How can Ocean Color help Marine Managers?

• The color of coastal waters can tell us much about water quality

• Satellite Ocean Color Data is a good source of water quality information

• Of the many Ocean Color products, two are most commonly used for monitoring water quality:
  • Chlorophyll-a (Chl-a) is the most commonly used parameter for monitoring phytoplankton biomass and nutrient status (i.e. productivity), as an index of water quality.

  • $K_d(490)$ is the diffuse attenuation coefficient at 490nm (or light blue in the visible spectrum) and is a good measure of the total organic and inorganic matter held in solution and suspension (i.e. turbidity) within the water column.

E. Caribbean Overview: Red box: 12-22 °N, 60-70 °W

Climatology = Average of all Monthly means from Jan 2012 to Aug 2015
(Our definition of “normal” expected levels)

Point A – 10km x 10km
Guánica Virtual Station
Used for Puerto Rico Climatology
17.92347 °N, 66.90108 °W
VIIRS Target Site (A) – Guánica Watershed outfall area
10km x 10km – Water pixels only
10 Km around Point A (17.92347 °N, 66.90108 °W)

Target Site: Guánica watershed discharge site

3 ½ Year Monthly mean Time-series

Chlorophyll-a
--- Chl-a ---

Depth-integrated attenuation coefficient – $K_d(490)$ ("turbidity")

Date Format (YYYYMM)

Chl-a (mg/m³)

$K_d(490)$ (m⁻¹)

Tropical Storm Cristobal
- -> 5in @ La Parguera

Tropical Storm Bertha

Large Nov Rain event
- ~ 5in @ La Parguera

--- Chl-a (mean: 0.316)

--- $K_d(490)$ (mean: 0.052)
Comparing monthly imagery of $K_d(490)$ and Chl-$\alpha$ against the expected **Normal levels (mean)**

**Aug 2014 Anomaly Images**

**K$_d$(490) anomaly**

**Chl-$\alpha$ anomaly**

**Nov 2014 Anomaly Images**

**K$_d$(490) anomaly**

**Chl-$\alpha$ anomaly**

Red Box (circle) = Target A Guánica Watershed Outfall
Large 10 x 10 degree average in box (12-22 °N, 60-70 °W)

Monthly Mean Time-series

- **Chl-a (mg/m³)**
- **Kd(490) (m⁻¹)**

**Date Format (YYYYMM)**

- **Summer Max**
- **Winter Min**

**Chl-a** (mean: 0.161)

**Kd(490)** (mean: 0.036)
Aug 2014

VIIRS Monthly Anomalies
Expanded Area (August: typically highest levels)

Kd(490) : Aug 2014 minus Climatology

Chl-α: Aug 2014 minus Climatology

Regional View of Anomalies for most of Eastern Caribbean Basin

Reports of Potential Sargassum Invasion: 2014 & 2015

“Climatology” = Expected Normal condition for all months (Jan2012-Aug2015)
Nov 2014

VIIRS Monthly Anomalies
Expanded Area (November: typically average levels)

$K_d(490)$ : Nov 2014 minus Climatology

$\text{Chl-}{\alpha}$ : Nov 2014 minus Climatology

-0.05 0.05 0 -0.5 0.5

$K_d(490)$ anomaly (m$^{-1}$) chl-$\alpha$ anomaly (mg/m$^3$)
NESDIS/STAR’s 5 km Geostationary-Polar Blended Satellite Sea Surface Temperature (SST) Time Series for Point A, Guánica Virtual Station (17.92347 °N, 66.90108 °W)