MODIS Data Product Status
Numbers 19, 23, & 26

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July 2002
MOBY
Five Year Time-Series
7/20/97 to 7/20/02

• NIST Radiometric Scale & Overview
• NIST Stray Light Characterizations
• Sensor Spectral Band Matching
• Ocean Color Sensors
  – Japan’s OCTS
  – SeaWiFS
  – MODIS Terra and Aqua
  – Japan’s GLI (Fall 2002)
MODIS Terra/Aqua-Products

**Product 19**
- Parameter 13 - CZCS_pigment
  - (Chl a + Phaeo) - Fluorometrically determined
- Parameter 14 - chlor_MODIS
  - (Chl a (monovinyl and divinyl), Chl a allomer, Chl a epimer, and chlorophyllide a) - HPLC determined
- Parameter 15 - pigment_c1_total
  - (Chl a + 27 Accessory Pigments) - HPLC determined

**Product 23**
- Parameter 19 - Total Suspended Matter
  - Dry Weight

**Product 26 - Parameter 23 - K_490**
- SeaWiFS - Downwelled Irradiance Diffuse Attenuation Coefficient
nLw calibrations stabilized Product Impacts

- Problem: Chlor_modis > Total pigment concentration
  - In regions with high pigment concentrations
  - At high latitudes
- Reason: nLw 443 (b9) retrievals too low and 490 was stabilizing the 3 band total pigment retrievals.
- Problem: MODIS nLw’s scaled to MOBY’s stray light corrected nLw’s were returning higher pigment concentrations in the low concentration regions.
- Reason: The in-water radiometric measurements were not stray light corrected.
Parameter Modifications

- Parameters 14 & 19 reformulated from 2 band to 3 band ratios (chlor_MODIS & Total Suspended Matter).
- All products forced through Gordon’s radiance ratios for pure water.
- *In situ* blue water nLw’s were corrected for stray light with the NIST nominal characterizations.
- All parameter algorithms were split into two 3rd order polynomials to optimize the high radiance ratio range.
Effect of stray light correction on the chl_MODIS Product

December 2001

July 2002
Generalized Form for Product Computation

HIGH Lwn Ratio Range Log Product = (A(\log X)^3 + B(\log X)^2 + C(\log X) + D) / E

LOW Lwn Ratio Range Log Product = (A(\log X)^3 + B(\log X)^2 + C(\log X) + D) / E

Switch Point (SP) is the value of the log Lwn ratio where:
the HIGH range form is replaced with the LOW range form.

• Products 19 and 23
  – Two Least Squares Regressions (Log, Log)
  – 3rd order polynomials
    – $R^2 > 0.91; S_{yx} \sim .045$

• Product 26
  – Least Squares Regression
  – Linear
    – $R^2 = 0.94; S_{yx} = 0.167$
Initial MOCE Validations
Ship and MODIS Pigments

HPLC Chl a
Chlor_MODIS

mg/m³

mose6  L5  L59  mose7  mose8  L69  L72  mose9  L74
4/00  5/00  8/00  12/00  3/01  6/01  9/01  12/01  1/02
MOCE 7 - MODIS_Chl Ship Track

MOCE-7 (Day 2000345) Ship to MODIS Chl_a Comparison

MOCE-7 (Day 2000345) Ship to MODIS Chl_a % Difference
MOCE 8 - MODIS_Chl Ship Track

MOCE-8 (Day 2001061) Ship to MODIS Chl_a Comparison

MOCE-8 (Day 2001061) Ship to MODIS Chl_a % Difference
Present Status - Future Validation

- Recent Miami characterizations/calibration results have solved most of the major nLw retrieval problems.
- Present products are computationally validated and initial validation results indicate that the pigment retrievals are within 30%.
- MOBY observations now operational for Aqua.
- July - Two cal/val data sets with Modis Terra, Aqua & SeaWiFS overpasses.
- MODIS Validation/Initialization cruises scheduled for Sept. and Oct. 2002 in the Chesapeake Bay and Hawaii.