

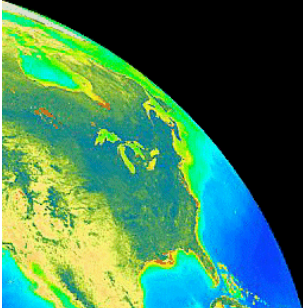
# OBPG Status Report

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Chuck McClain & Gene Feldman  
Ocean Biology Processing Group Leaders

NASA Ocean Biogeochemistry Science Team  
Meeting

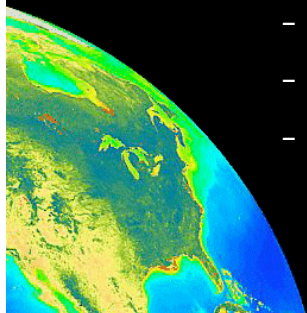
April 11-13, 2007



# Presentation Outline

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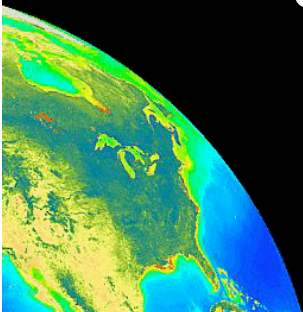
- **Ocean Biology Data Processing**
  - SeaWiFS
    - Updated temperature sensitivity
    - Intergain analysis
  - MODIS/Terra
  - OCTS and CZCS reprocessing
  - MODIS HiRes
  - NO2 sensitivity analyses & global data set development
  - Chesapeake Bay analyses
    - Chlorophyll-a algorithms
    - Aerosol model evaluations
  - NPP VIIRS
  - SeaWiFS, MODIS reprocessing proposal
  - SeaBASS
- **Sea Surface Temperature Data Processing: Aqua & Terra**
- **Aquarius**
- **SeaDAS**
- **Data Distribution**
- **HQ Program Support**
- **Recent OBPG Publications**



## OBPG Primary Tasks for Next Year: 2006 OCRT Mtg.

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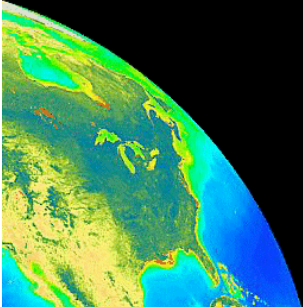
- ✓ Complete MODIS/Terra SST processing transition from MODAPS (early summer)
- ✓ Complete MODIS/Aqua HIRS module
- ✓ Finalize OCTS and CZCS reprocessings
- ✓ Aqua/SeaWiFS Merged Chlorophyll Product
- Work on MODIS/Terra ocean color data quality - **ongoing**
- Continue analysis of VIIRS prelaunch test data & data system development - **ongoing**
- Continue preparations for Aquarius data processing - **ongoing**



# SeaWiFS

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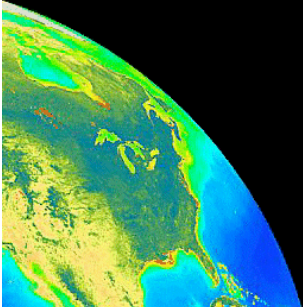
- Contract renewal in place
  - NASA funded for this year
  - 1 year with four 1-year options
- Instrument performance
  - Slight shift between lunar and science gains determined through analyses of daily calibration pulse data
  - Temperature sensitivity reassessed as result of orbit drift



# MODIS/Terra OC Data Evaluation

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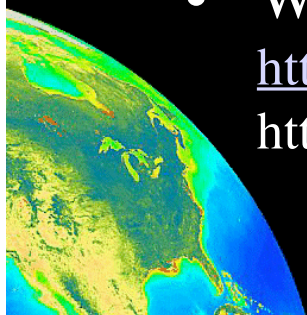
- Temporal degradation much more severe than MODIS/Aqua
- Using SeaWiFS Lwn fields to assess RVS (response vs. scan) and polarization time-dependent sensitivities
- Bryan Franz presentation (next)



# CZCS & OCTS Reprocessing

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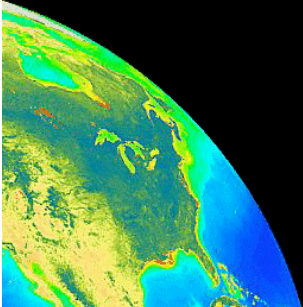
- Standardized algorithms to degree possible (calibration, bio-optical, atmospheric correction)
  - Calibration: **Jeremy Werdell presentation later this morning**
- CZCS
  - Renavigated entire mission (next reprocessing will include an additional navigation refinement)
  - Radiometric data quality issues after 1982 (sensor behavior at 550nm)
  - El Chichon aerosol effects in level-2 products
  - Apparent polarization sensitivity artifacts
- OCTS
  - NASDA tilt-dependent calibration removed
  - Two-epoch NIR degradation incorporated
- Websites:
  - <http://oceancolor.gsfc.nasa.gov/CZCS/>
  - <http://oceancolor.gsfc.nasa.gov/OCTS/>



# MODIS HiRes Data Processing

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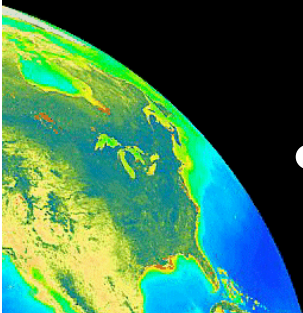
- Utilizes 250 m & 500 m land bands, & 1 km ocean color bands data
- Allows options for using 1240, 1640, and 2130 nm bands for aerosol corrections
- Supported in SeaDAS
- Bryan Franz presentation (next)



# NO<sub>2</sub> Global Data Set Development

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- Correction algorithm and sensitivity analysis completed (Ahmad, et al., *Applied Optics*, in press)
- Global time series constructed using GOME, SCIAMACHY, & OMI data sets
- Evaluation of NO<sub>2</sub> correction on SeaWiFS and MODIS derived product time series underway
- See [Robinson et al. poster](#)

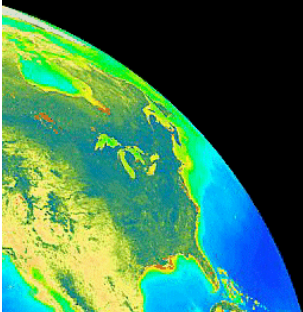




# Chesapeake Bay Analyses

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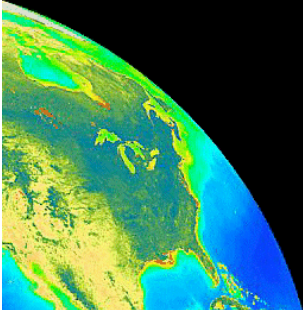
- **Objectives:**
  1. Provide high quality ocean color data products to the Chesapeake Bay Program for water quality assessments
  2. Refine methodologies for assessing product quality and improving algorithm performance in coastal areas
- **Current Activities**
  - Evaluation of bio-optical algorithms & derived product quality in coastal waters
    - **Jeremy Werdell presentation (later this morning)**
  - Development of regional coastal aerosol models
    - See **Ahmad et al. poster**



# NPP VIIRS

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- EDU test data
  - Worked closely with NPP Instrument Characterization Support Team (GSFC) on test data analyses
  - Developed archive of test data
- Preparing for FU1 test data
- Sensor Performance Issues:
  - Optical and electronic crosstalk
  - Polarization sensitivity
  - Relative Spectral Response (RSR)
  - **Money & Schedule** constraints on characterization testing

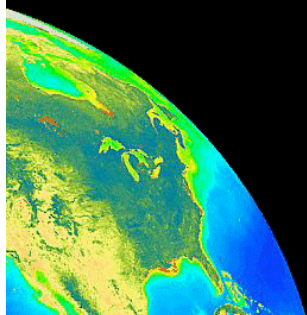


# SeaWiFS & MODIS Reprocessing

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- **Ocean Biology**
  - Last reprocessing in June 2005
  - Primary algorithm improvements
    - SeaWiFS: temperature & lunar gain corrections
    - MODIS/Aqua: band center change from 551 nm to 546 nm
    - SeaWiFS & MODIS: NOMAD-based Chl-a algorithm,  $K_d(490)$  (Morel et al. 2007)
    - MODIS/Aqua: aerosol polarization correction
    - SeaWiFS & MODIS:  $\text{NO}_2$  correction
    - Updated aerosol models
  - Products
    - SeaWiFS & MODIS: Calcite
    - MODIS: PAR (Frouin), FLH, Lwn(678)
    - Others ?
- **MODIS SST Reprocessing**
  - GHRSSST format
  - Prior to Ocean Biology reprocessing

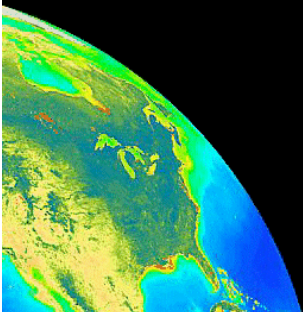
Planned  
Under study



# SeaBASS

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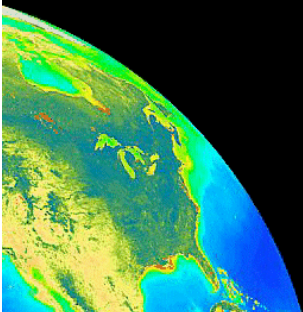
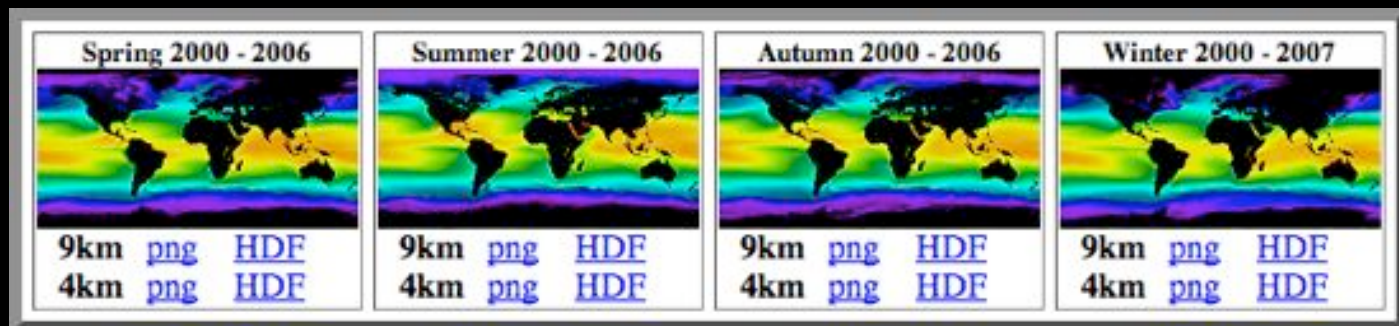
- SeaBASS data submission rate on the rise (Giulietta Fargion presentation later this afternoon).
  - AOPs and Chl-a requisite, but IOPs, carbon, CTD, partical size distributions, etc. all useful and desired.
- NOMAD updated to include HPLC pigments (~1,000 stations affected) and coincident SeaWiFS Rrs (~300 stations affected).
  - NOMAD “version 2” expected to be released in Fall 2007.
- Operational OBPG validation “cookbook” published in May 2006.
  - Bailey, S. W., and P.J. Werdell, A multi-sensor approach for the on-orbit validation of ocean color satellite data products, *Remote Sens. Environ.*, 102, 12-23, 2006.



# MODIS Sea Surface Temperature

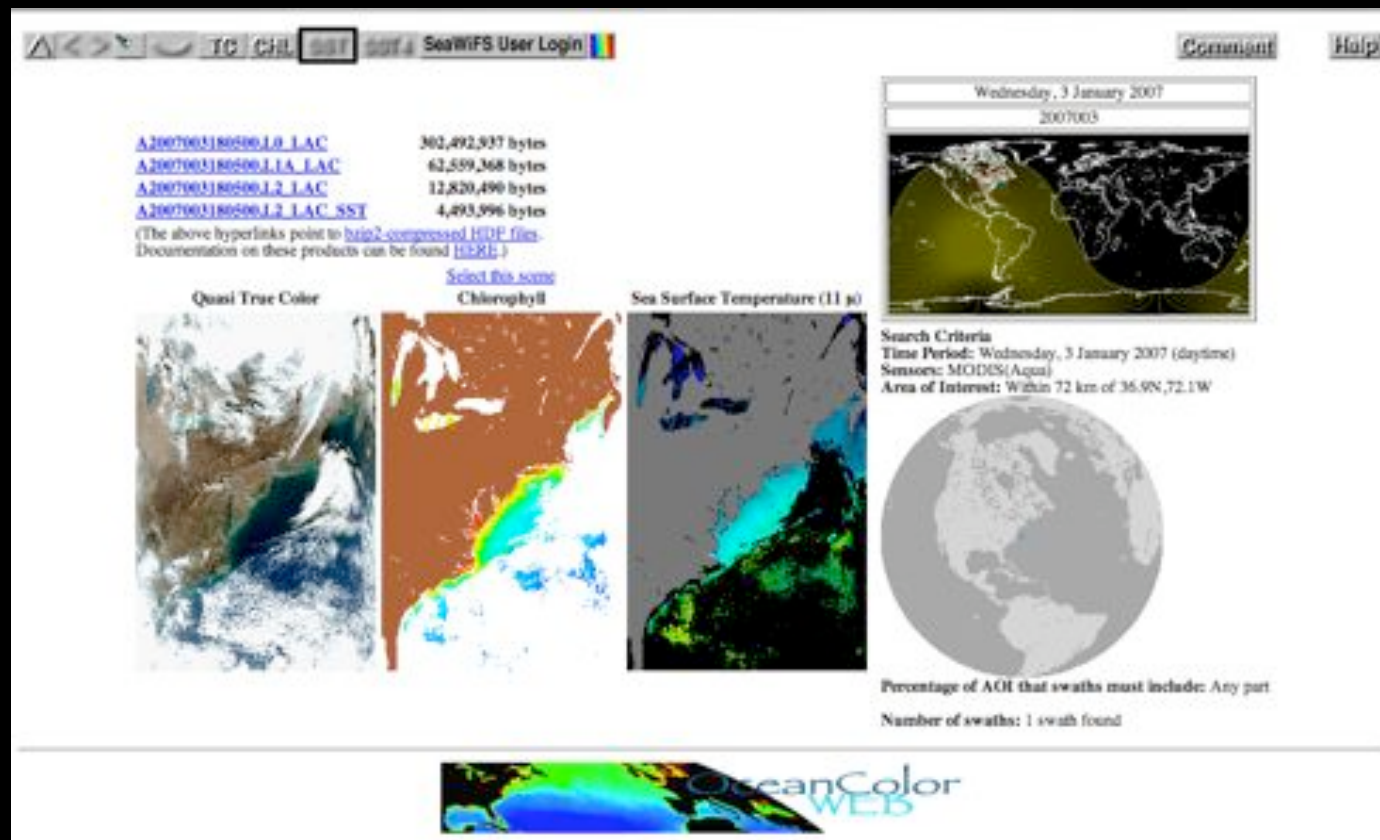
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- Complete Aqua (500,000 files/ July 2002 - present) and Terra (730,000 files/Feb. 2000 - present) SST products available at 1, 4 and 9 kilometer resolution.
- Operationally providing GHRSSST-formatted global Level-2 SST data to JPL for both Aqua and Terra within 4 hours of acquisition by satellite.
- Mission-long climatologies available at 8-day, monthly, seasonal, and cumulative time scales



# MODIS Sea Surface Temperature

- Consolidated web browse, order, subscription and data extraction tools for all missions / all parameters
- 15 million Ocean Color products and 2 million SST products distributed via web and FTP.

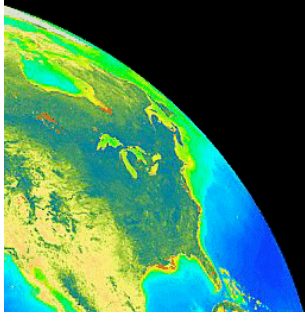


The screenshot displays the OceanColor WEB interface. At the top, there are navigation buttons for 'TC', 'CHL', and 'SST', along with a 'SeaWiFS User Login' link. A date filter is set to 'Wednesday, 3 January 2007' with the year '2007003'. Below this, a list of search results is shown:

<a href="#">A2007003180500.L0.LAC</a>	302,492,937 bytes
<a href="#">A2007003180500.L1A.LAC</a>	62,539,368 bytes
<a href="#">A2007003180500.L2.LAC</a>	12,820,490 bytes
<a href="#">A2007003180500.L2.LAC.SST</a>	4,493,996 bytes

(The above hyperlinks point to [gzip-compressed HDF files](#). Documentation on these products can be found [HERE](#).)

Below the list are three thumbnail images: 'Quasi True Color', 'Chlorophyll', and 'Sea Surface Temperature (11 µ)'. To the right, a search criteria box shows: 'Time Period: Wednesday, 3 January 2007 (daytime)', 'Sensors: MODIS(Aqua)', and 'Area of Interest: Within 72 km of 35.9N,72.1W'. A globe icon is also present. At the bottom right, it states: 'Percentage of AOI that swaths must include: Any part' and 'Number of swaths: 1 swath found'. The 'OceanColor WEB' logo is visible at the bottom center.



# AQUARIUS Support

## Salient Features

- *Earth System Science Pathfinder (ESSP) Mission*
- *NASA-CONAE Partnership Science Mission*
- *NASA provides L-band Radiometer / Scatterometer*
- *CONAE provides Service Platform & MOC*
- *Dedicated Delta II launch vehicle provided by NASA*
- *Launch Readiness Date (LRD) : **July 2009** \**
- *Aquarius Operational life: 3 years*

*\* new LRD will be established by JSG in May 2007*



## Science

- *Investigate the links between the global water cycle, ocean circulation and climate*
- *Make global, space-based measurements of Sea Surface Salinity (SSS)*
- *Provide 0.2 psu (practical salinity unit) accuracy at monthly, 150 km resolution*
- *Observe and model seasonal and year-to-year variations of SSS, and how these relate to changes in the water cycle and ocean circulation*
- *Aquarius will yield an unprecedented view of ocean's role in climate and weather*

1- Extensive user support with over 500 sites, active online Forums. > 3500 posts

2- SeaDAS ported to the Macintosh OS X including new Intel architecture. Also runs on Linux, Sun, SGI

3- Redesigned GUI and website are now much more user-friendly

4- New simple online installer and four SeaDAS ftp mirrors (Australia, Brazil, Japan, UK)

5- Automated ancillary data download during processing

6- SeaDAS-lite option for display/analysis only

7- MODIS Direct Broadcast And High Resolution processing module.

8- User training workshops

SeaDAS Home Page

http://oceancolor.gsfc.nasa.gov/seadas/

# OceanColor SeaDAS

Download Help Documents Contact Links OceanColor News FAQ Forum

## SeaDAS Web

### Support

[SeaDAS Forum](#)  
[Ocean Color Forums](#)  
[Ocean Color Web](#)  
[Ocean Mailing Lists](#)

### Download and Installation

We have a now simplified online installation process. Or, you can manually download SeaDAS, and follow the installation instructions.

### Satellite Data

[Data Product Specifications](#)  
[Processing Versions Chart](#)  
[Level 1 and 2 Browser](#)  
[Level 3 Browser](#)  
[Data by FTP](#)

### Ancillary Data

[METOZONE](#) [INFO](#)  
[NOAA OISST](#) [INFO](#)  
[Aqua ATTEPH](#) [INFO](#)  
[Terra ATTEPH](#) [INFO](#)  
[MODIS L1B](#) [INFO](#)  
[MODIS L2](#) [INFO](#)  
[elements.dat](#) [INFO](#)

## What is SeaDAS

The SeaWiFS Data Analysis System (SeaDAS) is a comprehensive image analysis package for the processing, display, analysis, and quality control of ocean color data.

Supported satellite sensors are MODIS, SeaWiFS, OCTS, and CZCS.

- Features
- Requirements
- Online Help
- SeaDAS FAQ
- History of Events
- References

[SeaDAS Software Usage Policy](#)  
[seadas@seadas.gsfc.nasa.gov](#)

## What's New

### SeaDAS 5.0 released

- MODIS high-resolution processing
- New ml12, l2bin, l3bin, smigen
- OBPB format CZCS processing
- AVHRR Version 5 display support
- New custom color LUT features
- SeaDAS benchmarking script

MODIS 250m high resolution imagery

### MODISL1DB 1.3 released

MODISL1DB is for Direct Broadcast users and contains only the portions of SeaDAS for processing MODIS Aqua and Terra L0 data to L1A and L1B.

We now have 4 SeaDAS mirrors helping us to distribute SeaDAS 5.0. The OBPB would like to thank those who have so kindly donated their resources. **THANK YOU!**

Curator: OceanColor Webmaster  
Authorized by: gene.carl.feldman  
Updated: 17 October 2006

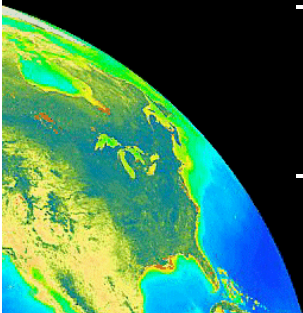
Privacy Policy and Important Notices



# NASA HQ Program Support

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- Formulation of the NASA Ocean Biology & Biogeochemistry long-term measurement strategy
  - “Earth’s Living Ocean: The Unseen World”
- Formulation of a calibration & validation program strategy
  - “A Comprehensive Plan for the Long-Term Calibration & Validation of Oceanic Biogeochemical Satellite Data” – Stan Hooker presentation this afternoon
- Satellite mission formulations
  - Global Ocean Carbon, Ecosystems, & Coastal Processes mission
  - Aerosol-Cloud-Ocean Biology mission

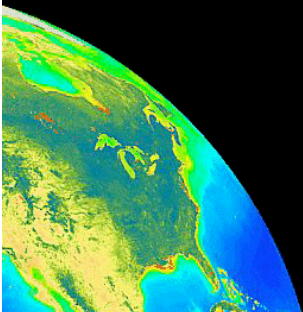


# OBPG Publications

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- **Conference papers**

- Meister, G., E. K. Kwiatkowska, and C. R. McClain, Analysis of image striping due to polarization artifacts in remotely sensed ocean scenes, Proc. SPIE, Earth Observing Systems XI, 6296, San Diego, 12 pp., 2006.
- Eplee, R. E., Jr., F. S. Patt, R. A. Barnes, C. R. McClain, SeaWiFS long-term solar diffuser reflectance trend analysis, Proc. SPIE, Earth Observing Systems XI, 6296, San Diego, 10 pp., 2006.
- Eplee, R. E., Jr., S. W. Bailey, R. A. Barnes, H. H. Kiefer, and C. R. McClain, Comparison of SeaWiFS on-orbit lunar and vicarious calibrations, Proc. SPIE, Earth Observing Systems XI, 6296, San Diego, 7 pp., 2006.
- Franz, B. A., P. J. Werdell, G. Meister, E. J. Kwiatkowska, S. W. Bailey, Z. Ahmad, and C. R. McClain, MODIS land bands for ocean remote sensing applications, Proc. Ocean Optics, Montreal, 12 pp., 2006.
- Werdell, P. J., B. A. Franz, S. W. Bailey, and C. R. McClain, Recent advances in the operational vicarious calibration of visible and near-infrared ocean color satellite radiometry, Ocean Optics, Montreal, 12 pp., 2006.
- Ahmad, Z., C. R. McClain, J. R. Herman, B. Franz, E. Kwiatkowska, W. Robinson, E. J. Bucsela, and M. Tzortziou, Atmospheric correction for NO<sub>2</sub> absorption in retrieving water-leaving radiances from SeaWiFS and MODIS measurements, Ocean Optics, Montreal, 11 pp., 2006.

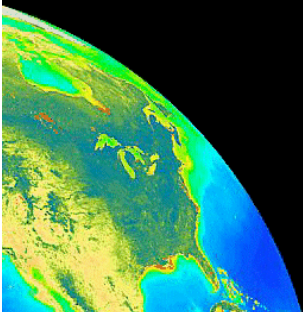


# OBPG Publications *cont.*

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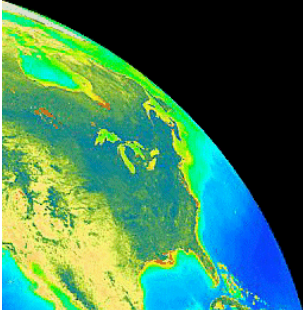
- **Journal articles**

- Bailey, S. W., and P.J. Werdell, A multi-sensor approach for the on-orbit validation of ocean color satellite data products, *Remote Sens. Environ.*, 102, 12-23, 2006.
- McClain, C., S. Hooker, G. Feldman, and P. Bontempi, Satellite Data for Ocean Biology, Biogeochemistry, and Climate Research, *Eos, Trans. Am. Geophys. Union*, 87(34), 337, 2006.
- Eplee, R. E., Jr., F. S. Patt, R. A. Barnes, and C. R. McClain, SeaWiFS long-term solar diffuser reflectance and sensor signal-to-noise analyses, *Appl. Opt.*, 46(5), 762-773, 2007.
- Franz, B. A., S. W. Bailey, P. J. Werdell, and C. R. McClain, Sensor-independent approach to the vicarious calibration of satellite ocean color radiometry, *Appl. Opt.*, in press.
- Ahmad, Z., C. R. McClain, J. R. Herman, B. A. Franz, E. J. Kwiatkowska, W. D. Robinson, E. J. Bucsela, and M. Tzortziou, Atmospheric correction of NO<sub>2</sub> in retrieving water-leaving reflectances from the SeaWiFS and MODIS measurements, *Appl. Opt.*, in press.
- Eplee, R. E., Jr., F. S. Patt, B. A. Franz, S. W. Bailey, G. Meister, C. R. McClain, SeaWiFS on-orbit gain and detector calibrations: impact on ocean products, to be submitted to *Appl. Opt.*

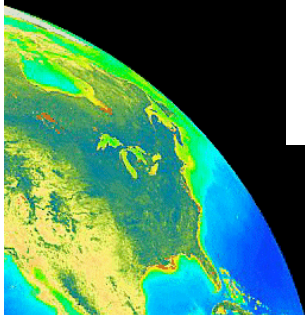
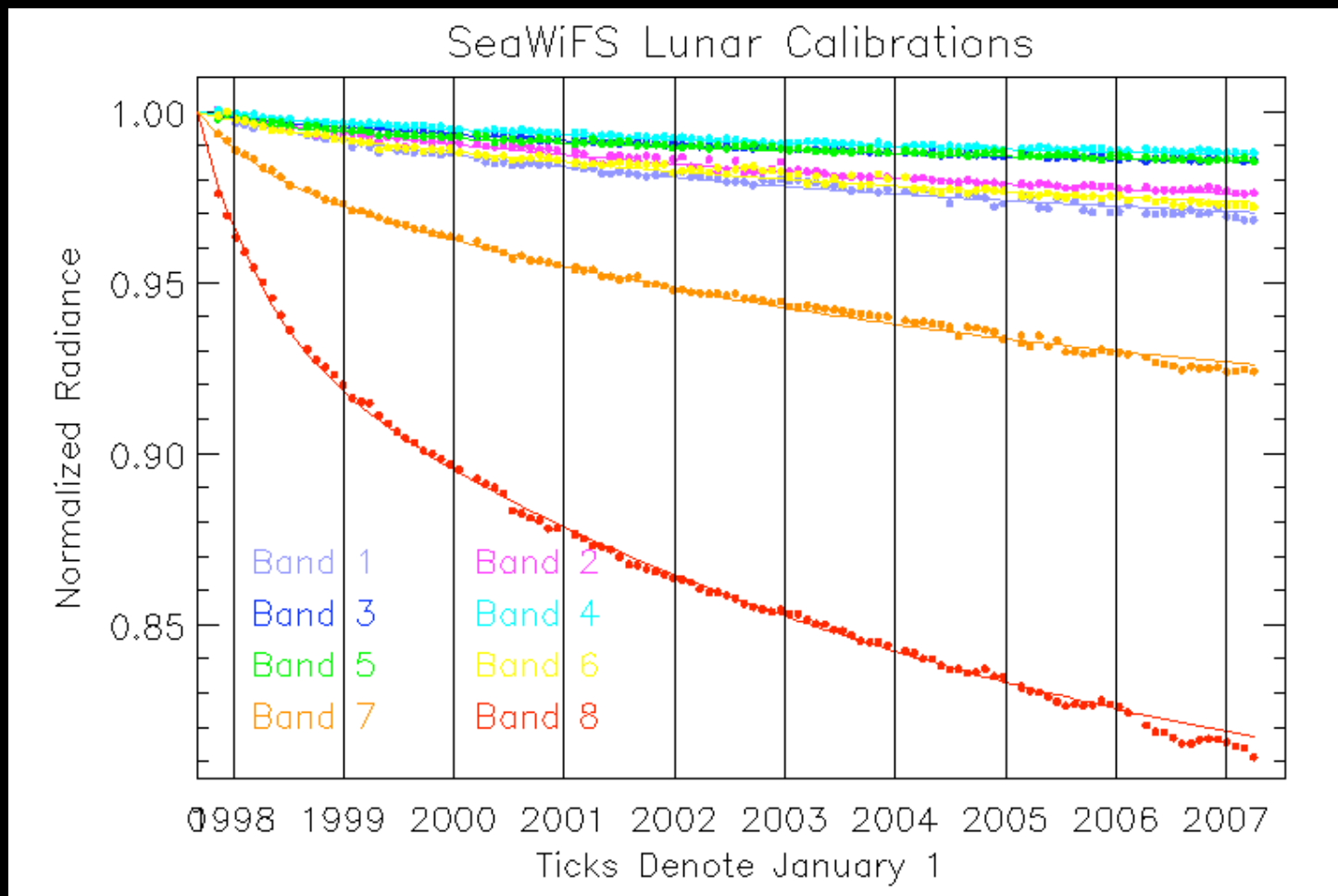


# BACK-UP SLIDES

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# SeaWiFS Temperature Dependence: Current



# SeaWiFS Temperature Dependence: Revised

