Integrating satellite-data products across the land-sea interface to track land-based pollution and sediment distribution in collaboration with CEOS COAST

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CEOS
Committee on Earth Observation Satellites

GEO BLUE PLANET

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COOPERATIVE INSTITUTE FOR SATELLITE EARTH SYSTEM STUDIES

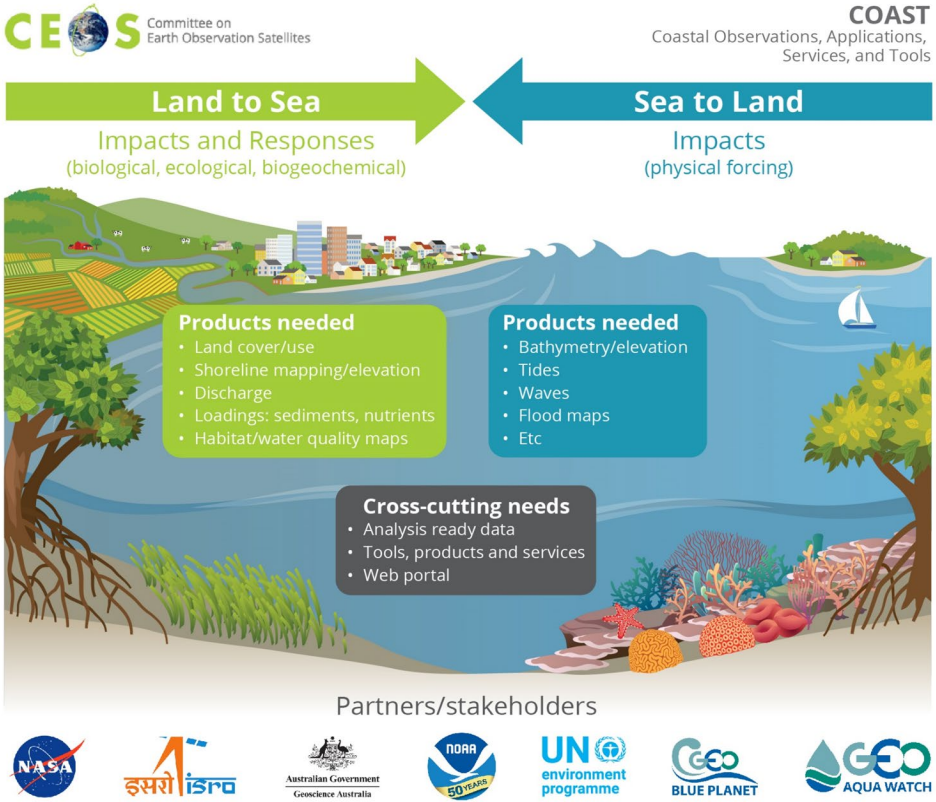
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

UNIVERSITY OF MARYLAND
18 56

CEOS Coastal Observations, Applications, Services & Tools (COAST) Ad Hoc Team

Themes:

- Shoreline mapping
- Bathymetry/
- Flooding
- Turbidity & Sediment Loading
- Coastal Eutrophication

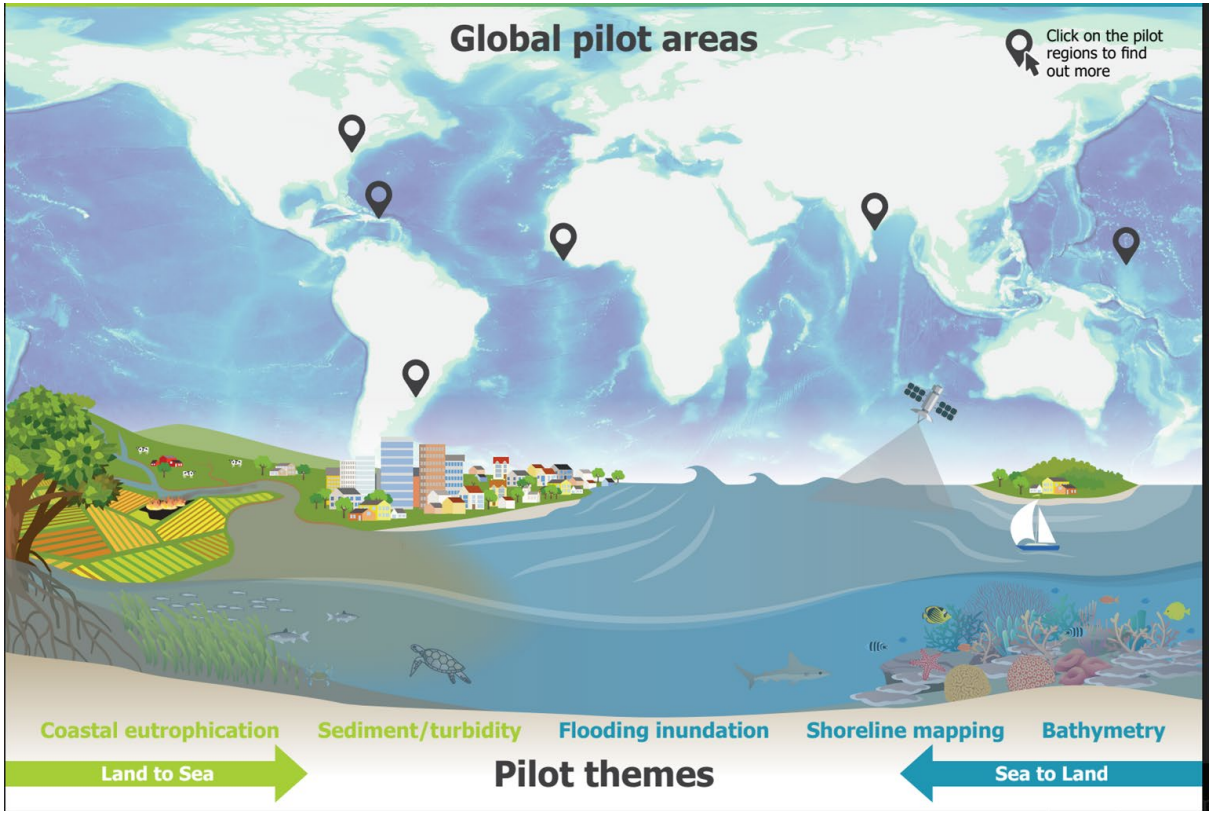


Product Co-Development Pilot Locations

Initial COAST Pilot Locations

Continental:
Chesapeake Bay (USA)
Odisha/Bay of Bengal
West Coast of Africa
Rio de la Plata region (Latin America)

Small Island Nations:
Caribbean: USVI
Pacific: Marshall Islands



Coastal Eutrophication and Sediment Products

CEOS
Committee on
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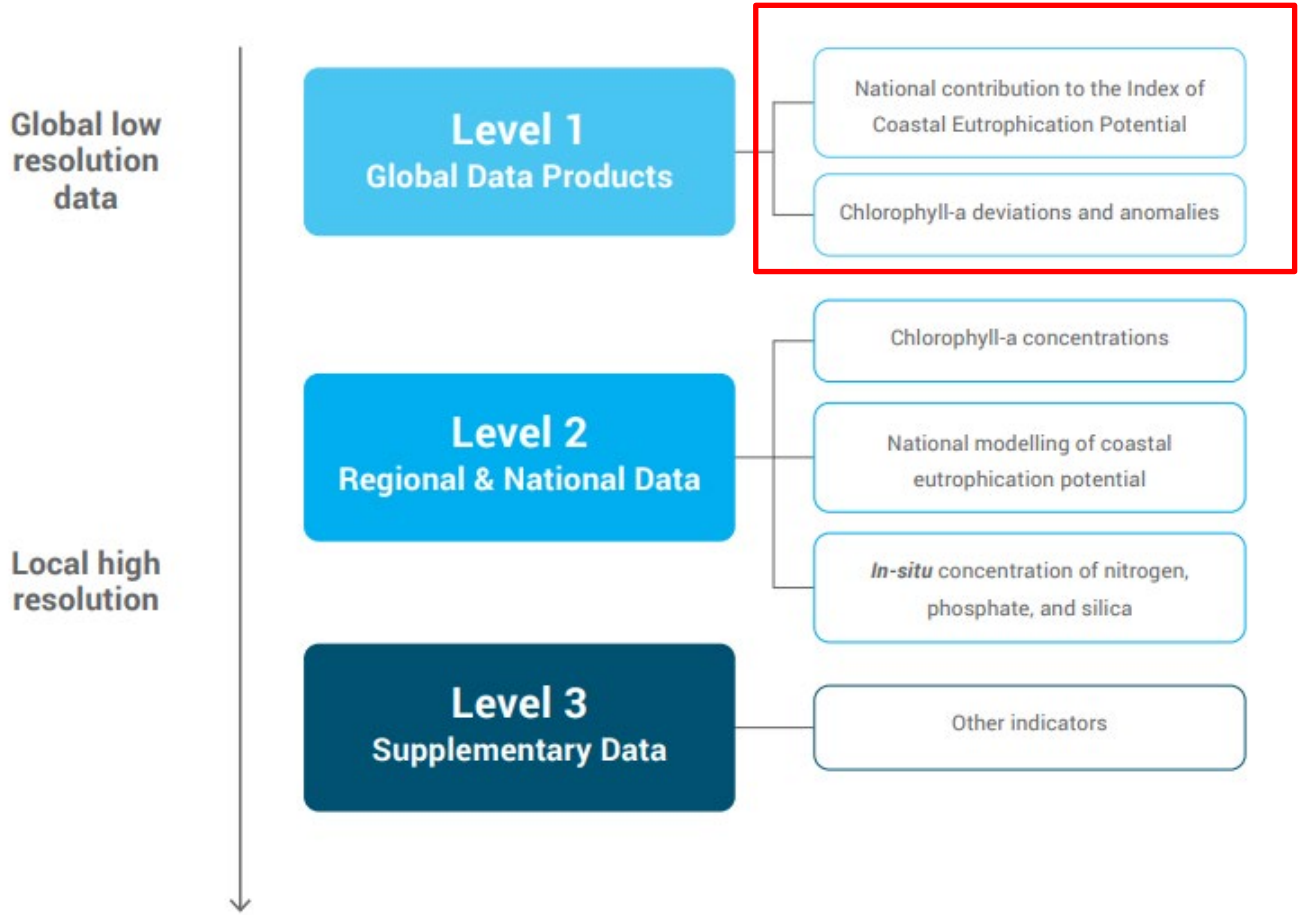
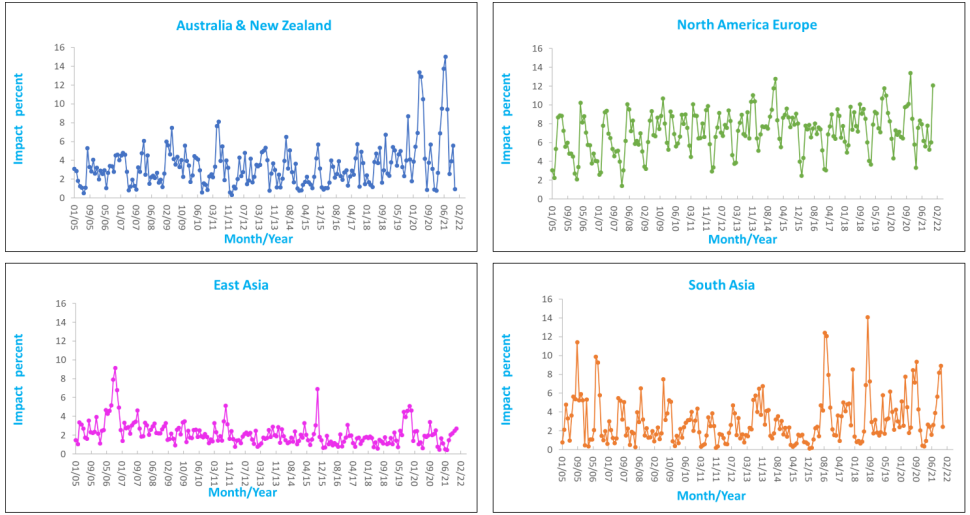
Partner Work: Coastal Eutrophication Product

- Countries found to lack adequate in situ data for reporting
- Developing global satellite indicators in collaboration with GEO Blue Planet and regional satellite indicators with CEOS agencies

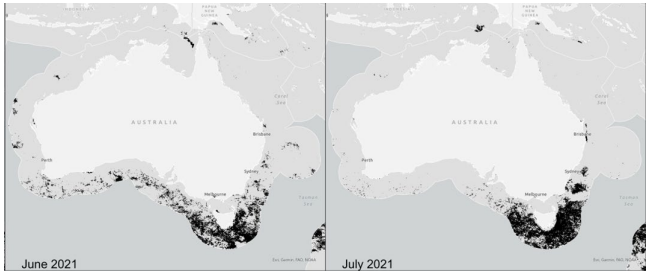

Global low resolution data
Local high resolution
Level 1
Global Data Products
National contribution to the Index of Coastal Eutrophication Potential
Chlorophyll-a deviations and anomalies
Level 2
Regional & National Data
Chlorophyll-a concentrations
National modelling of coastal eutrophication potential
In-situ concentration of nitrogen, phosphate, and silica
Level 3
Supplementary Data
Other indicators

Level 1: Global indicators

Regional EEZ Chlorophyll-a Deviation from Baseline (2005 – 2021)



Distribution of Deviating Pixels in the Australian Region for June/July 2021



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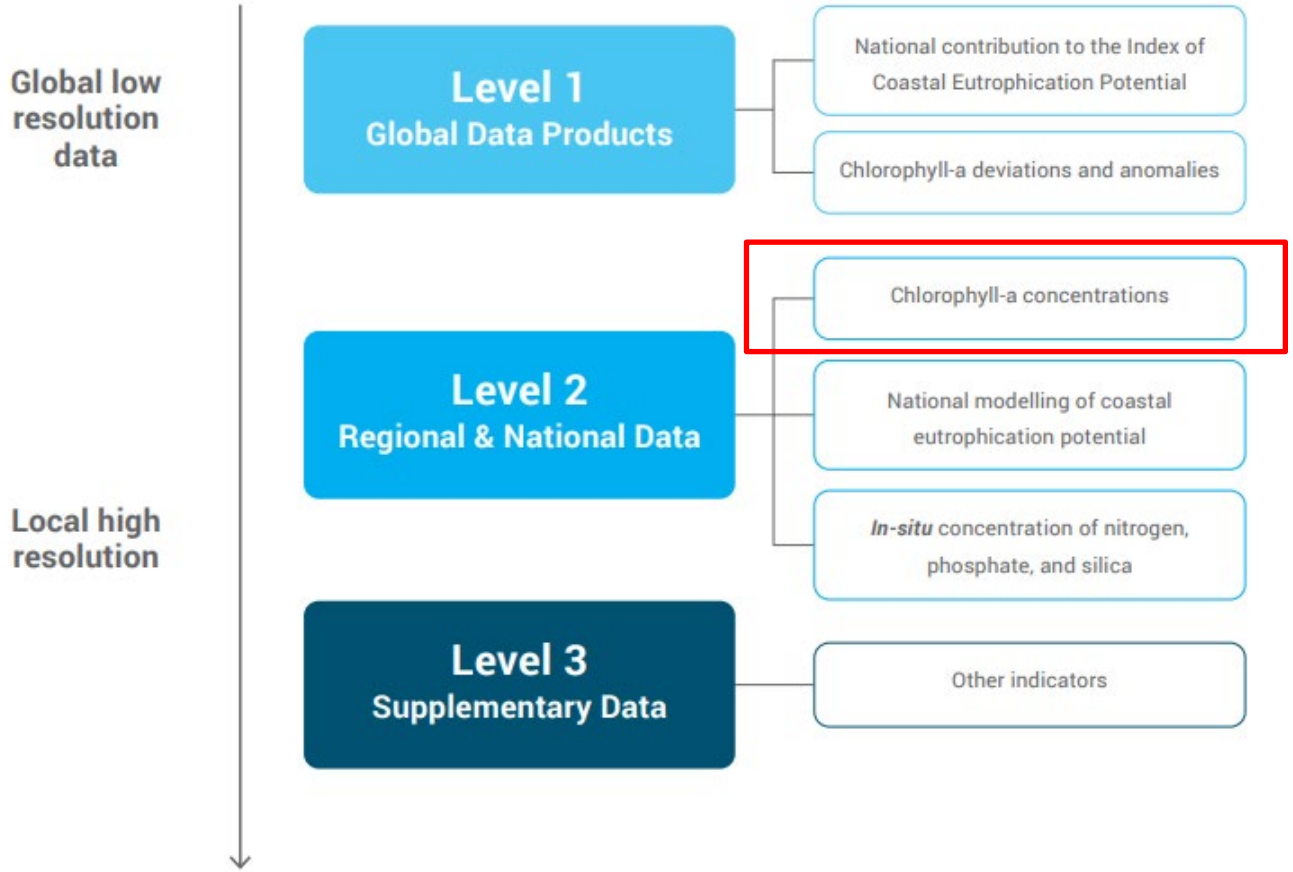
United Nations Environment Programme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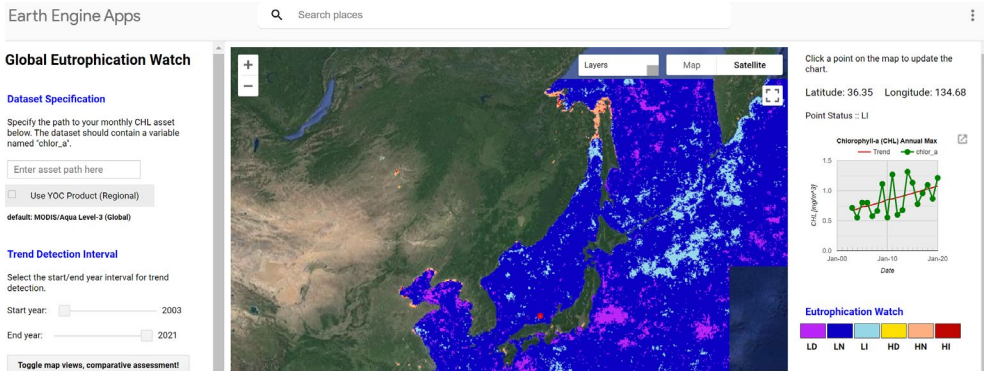
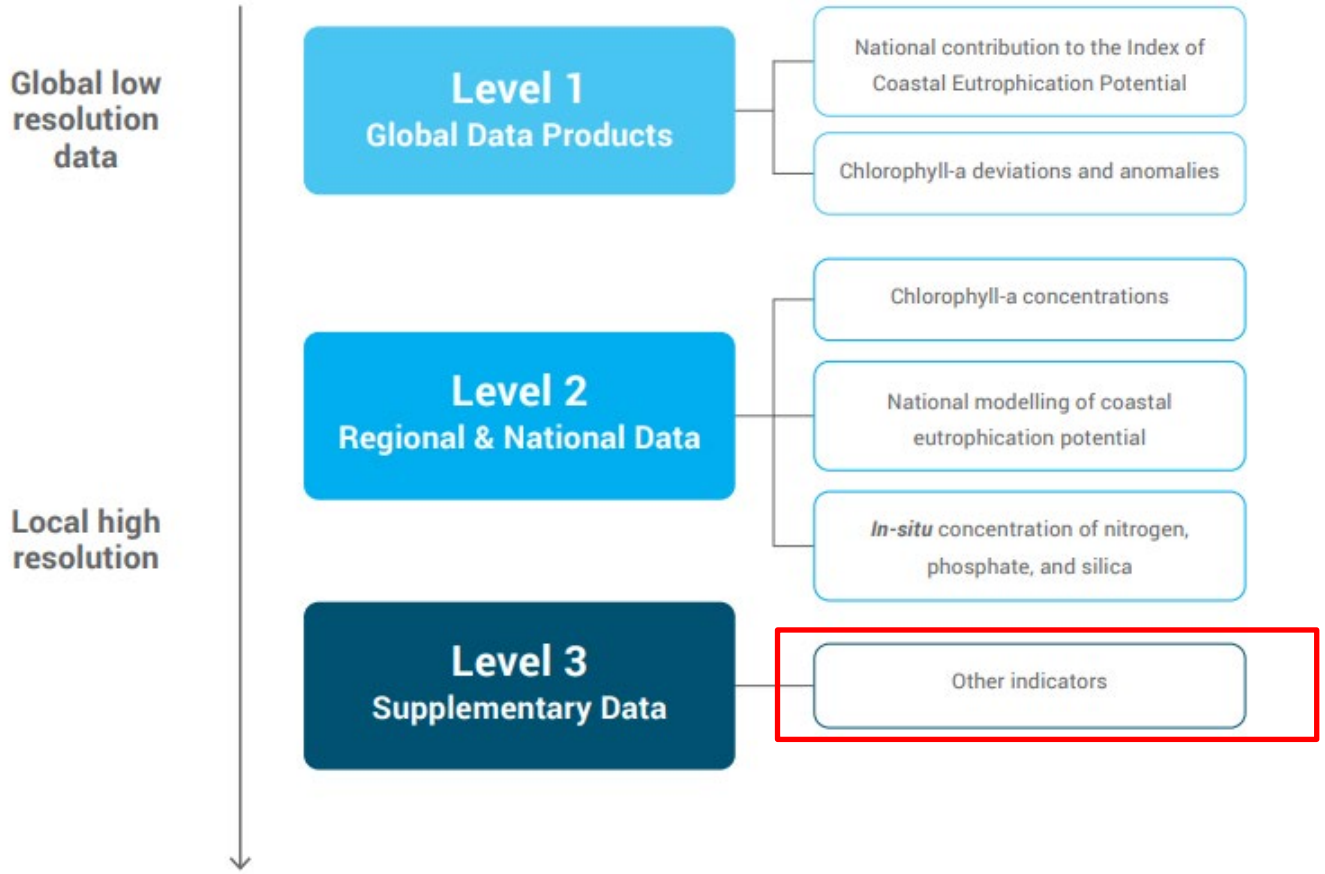
Level 2: Regional/local indicators

- Build capacity at national regional level
- Engage with NOWPAP regional seas convention Google Earth Engine Tool
- ISRO on Bay of Bengal

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Level 3: Supplementary Indicators

Integrate data from inland water SDG water quality indicator, land use, agriculture and hydrology data

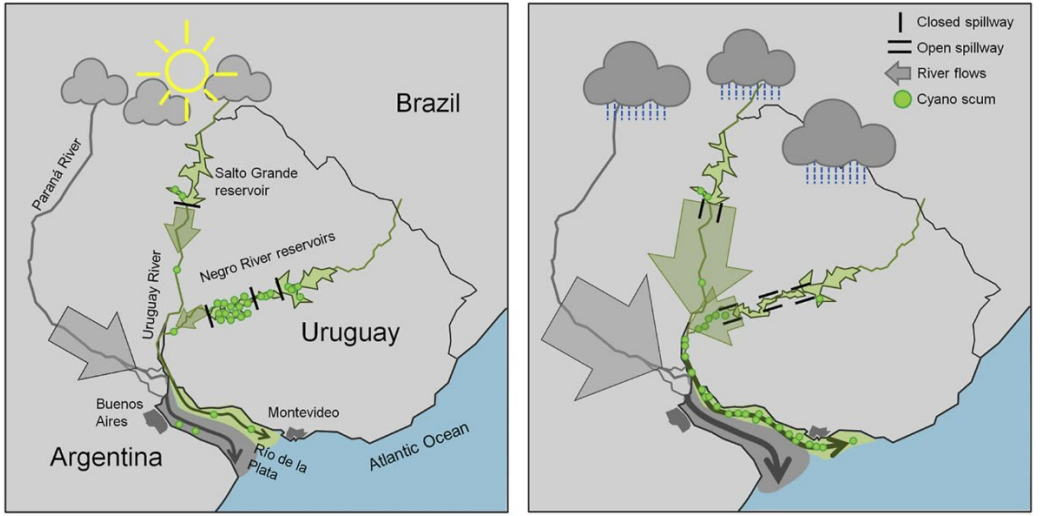


Image source: https://freshwaterecology.wordpress.com/2020/05/25/assessing-the-origin-of-a-massive-cyanobacterial-bloom-in-the-rio-de-la-plata-2019-towards-an-early-warning-system/

Turbidity & Sediment Products:

- **Related parameters-TSS, Turbidity, TSM, Secchi Disk, Kd(490)**
- Strong connection to land-suspended particles can come from soil erosion, runoff, discharges. (runoff and hydrodynamic modeling)
- Resuspension of bottom sediments or algal blooms.
- Impact light, productivity, dissolved oxygen. Carry nutrients, pollutants and pathogens
- Threat to coral reef health, shellfish
- Possible climate change influence
- Might have different temporal and spatial resolution

Judi Hewitt, NIWA, Hamilton, NZ.

Natural Resources Conservation Service — New Mexico, U.S. Department of Agriculture/Wikimedia Commons/Public Domain

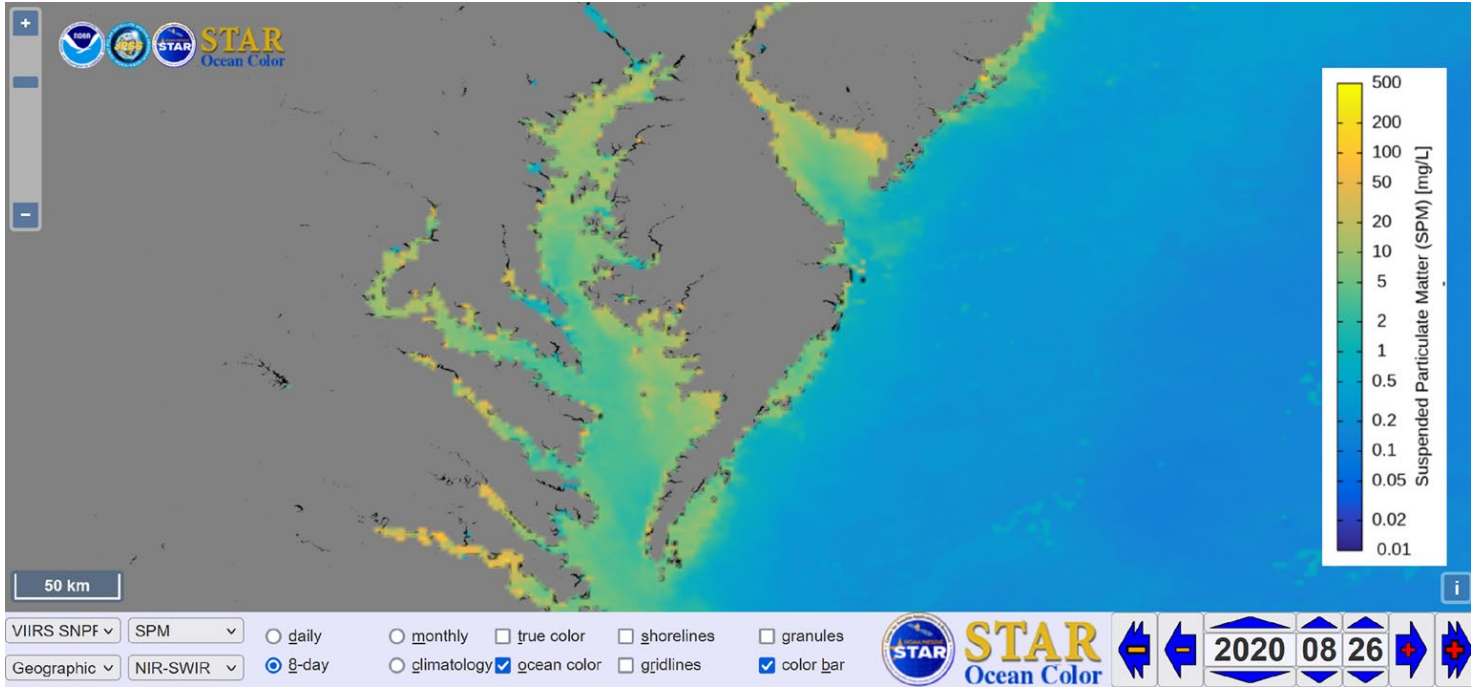
Photograph: STR/AFP/Getty Images

Turbidity & Sediment Products: Available to CEOS COAST

NOAA STAR Suspended Particulate Matter (SPM) - daily, 8-day, monthly product

Blended images from VIIRS and OLCI-S3A (Ocean and Land Colour Instrument)

https://www.star.nesdis.noaa.gov/socd/mecb/color/ocview/

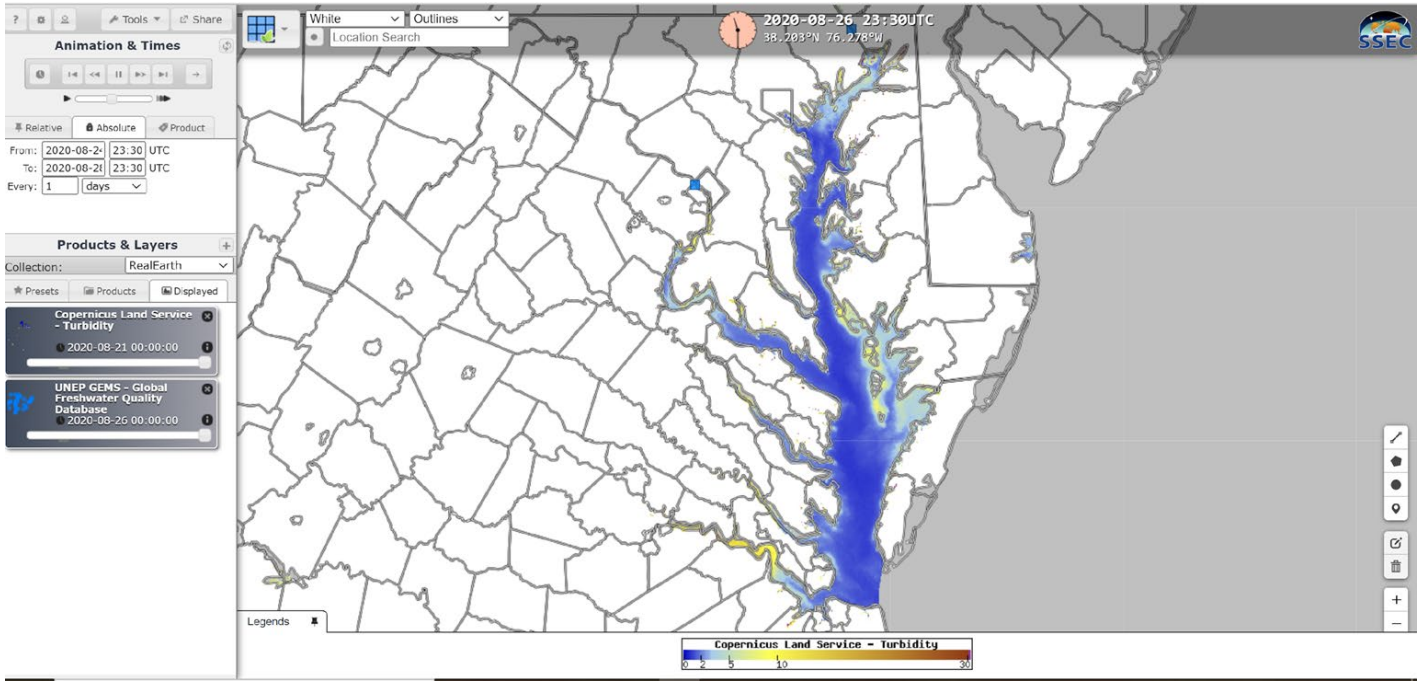


Turbidity and Sediments Products: Available to CEOS COAST

European Space Agency: Copernicus Global Land Service

10-day Turbidity Product from Sentinel-2 MultiSpectral Instrument (MSI)

Access via University of Wisconsin RealEarth Portal https://realearth.ssec.wisc.edu/



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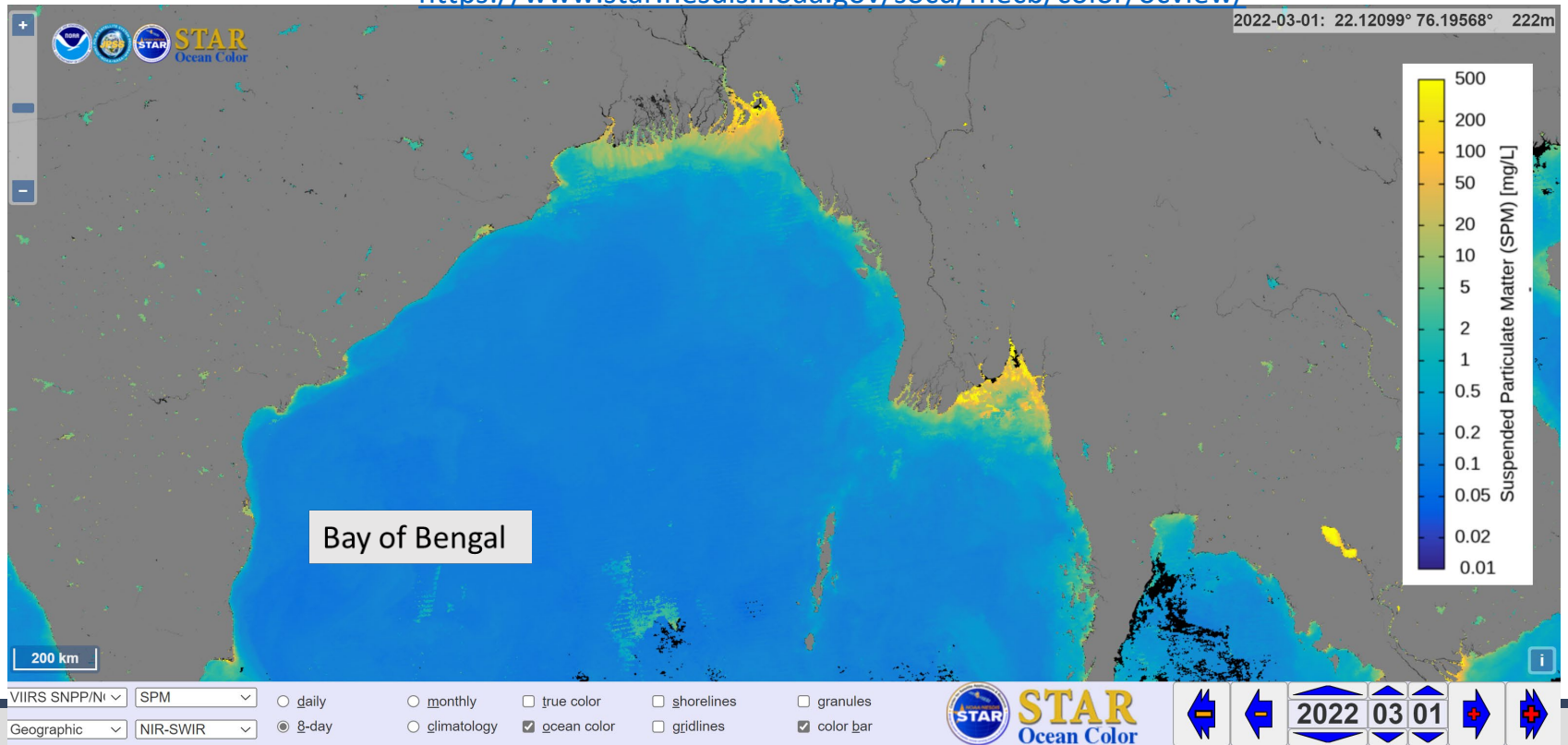
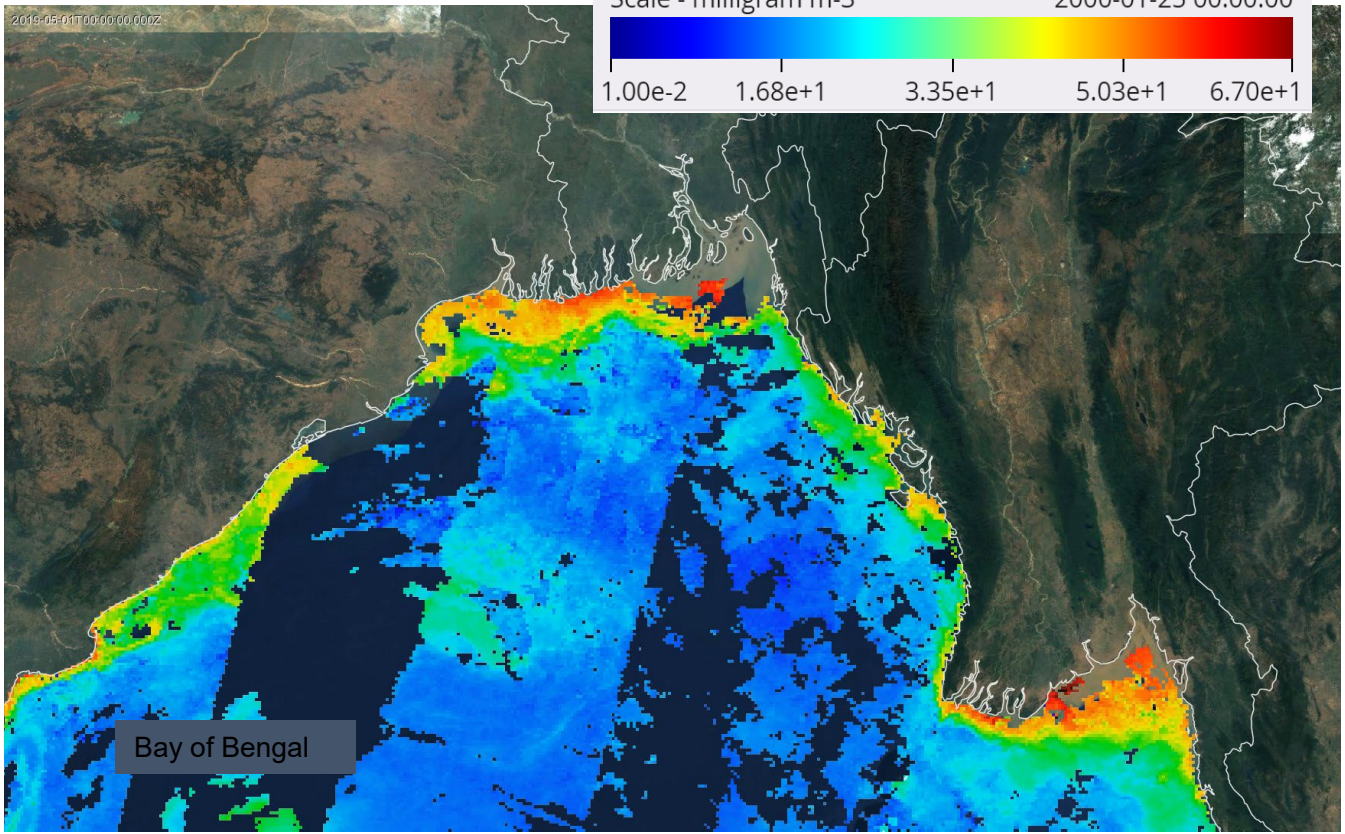


Turbidity and Sediments Products: Available to CEOS COAST

Climate Change Initiative (CCI) Ocean Color Chlorophyll Conc. V.5 (8-day composite)



Turbidity and Sediments Products: Available to CEOS COAST

- Next steps in turbidity products
  - A collaborative project between GEO AquaWatch, the World Bank, Conservation International, UNESCO and Google Earth Engine (GEE) to provide fit-for-purpose water quality information for inland and coastal waters
  - Enable processing turbidity data on the cloud in real time through GEE
  - Expected later this summer