High Temporal Resolution Assessments of Tampa Bay Water Quality Using Satellites

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Why High-Temporal Resolution?

http://www.epchc.org Monthly sampling 1972 - present
Why High-Temporal Resolution?

December 2004

January 2005
Why High-Temporal Resolution?

Power spectra
How?

Dry season, Sta. 2, 3 July 2004

Wet season, Sta. 2, 4 Oct. 2004
Station Name: Port Manatee
Station ID: BRMET1
Latitude: 27° 39.708’ N
Longitude: 82° 35.669’ W
Organization: USF

How?

Facility

Station Name: Port Manatee
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Algorithm Development

Turbidity and Clarity for Tampa Bay

Hu et al., 2004, RSE; Chen, Hu, Muller-Karger, 2007a, 2007b, RSE
Validation of Satellite Data

December 2004 | January 2005
Seasonality and Long-term Trend
Turbidity and Clarity for Tampa Bay
Water Clarity and Seagrass Coverage

Water Clarity from Satellite

Seagrass Coverage
Light Penetration Depth

Light attenuates 8 times faster in wet season than in dry season.
Light Penetration Depth

1998-2007 SeaWiFS and *in situ* data

\[ y = 0.7513x + 1.5862 \]

\[ R^2 = 0.645 \]
Satellite Chl in Tampa Bay: Headache!

1998-2005 SeaWiFS and *in situ* data
**Alternative Index for Chl**

**Chl Fluorescence**

\[ F_{\text{chl}}(z, \lambda_m) = \int_{\lambda_e}^{\lambda_m} \frac{\lambda_e}{\lambda_m} \eta(\lambda_e, \lambda_m) a_c(\lambda_e) D_d E_d(z, \lambda_e) d\lambda_e \]

\[ \eta(\lambda_e, \lambda_m) \propto \frac{1}{(2\pi\sigma^2)^{1/2}} \exp\left( -\frac{(\lambda_m - 685)^2}{2\sigma^2} \right) \]
MERIS Fluorescence as a Bloom Index
MERIS Fluorescence as a Bloom Index

9/16/2009

9/25/2009

10/2/2009

10/8/2009

10/11/2009
Objective Template: SST Anomaly
http://imars.usf.edu/ merged_sst
Summary

- Satellite-derived SST: Good
- Satellite-derived Water Turbidity, Clarity, Light Penetration Depth: Good
- Satellite-derived Chl: Bad
- Satellite-derived Fluorescence: Provisional
- Goal: Mean and Anomaly Products Online
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- NOAA
- USGS
- FDEP