https.. SFTP..

bhoonidhi.nrsc.gov.in/bhoonidhi/index.html

EOS-06 -. GAC,LAC,SCAT-3

VISTA

Visualize at Full Resolution

Visualize the NRT daily acquired data and temporal cycle based mosaic,

Quick animation of a point AOI

For Online Analysis

bhoonidhi.nrsc.gov.in/vista/index.html

UPAGRAH

Orbit Viewer

Orbit Viewer - Live satellite/orbit tracking

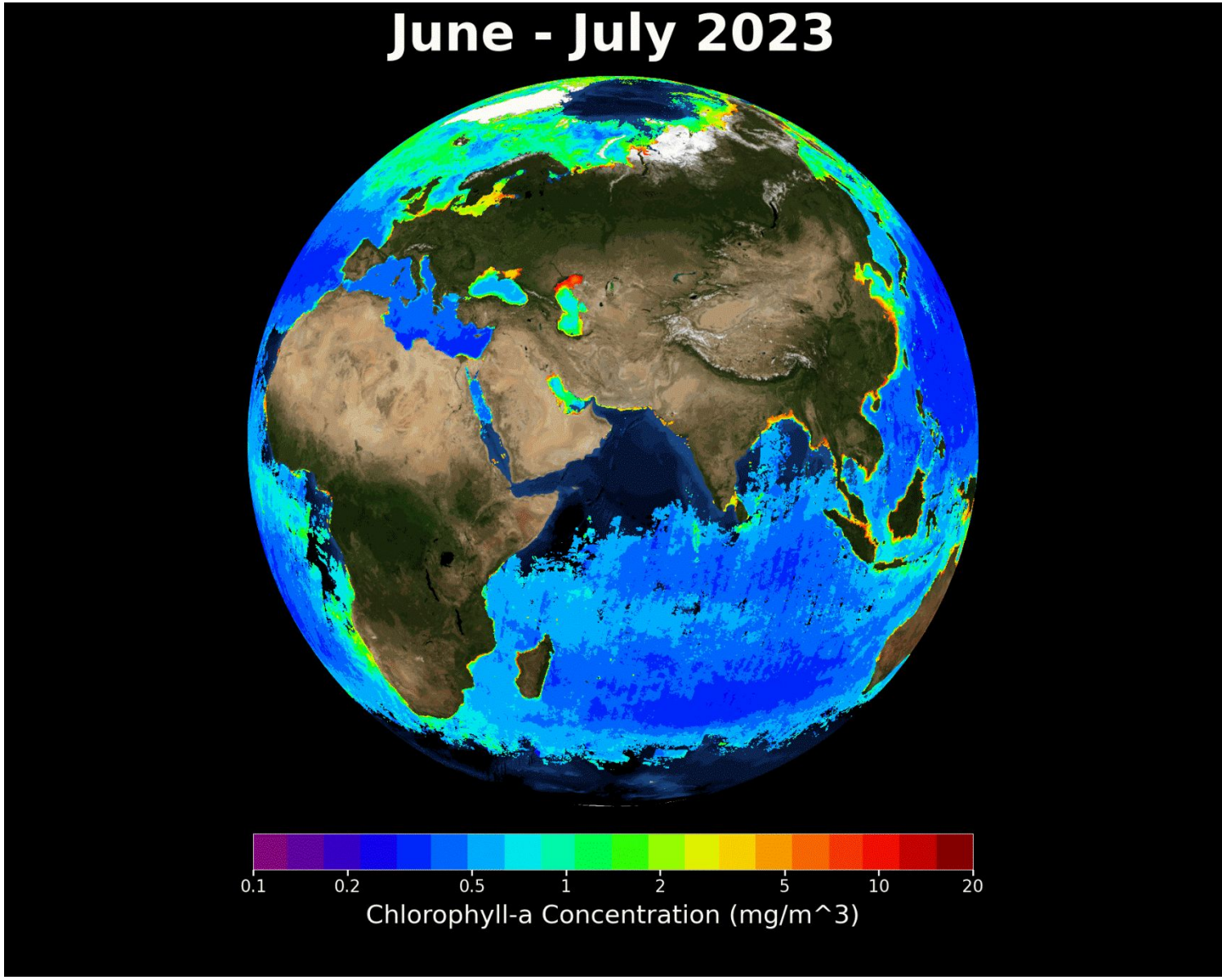
Quick View of all satellites at predicted UTC time.

For Online Analysis

bhoonidhi.nrsc.gov.in/upagrah

Way Forward...

- Continuation of Cal-Val activities from the global in-situ sites, Bio-Argos and cruises
- Oceansat-3A as the continuity mission for EOS-06
- Availability of Advanced R&D and Evaluation Products for the global ocean
- Usage of real time winds for Atm.correction
- Assimilation of Ocean Color Products into Ocean Biogeochemical Model



Thank you!