Overview of Ocean Color Calibration & Validation Efforts

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OS42D: Calibration & Validation Efforts Underway by the Ocean Color Missions

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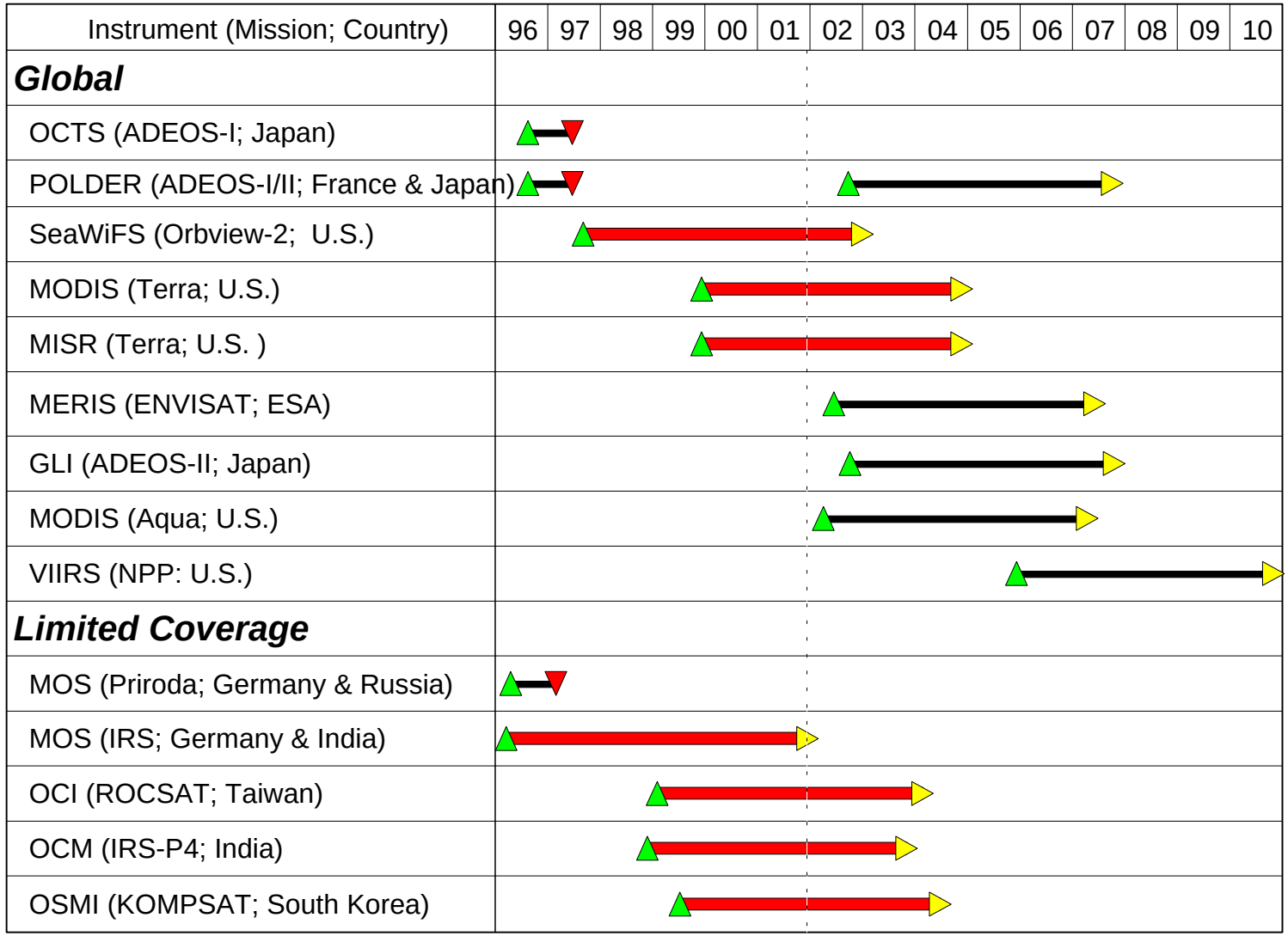
OCEAN COLOR MISSIONS

12/10/01



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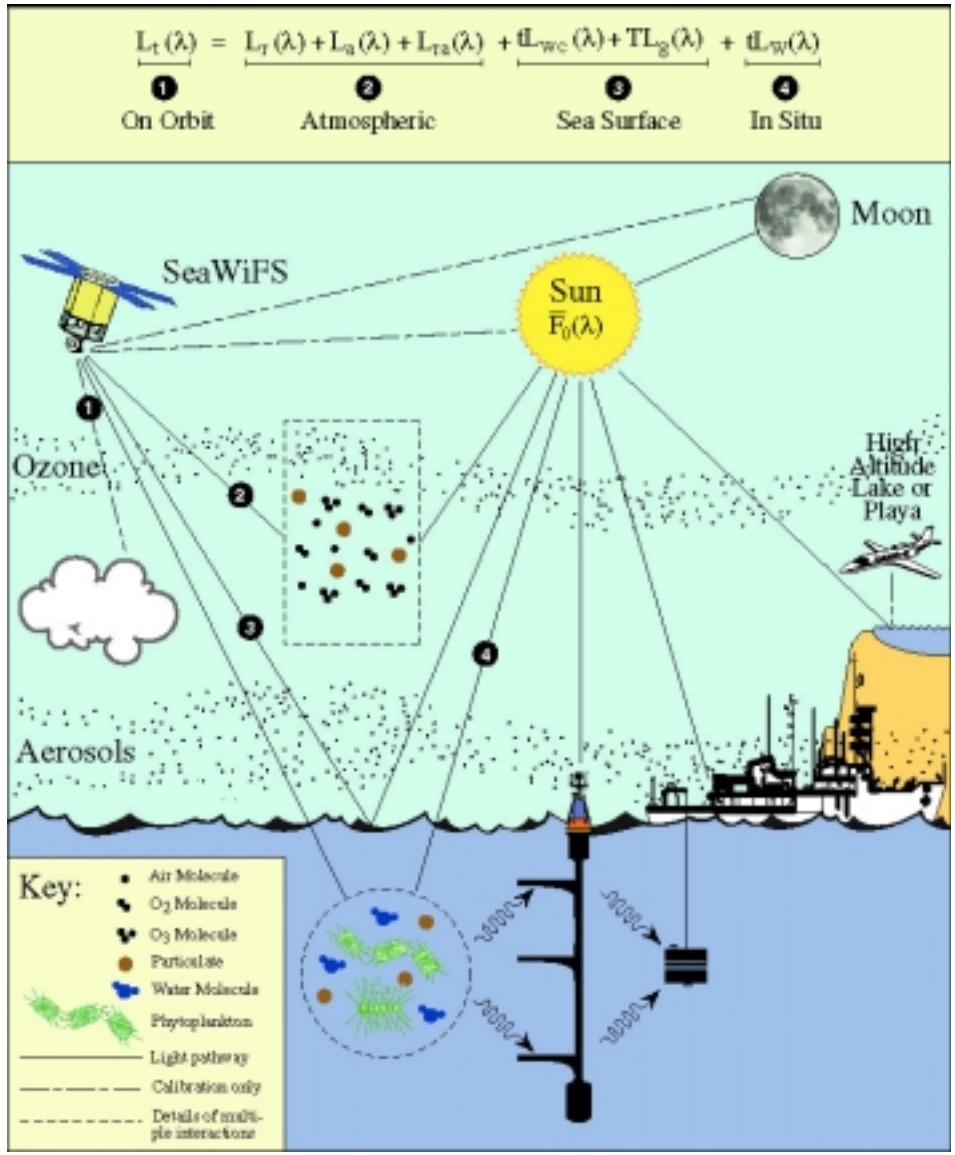
Calibration & Validation Paradigm



SIMBIOS Objectives

Sensor Intercomparison & Merger for Biological & Interdisciplinary Ocean Studies

- Ensure development of internally consistent research products and time series from multiple satellite ocean color data sources
- Develop methodologies for cross-calibration of satellite ocean color sensors
- Develop methodologies for merging data from multiple ocean color missions
- Promote cooperation between ocean color projects
- Serve as a prototype for other Earth observation programs

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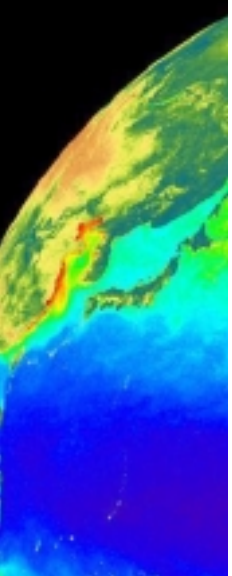

Program Requirements/Activities

- Field measurement & data processing protocol definition & development
- Global bio-optical & atmospheric *in situ* data collection
- Bio-optical & atmospheric database development
- Traceabilty of laboratory calibration sources to standards
- Instrumented calibration sites
- Prelaunch sensor calibration & characterization protocols
- On-orbit calibration evaluation & methodology development
- Bio-optical & atmospheric correction algorithm development
- Product accuracy evaluation & methodology development
- Data merger algorithm development & data processing
- High volume data processing capabilities
- Technology evaluation & development
- Systematic documentation

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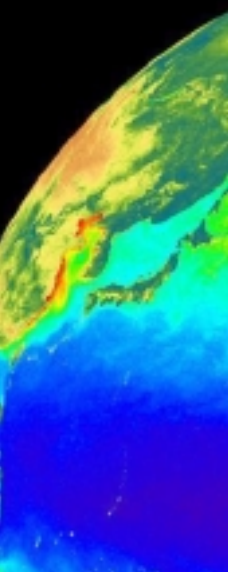

Project Structure

- **SIMBIOS Science Team**
  - NRA-96 (1997-2000): 21 US & 5 international investigations
  - NRA-99 (2001-2003): 19 US & 14 international investigations
  - MODIS Oceans Team
- **SIMBIOS Project Office**
  - Technical, program management, science team coordination & NRA support
  - Technical interface with space agencies (e.g., NASDA, CNES, KARI), other organizations (e.g., NIST, IOCCG, JRC, DLR), and programs (e.g., EOS, AERONET)

SIMBIOS Project Office

- Satellite Data Processing
  - CZCS, SeaWiFS, MOS, OCTS, POLDER-I, & OSMI
- Data Product Validation
  - Algorithm validation
  - Sensor calibration
  - Match-up analysis & SeaBASS interface
- Support Services
  - Scheduling SeaWiFS LAC data & over-flight prediction for MODIS, SeaWiFS, MOS, OCI, OSMI, & OCM
  - Satellite data: OCTS-GAC, MOS & SeaWiFS (diagnostic data set)
  - Near real-time images (SeaWiFS Level-1 & Level-2)
  - SeaDAS international satellite data processing software
- Instrument Calibration & Data Collection Support
  - Field instrument pool & calibrations
  - Calibration RR: SeaWiFS Transfer Radiometer (SXR-II) & SeaWiFS Quality Monitors (SQM)
- Administrative Support
  - Project & Science Team Coordination & Contracting
  - Documentation

SIMBIOS Activities

- MOS-SeaWiFS cross calibration
  - German Aerospace Research Establishment (DLR)
- MOS data acquisition at NASA Wallops Flight Facility
  - Indian Space Research Organization (ISRO)
- OCTS-POLDER cross calibration
  - NASDA (Japan) & CNES (France)
- OCTS global GAC reprocessing
  - NASDA
- OSMI data processing and calibration
  - Korean Aerospace Research Institute (KARI)
- GLI calibration & validation team
  - NASDA
- POLDER-2 calibration & validation team
  - CNES
- MODIS product validation & data merger
  - MODIS Oceans Team

SIMBIOS Activities *continued*

- Calibration round-robin
  - 1997: NASA/GSFC, PML (UK), JRC (Italy), SDSU, Biospherical Instruments Inc., UCSB, NRL, DLR (Germany), NASA/WFF, Satlantic Inc. (Canada)
  - 2001: NASA/GSFC, Satlantic Inc., Biospherical Instruments Inc., HOBI Labs, UCSB, NRL, SIO
- Chlorophyll round-robin
  - 2000: ONR, UMD, SIO, SDSU, Bigelow, USF, NOAA & NASA/SSC
  - 2001: SDSU, UMD, CNR (Italy), LODYC (France) and BBRS
- Sunphotometer deployment, maintenance, data processing
  - Cimel (NASA-GSFC, AERONET)
  - PREDE MKII, SIMBAD, MicroTops and MPL
- International coordination & outreach
  - International Ocean Color Coordinating Group (IOCCG)
  - SeaDAS training
- Technology development
  - Satlantic
  - Yankee Environmental Instruments

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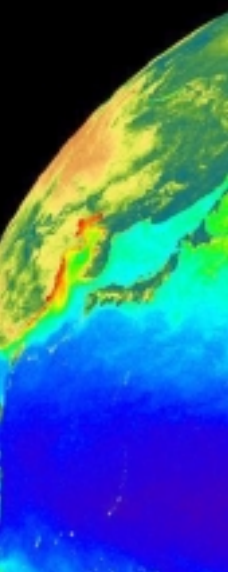

SIMBIOS Activities *continued*

- International field experiments
  - INDOEX (1999)
  - ACE-Asia (2001)
  - R/V Akademik Ioffe (2001)
- Field support
  - Satellite overflight & coverage info, real-time data
  - Over 276 field experiments supported
- Bio-optical data archival & distribution
  - SeaBASS
  - NODC
- Diagnostic Data Set Generation
  - SeaWiFS
  - OCTS-GAC (future)
  - MOS (future)

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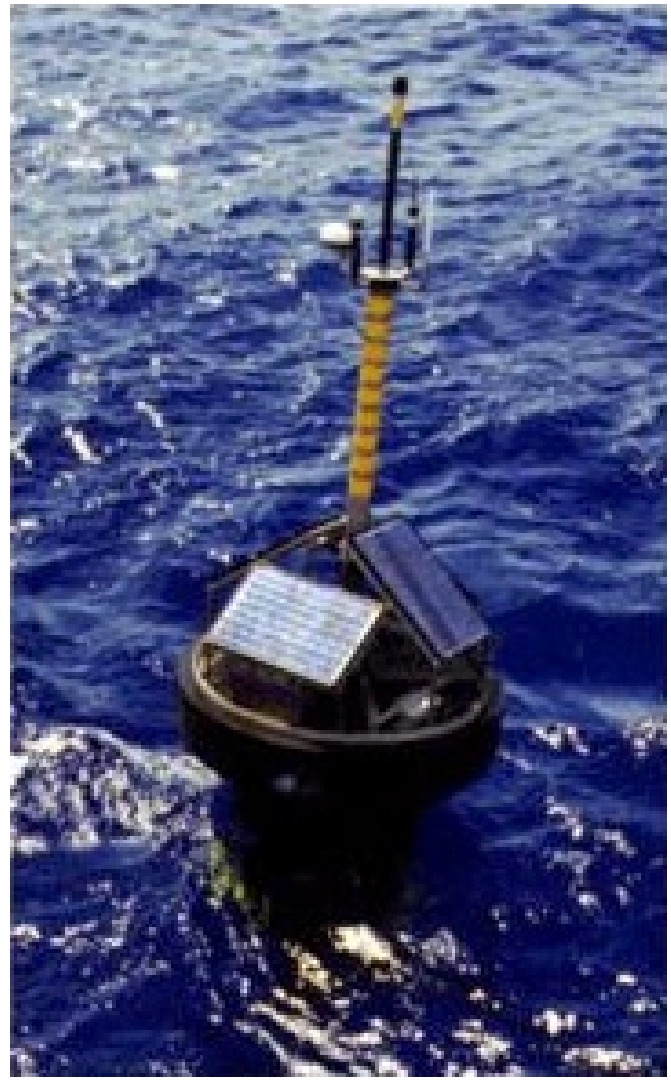
MOBY: On-Orbit Vicarious Calibration

- The Marine Optical Buoy (MOBY)
  - Supported by MODIS & SeaWiFS
  - Moored off the coast of Lanai in “clear water”
  - Initial deployment in late 1996
  - Operational since mid-1997
  - Used to calibrate OCTS, POLDER, SeaWiFS, MODIS, OSMI



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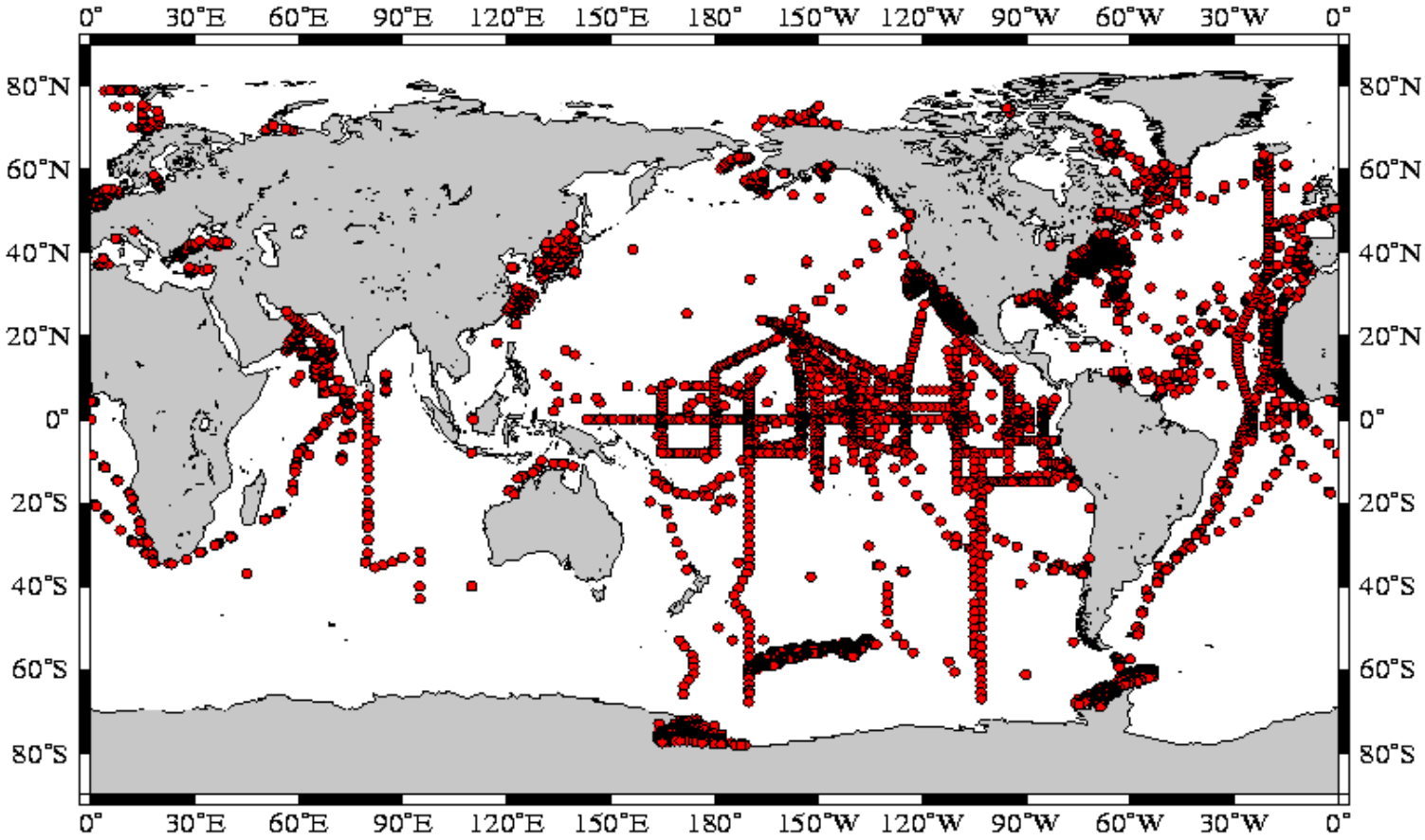
Bio-optical & Atmospheric Data archived in SeaBASS



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SeaWiFS:

Equatorial crossing time: 12:00 am

Resolution (km): 1.13

Swath (km): 2800

Repeak period: 16 days

2-day global coverage

MOS:

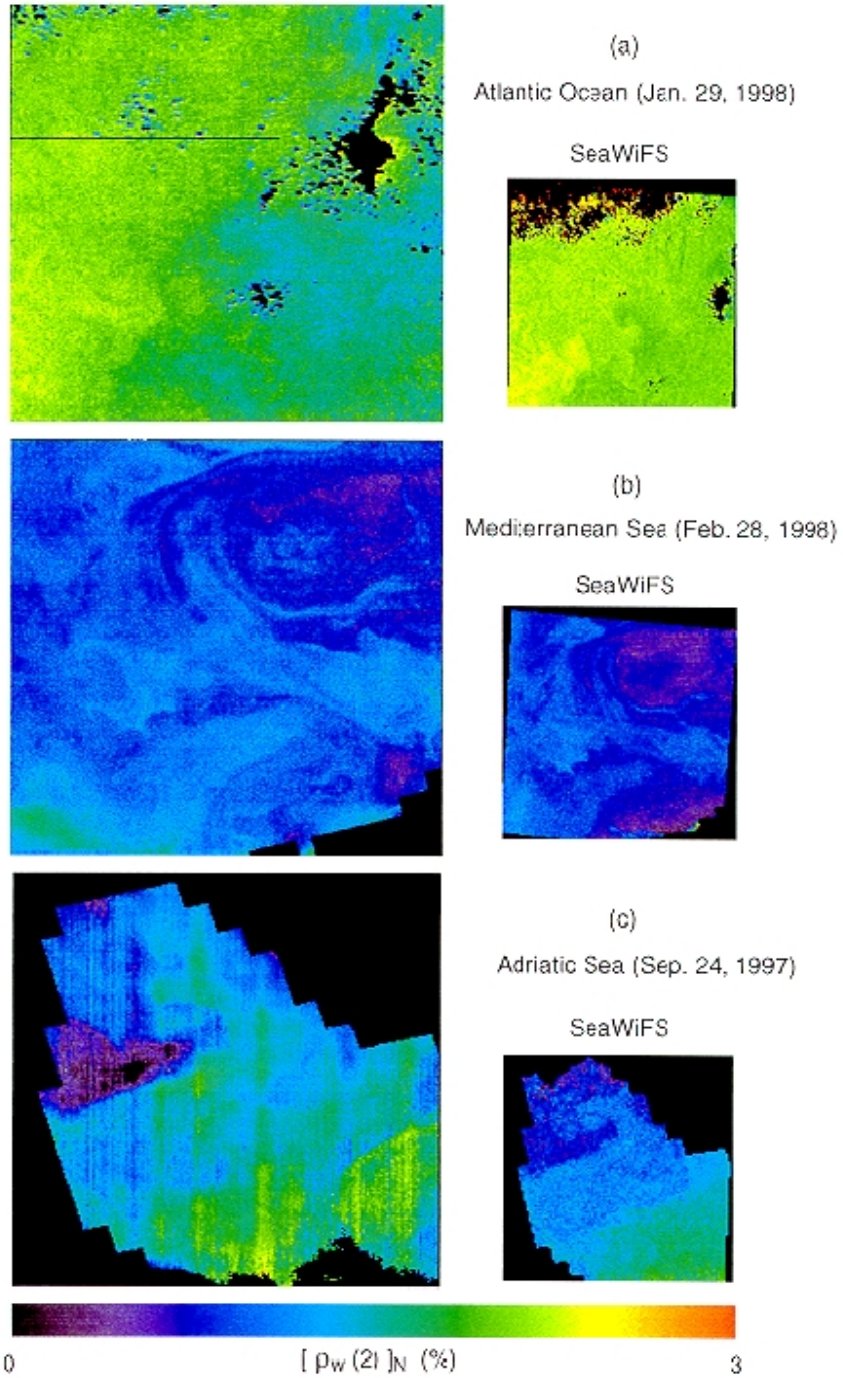
Equatorial crossing time: 10:30 am

Resolution (km): 0.52

Swath (km): 200

Repeak period: 24 days

No global coverage



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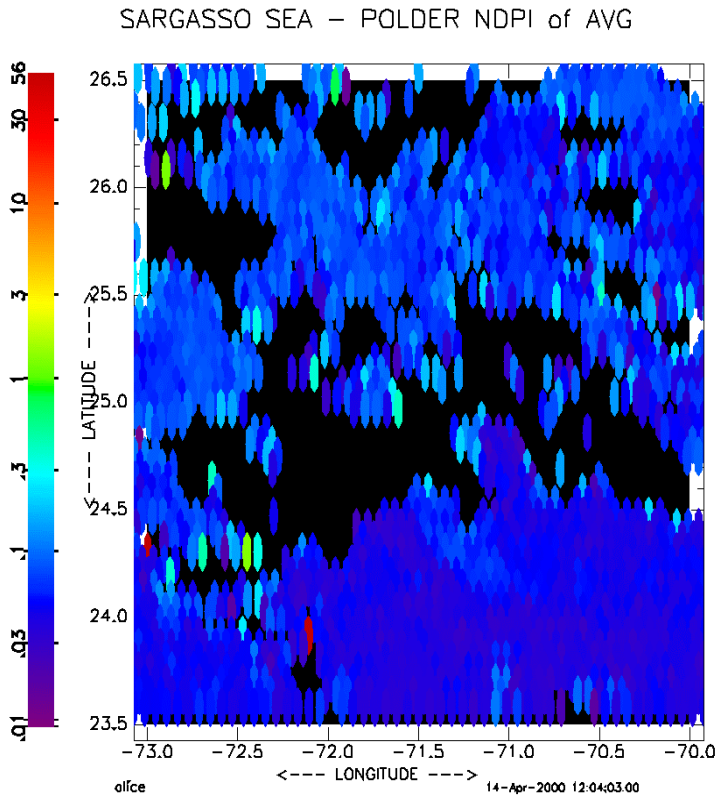
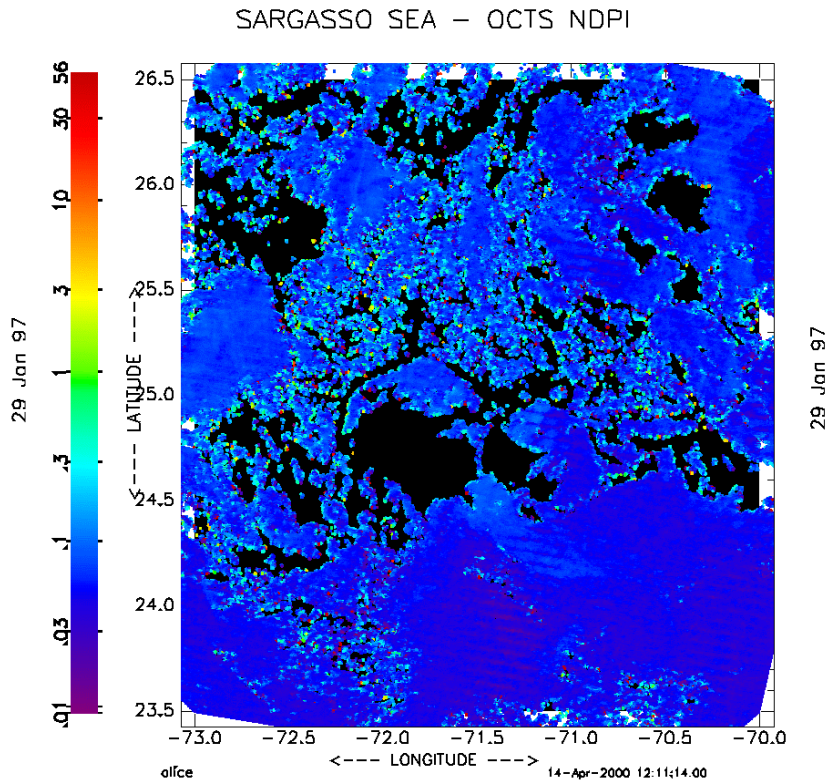
OCTS-POLDER Comparison





	POLDER	OCTS
Resolution	6 x7 km	700 x 700 m
Global coverage	1 day quasi-global	3 days
Recurrent period	41 days	41 days

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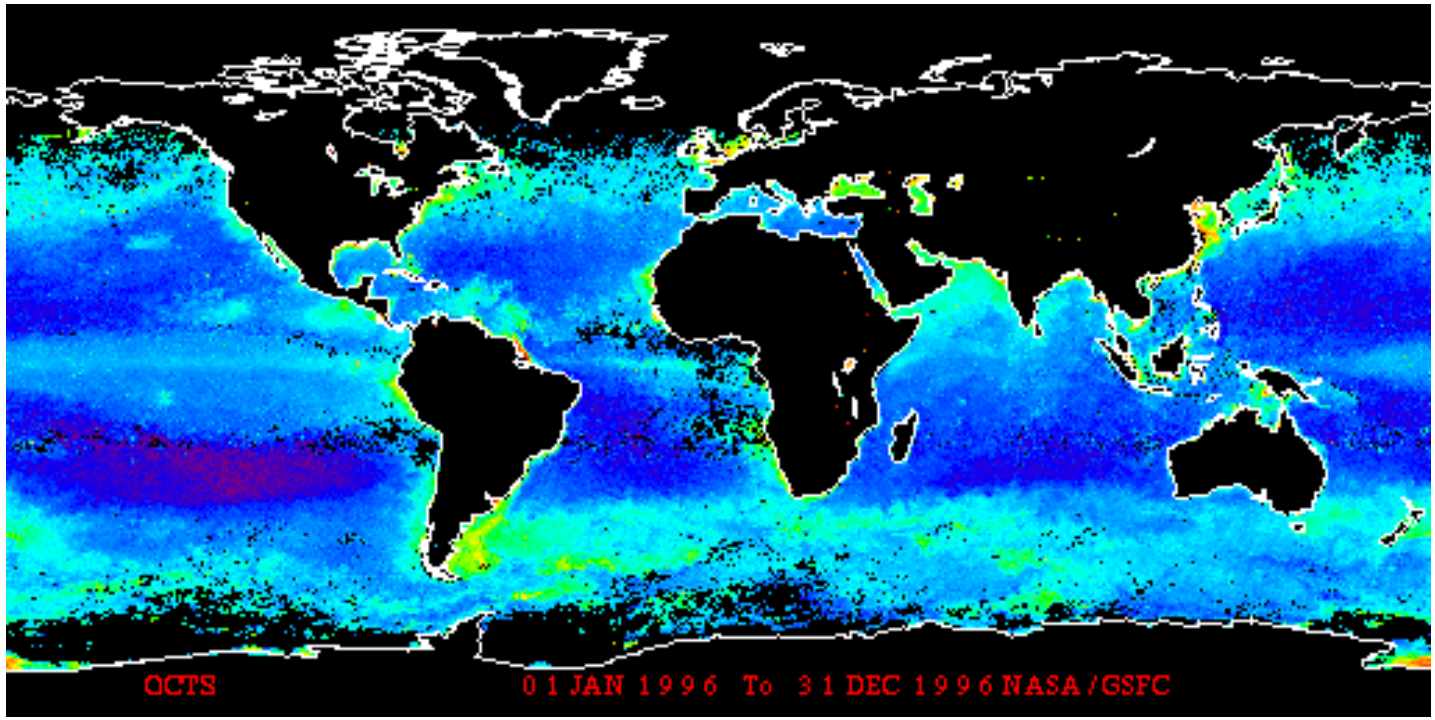
NASDA-NASA Collaboration: OCTS-GAC



- Web browse and download utility for Level-1, Level-2 and Level-3 products can be found at:

http://seawifs.gsfc.nasa.gov/cgibrs/octs_browse.pl

- SeaDAS 4.03p released on 11/9/01 - supports OCTS-GAC

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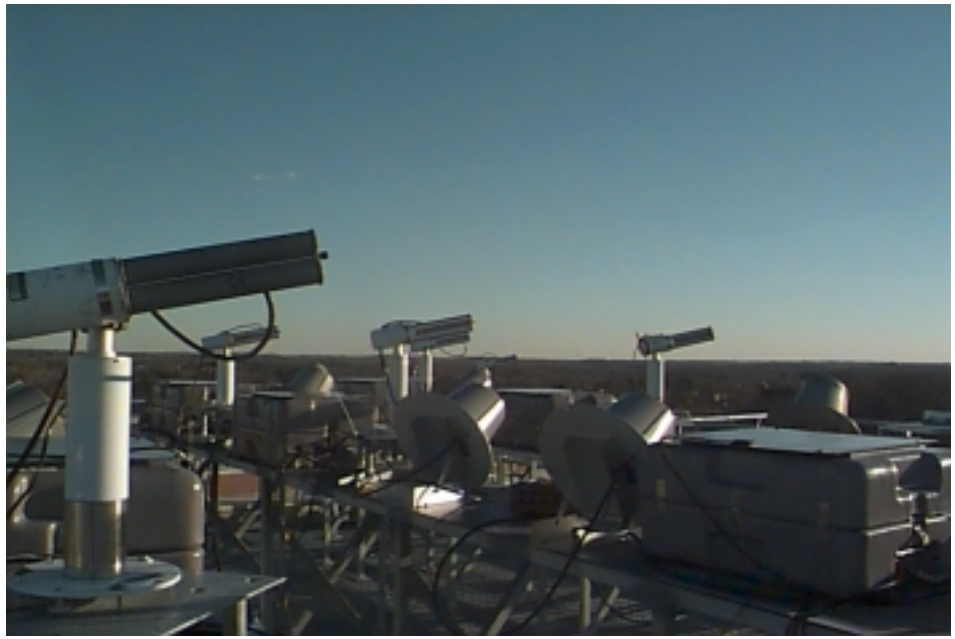
Sun Photometer Calibration Activities



- Roof platform at GSFC* used for transferring calibration to sun photometers
- Project completed ~ 55 instrument calibrations per year

- GSFC integrating sphere* used to calibrate SIMBIOS radiometers and sun photometers

*** AERONET facilities**

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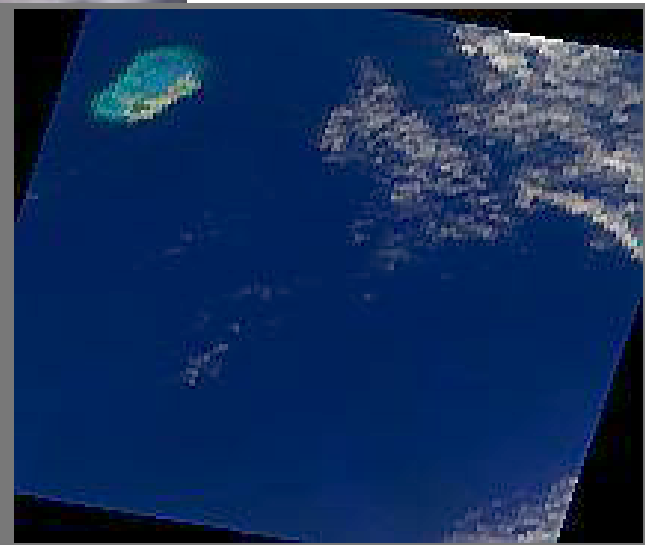
Diagnostic Data Set

- **33 sites**
- **SeaWiFS time series**
- **On-line browse**
- **Subscene download via web or FTP**



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S2000075165409.L2_HNSG.BBOP.extract

MOS (above) and **SeaWiFS** (right) data extracts of Bermuda collected on 15 March 2000