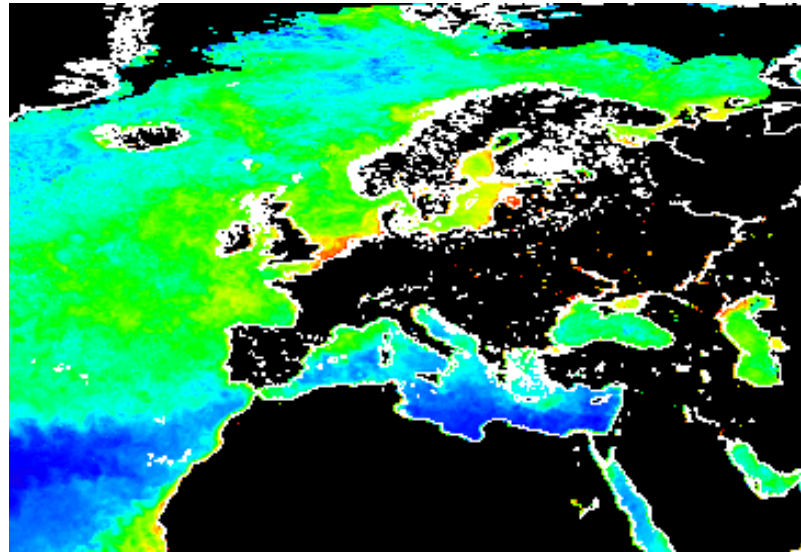


GlobColour Validation

**Samantha Lavender
and the GlobColour Team**



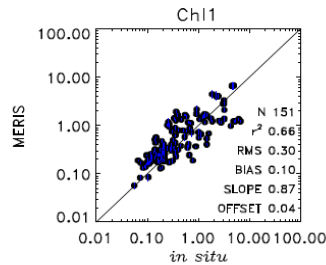
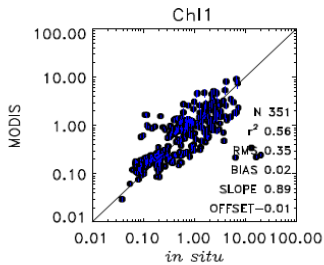
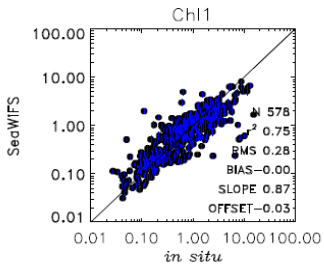
<http://www.globcolour.info/>

Phase 1 & 2: Sensor characterization

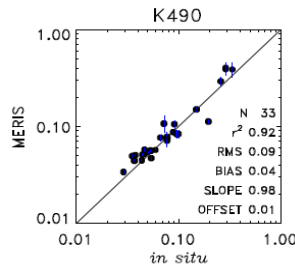
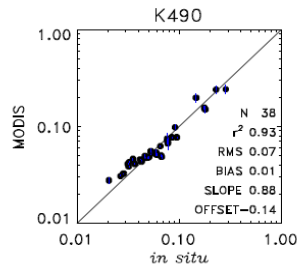
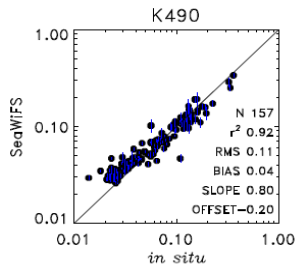
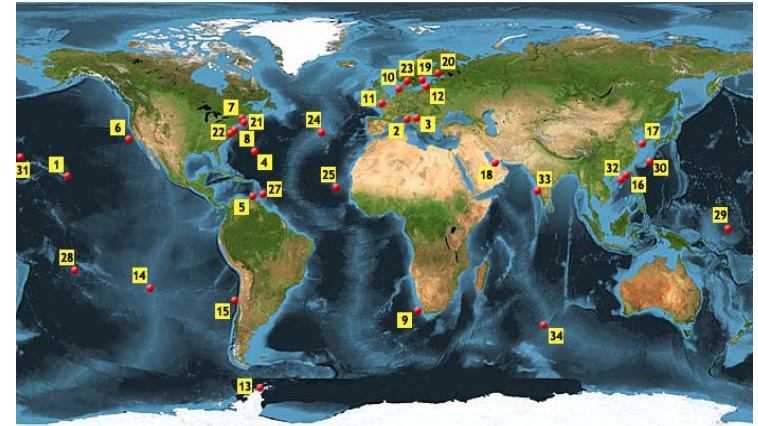
SeaWiFS

MODIS

MERIS

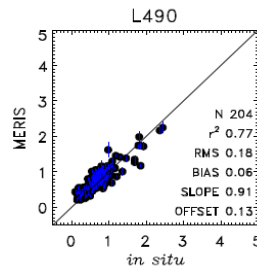
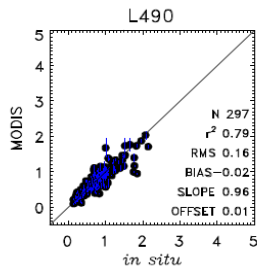
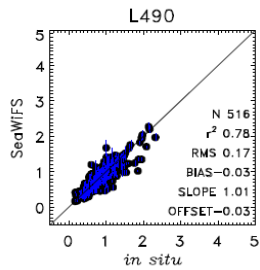


CHL



K490

In-situ Diagnostic Data Set (DDS) for characterization and validation



L490

Statistical uncertainties were derived and used for the data merging

DDS can now be downloaded via Hermes

The screenshot shows the Hermes web interface for downloading DDS data. The interface includes the ESA logo, the GlobColour logo, and the Hermes logo. A navigation bar contains links for Home page, Archive, Near Real Time, Demonstration products, Subscriptions, and Rolling archive. The main content area is divided into several sections:

- Product type:** Radio buttons for FPS and DDS (selected).
- Select an area on map or enter coordinates:** A world map with a red box highlighting a region in the North Atlantic. Below the map are input fields for North (35°N), West (70°W), East (52°W), and South (20°N), along with a Reset button.
- Resolution:** Checkboxes for 1 km (DDS only) (checked), 4 km, 25 km, and 100 km.
- Selected products list:** A table with 8 rows of product IDs and a 'Check/Uncheck All' checkbox (checked).

Product ID	Count
<input checked="" type="checkbox"/> L3b_19970906_162131-18_BATS_4_SWF_DDS_TR_00.nc	# 1
<input checked="" type="checkbox"/> L3b_19970920_165612-18_BATS_4_SWF_DDS_TR_00.nc	# 2
<input checked="" type="checkbox"/> L3b_19970921_160234-18_BATS_4_SWF_DDS_TR_00.nc	# 3
<input checked="" type="checkbox"/> L3b_19970922_164707-18_BATS_4_SWF_DDS_TR_00.nc	# 4
<input checked="" type="checkbox"/> L3b_19970924_163803-18_BATS_4_SWF_DDS_TR_00.nc	# 5
<input checked="" type="checkbox"/> L3b_19970926_162859-17_BATS_4_SWF_DDS_TR_00.nc	# 6
<input checked="" type="checkbox"/> L3b_19970927_171330-18_BATS_4_SWF_DDS_TR_00.nc	# 7
<input checked="" type="checkbox"/> L3b_19970928_161954-18_BATS_4_SWF_DDS_TR_00.nc	# 8
- Selected DDS list:** A checkbox for 'Check/Uncheck All' (checked) and a checkbox for 'BATS' (checked).
- Select a date or period:** A date range from 01/09/1997 to 14/11/2008, with a note to use the format dd/mm/yyyy.
- Binning period:** Radio buttons for track (DDS only) (checked), daily, 8-days, and monthly.

At the bottom of the interface are buttons for Order Products, New search, Download list, and Upload a list. The footer includes a link to the Interface User Manual, contact information, and a disclaimer: "All images and data available on this GlobColour site are for research and educational use only." The browser status bar shows "Internet | Protected Mode: On" and "100%".

Characterisation summary (2nd workshop)

- Overall performance of SeaWiFS (against *in situ*) was better* when compared to MERIS and MODIS-A.
- MERIS Lw670 had better relationship (against *in situ*) than MODIS-A and SeaWiFS; better Case 2 retrieval?
- In Phase-2, the match-up statistics were improved compared to both the NASA-OBPG global validation (for SeaWiFS and MODIS-A) and GlobColour Phase-1 characterisation results.
- The aerosol optical thickness (T865) match-up required improved match-up criteria; designed for *in situ* (water) rather than atmospheric parameters.

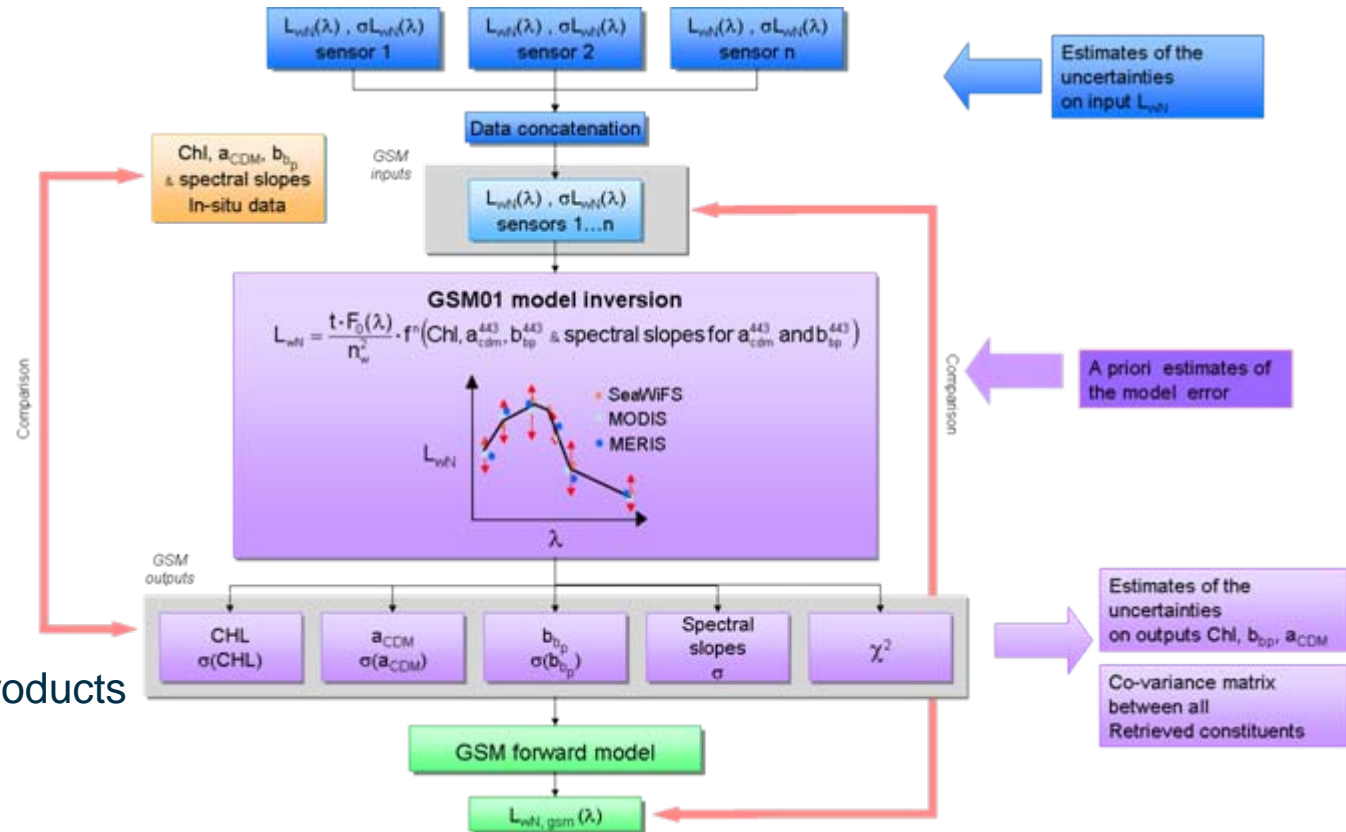
* besides better sampling (number of match-ups)

GlobColour – Data merging

Merging recommendations:

Weighted averaging of bio-optical properties (chl-a)

GSM01 model (Maritorena et al., 2002)



• Input

$L_{wrt}(\lambda)$ from all available sensors
+ sensor specific error estimates

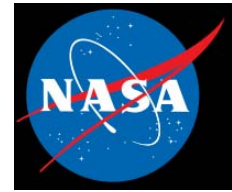
• Model

Inversion procedure of a bio-optical merging model

• Output

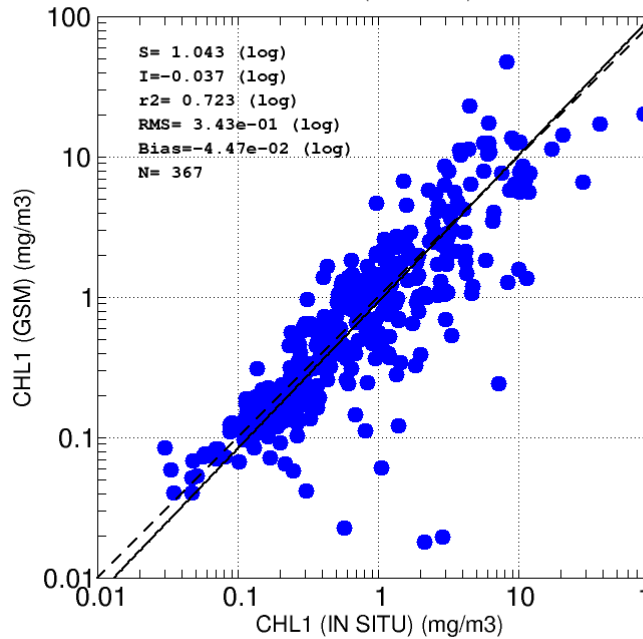
Several bio-geochemical products
+ **error estimates per pixel**

GlobColour validation

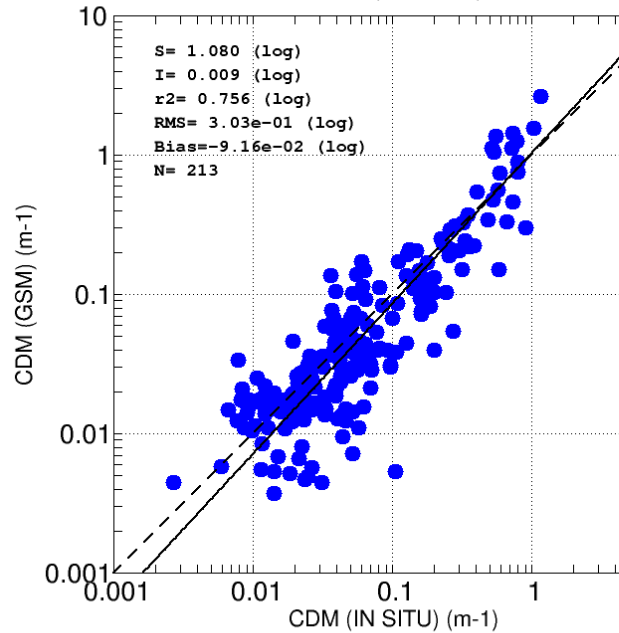


GSM Chla, CDM, bbp validation with NOMAD-V2 (provided by NASA)

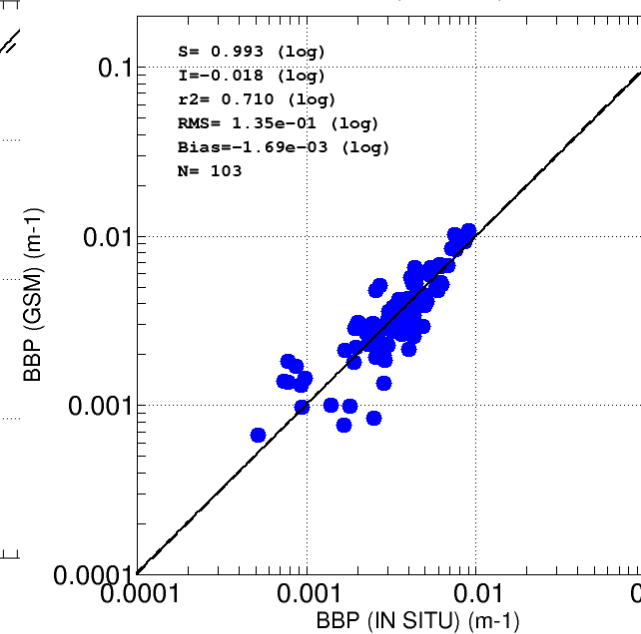
CHL1 (GSM GlobColour model) vs. CHL1 (IN SITU)



CDM (GSM GlobColour model) vs. CDM (IN SITU)



BBP (GSM GlobColour model) vs. BBP (IN SITU)



Wednesday, 19 November 2008

OCEANOGRAPHIC AUTONOMOUS OBSERVATIONS

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Oceanographic Autonomous Observations

The OAO project brings together scientists to collaborate on the latest technical advances in automatic platforms, robotic **gliders** and **profiling-floats** for the development of a realtime in-situ acquisition system for bio-optical and biogeochemical data.

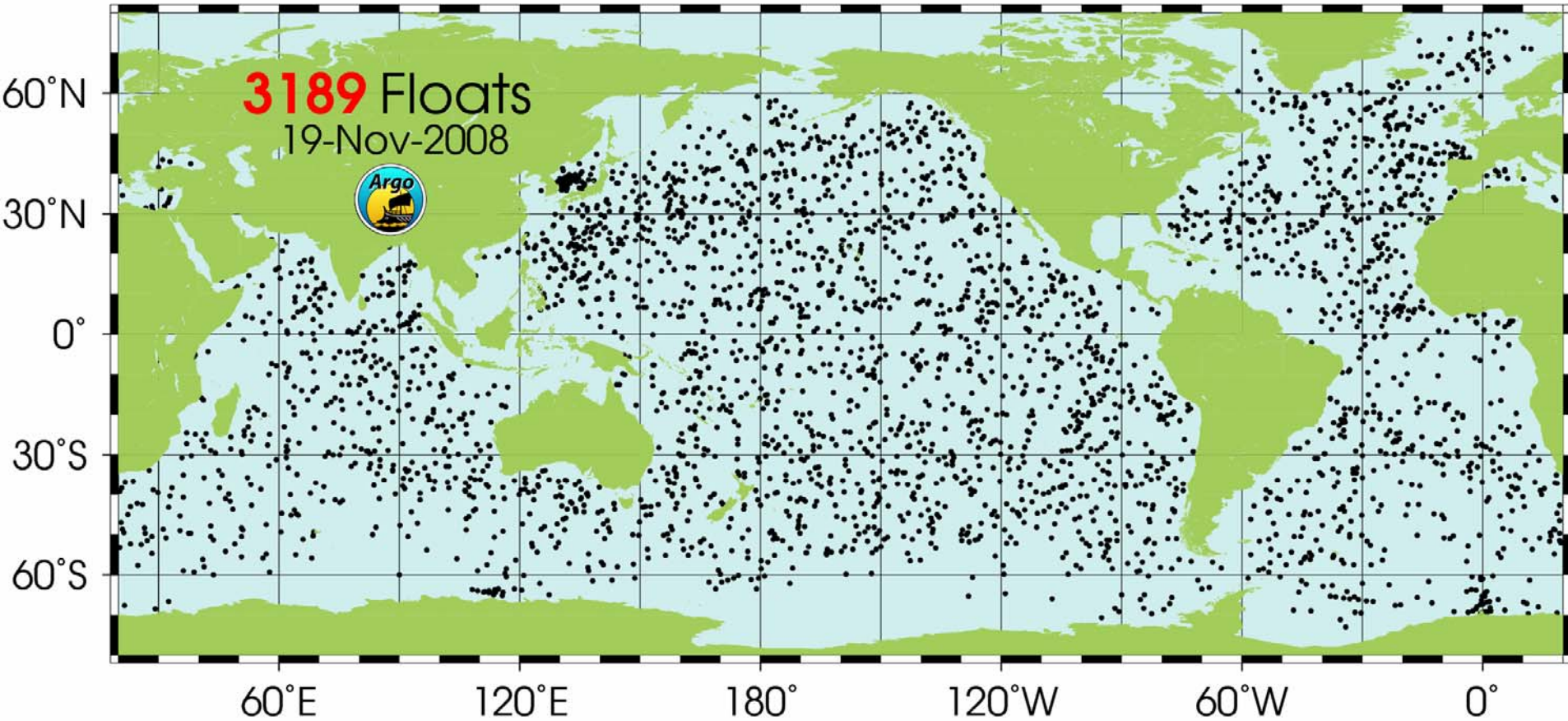


ARGANS

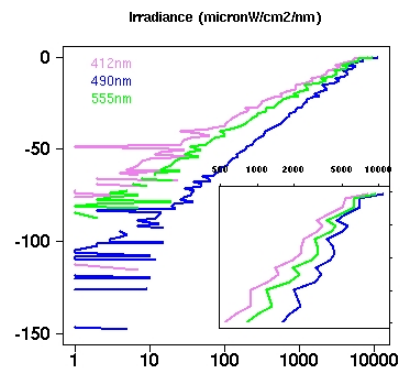
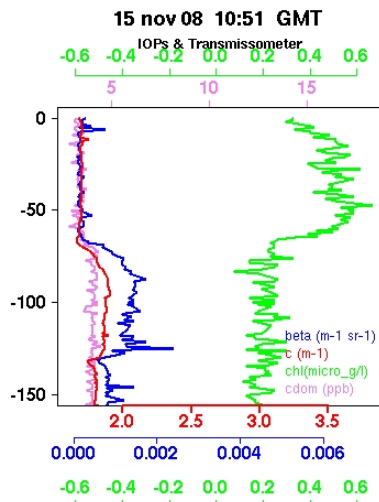
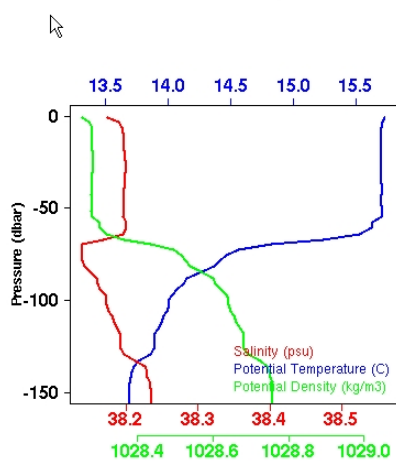
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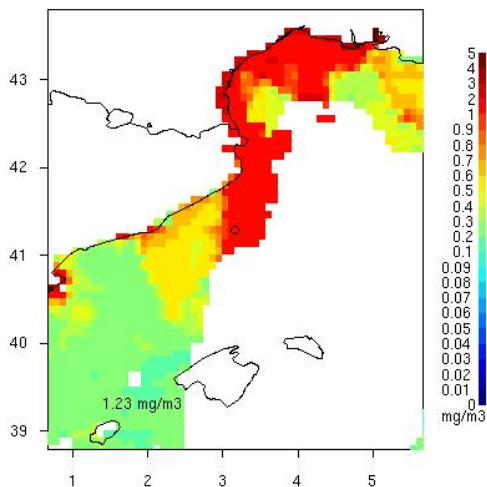
ARGO floats



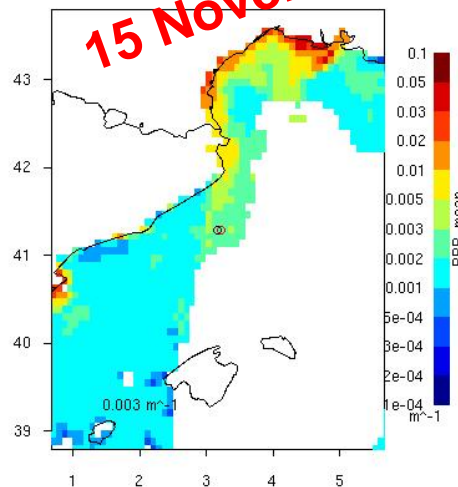
Cycle number: 49 MED_NW_B02_6900677 Mediterranean_sea (Lat: 41.29 Lon: 3.17)



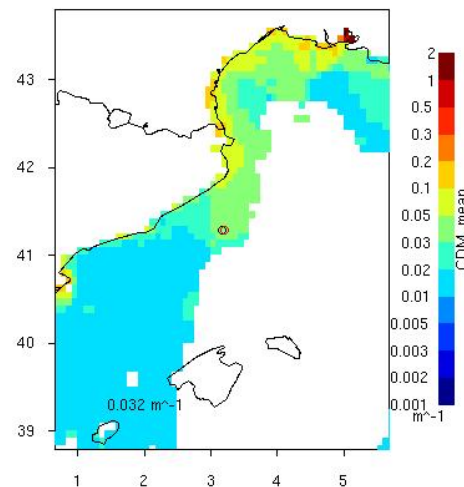
L3m_20081115_MedW_9_GSM-MERMOD_CHL1_DAY_00.nc



L3m_20081115_MedW_9_GSM-MERMOD_BBP_D_00.nc

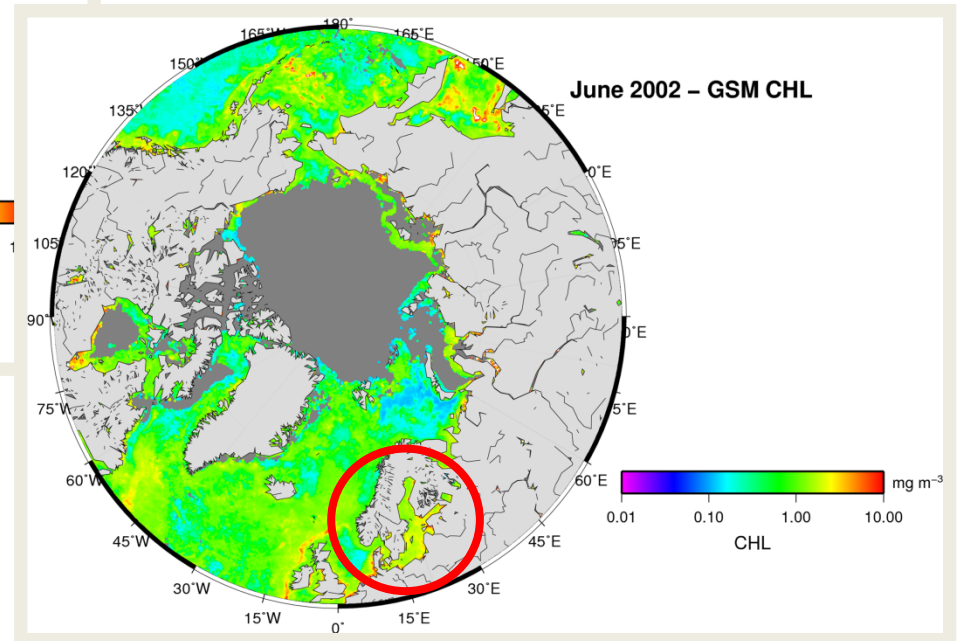
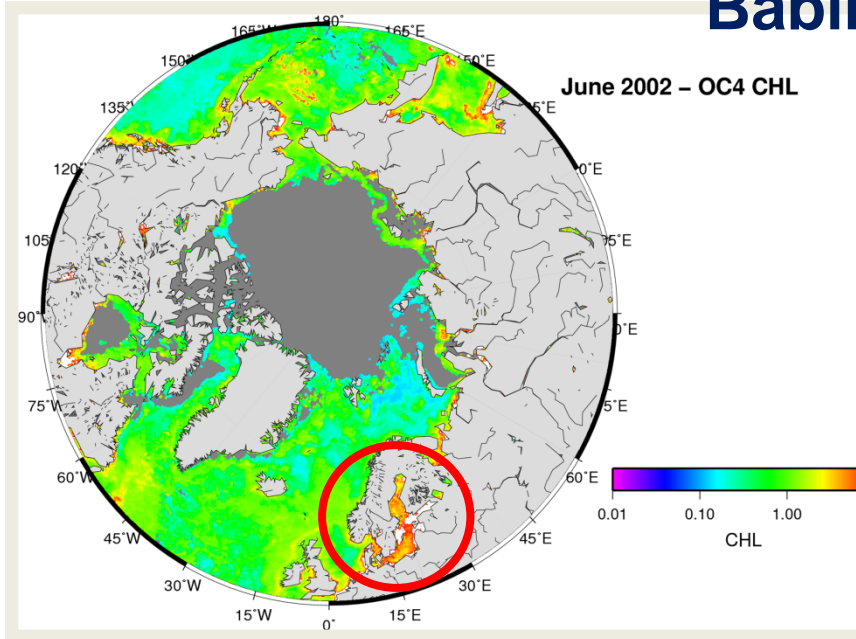


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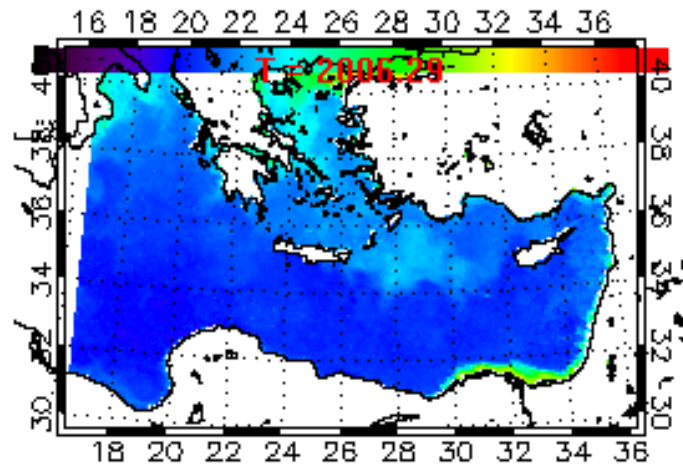


15 November 2008

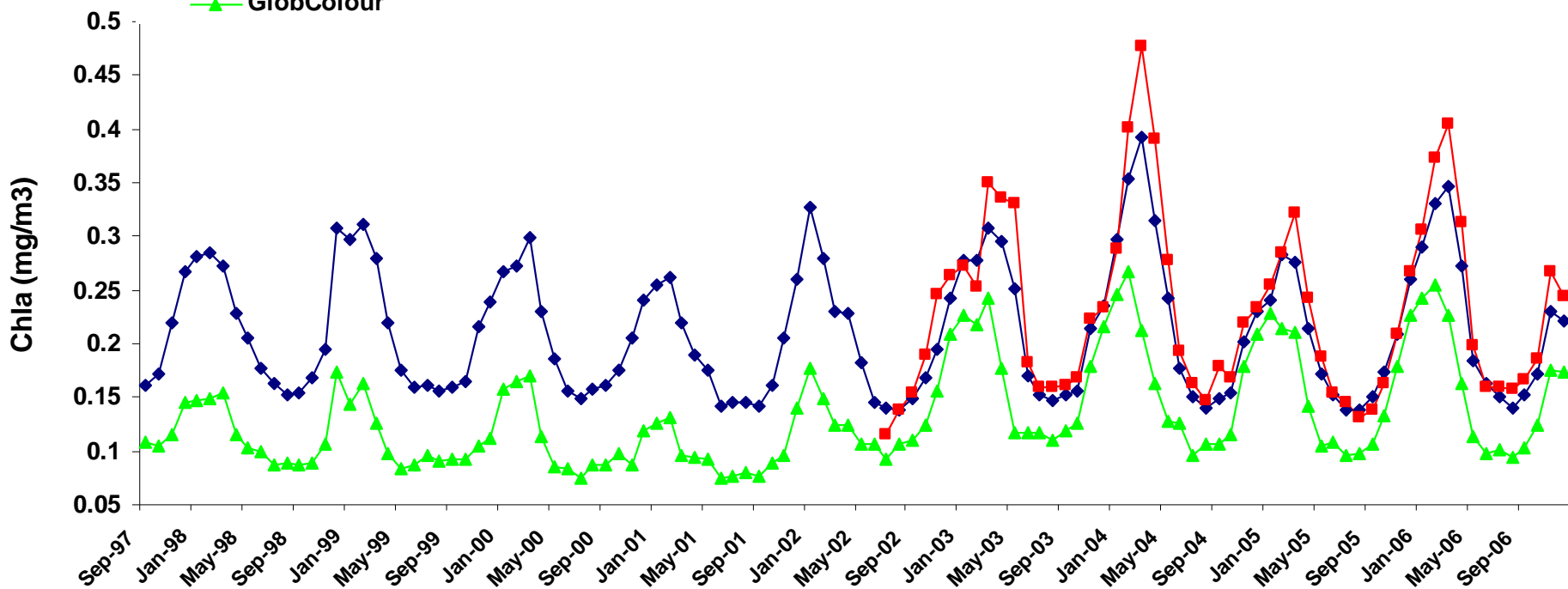
GlobColour GSM CHL products are lower than standard Case 1 algorithm products (courtesy of Babin and Bélanger)



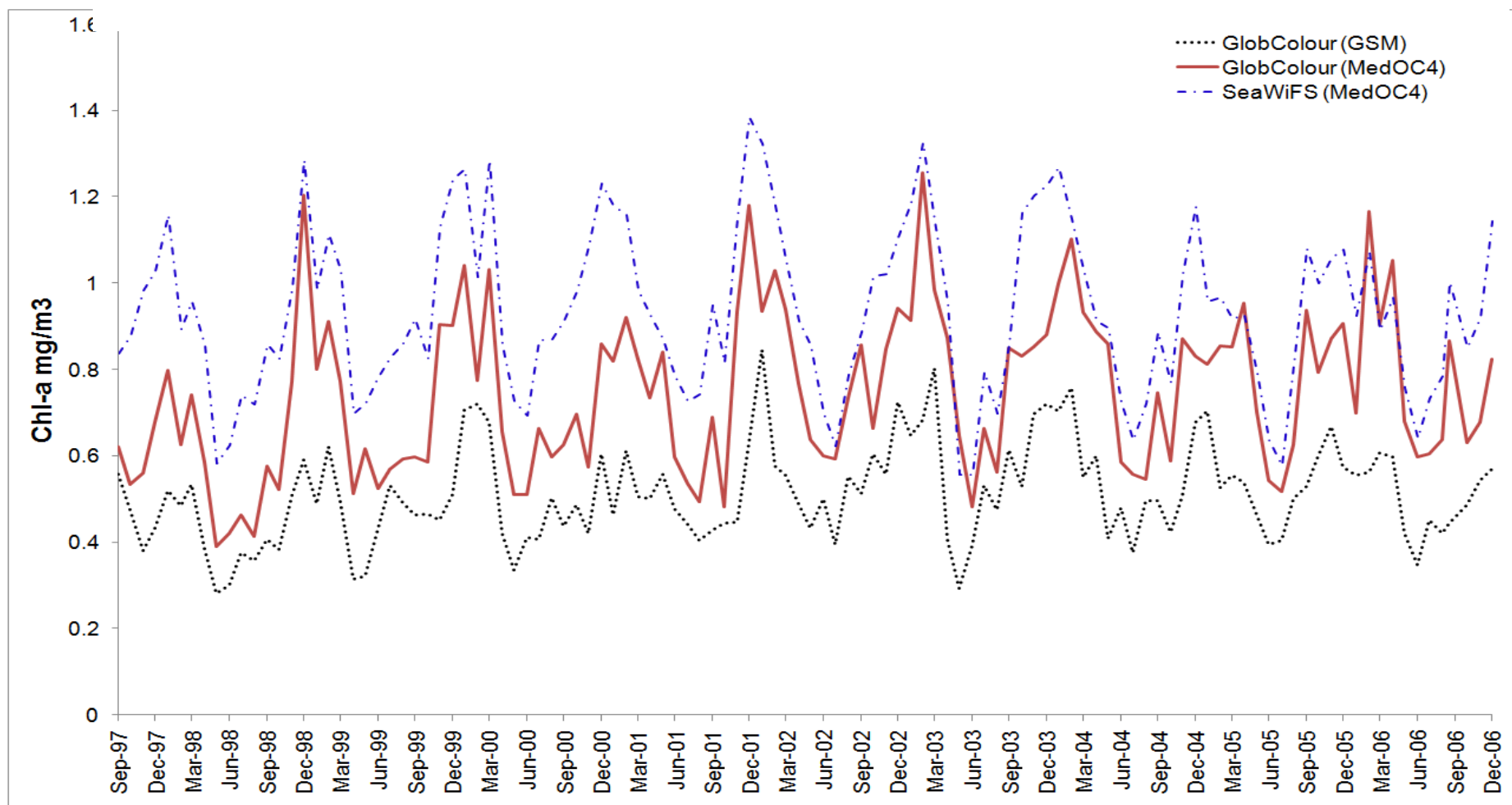
Intercomparison within the Eastern Med (courtesy of Raitzos)



- ◆ SeaWiFS
- MODIS
- ▲ GlobColour



Assessment on the Egyptian Mediterranean shelf (Lavender, Moufaddal and Pradhan)

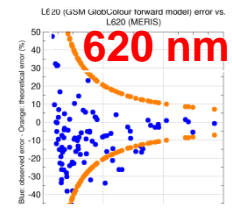


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GlobColour uncertainties estimates: exploitation of residuals



MERIS

MERIS

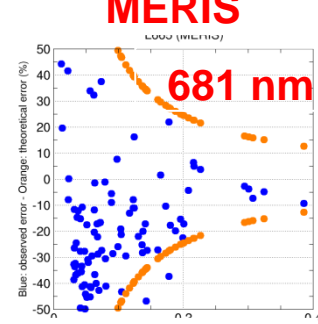
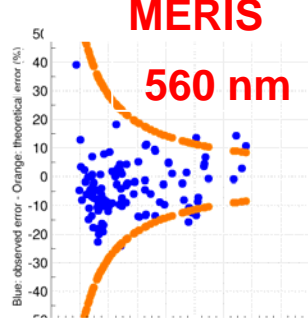
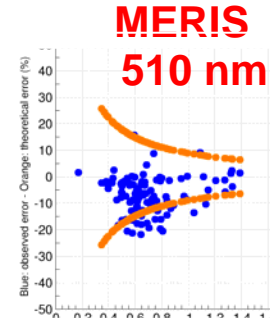
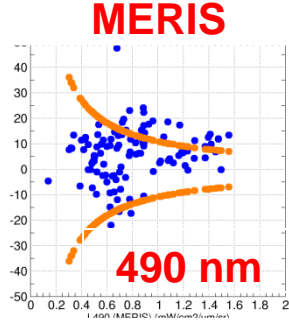
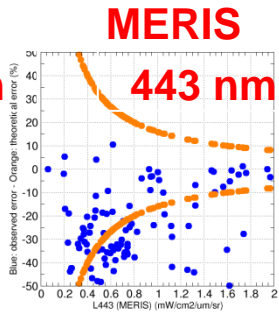
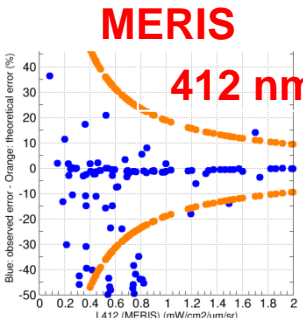
MERIS

MERIS

MERIS

MERIS

MERIS



620 nm

412 nm

443 nm

490 nm

510 nm

560 nm

681 nm

SeaWiFS

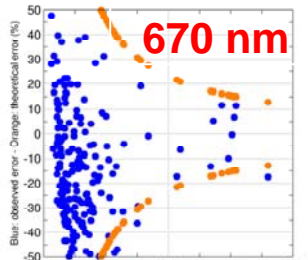
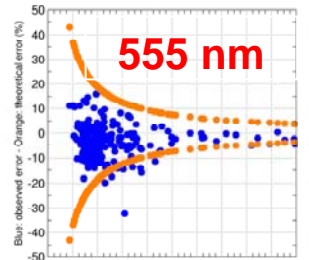
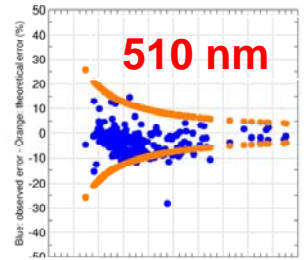
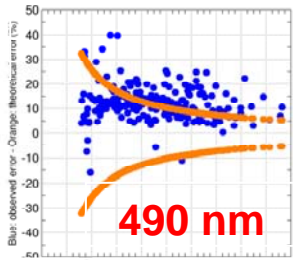
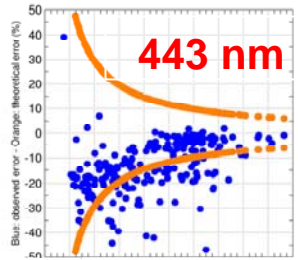
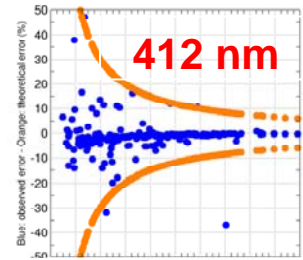
SeaWiFS

SeaWiFS

SeaWiFS

SeaWiFS

SeaWiFS



MODIS

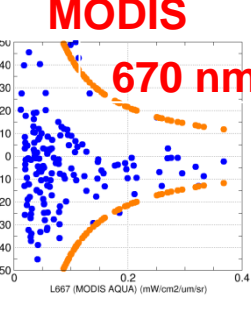
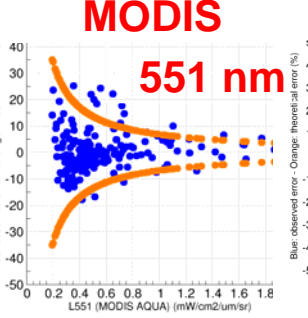
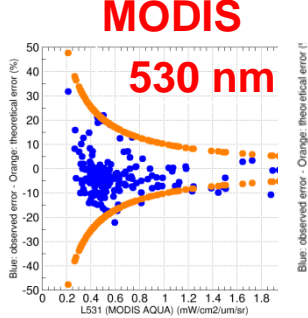
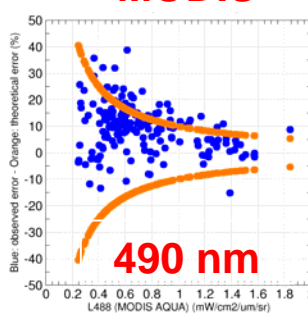
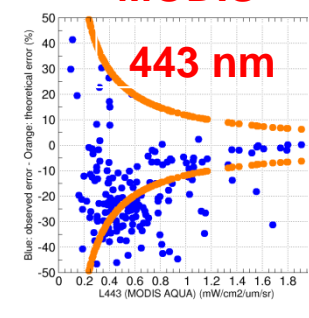
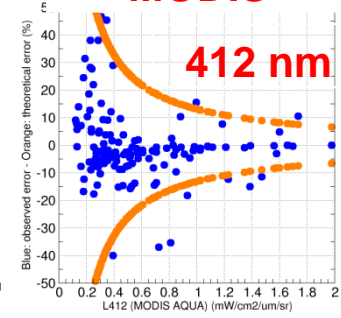
MODIS

MODIS

MODIS

MODIS

MODIS



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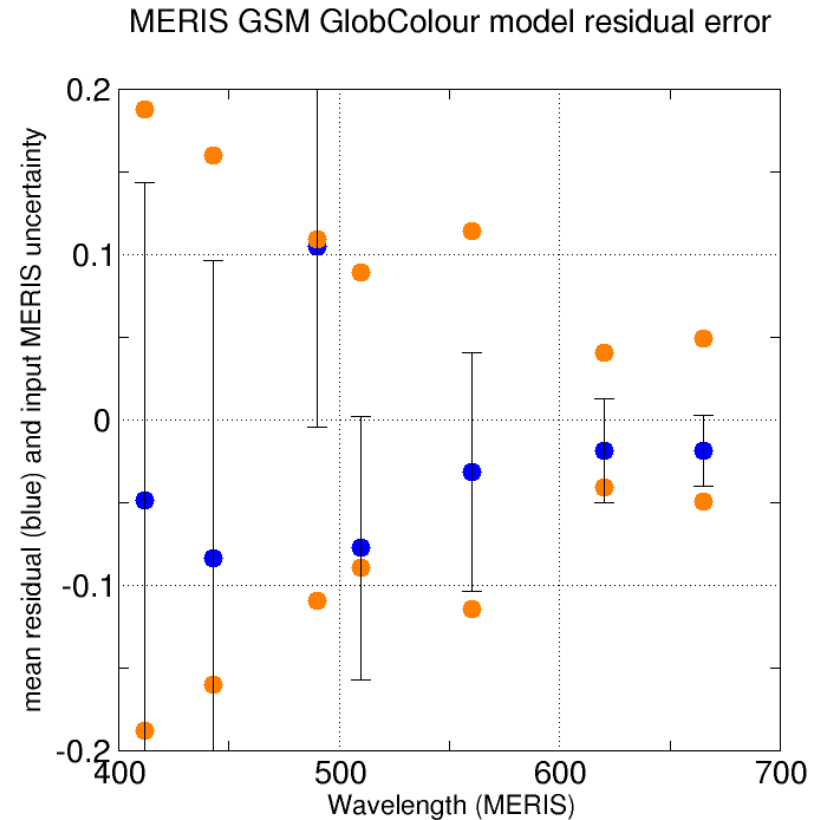
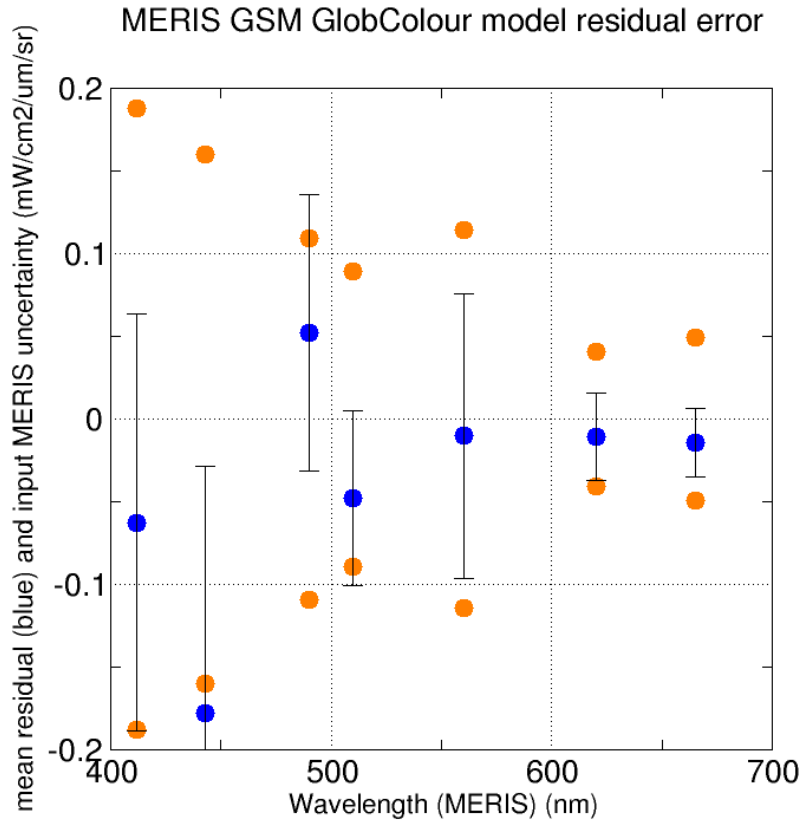


GlobColour uncertainties estimates

Qualification – MERIS – Water leaving radiances

NOMAD – V2.0

16 June 2004 - Global



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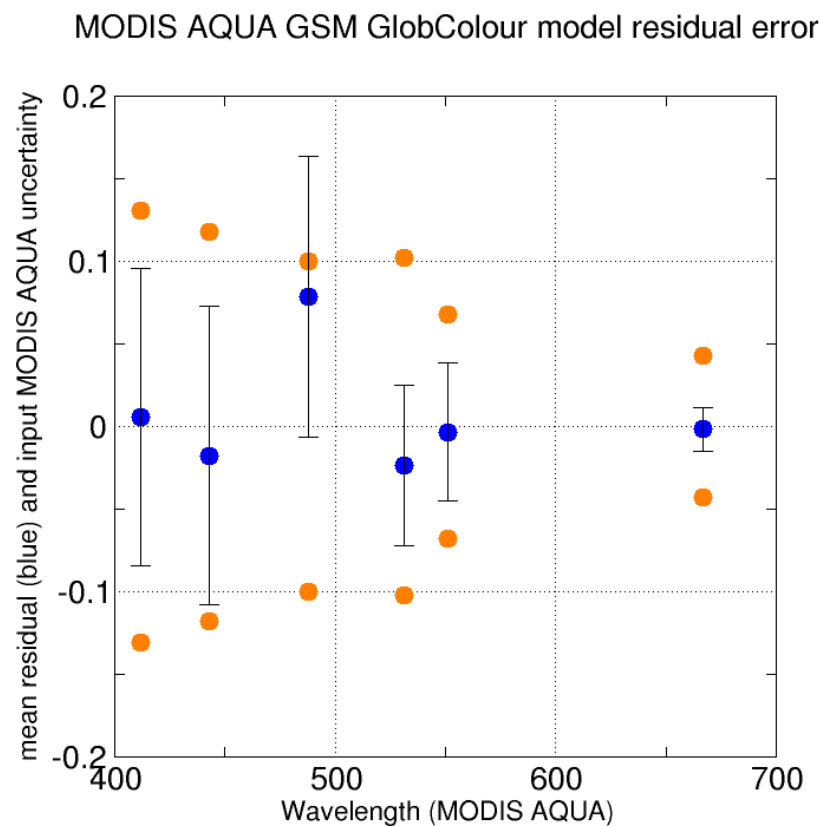
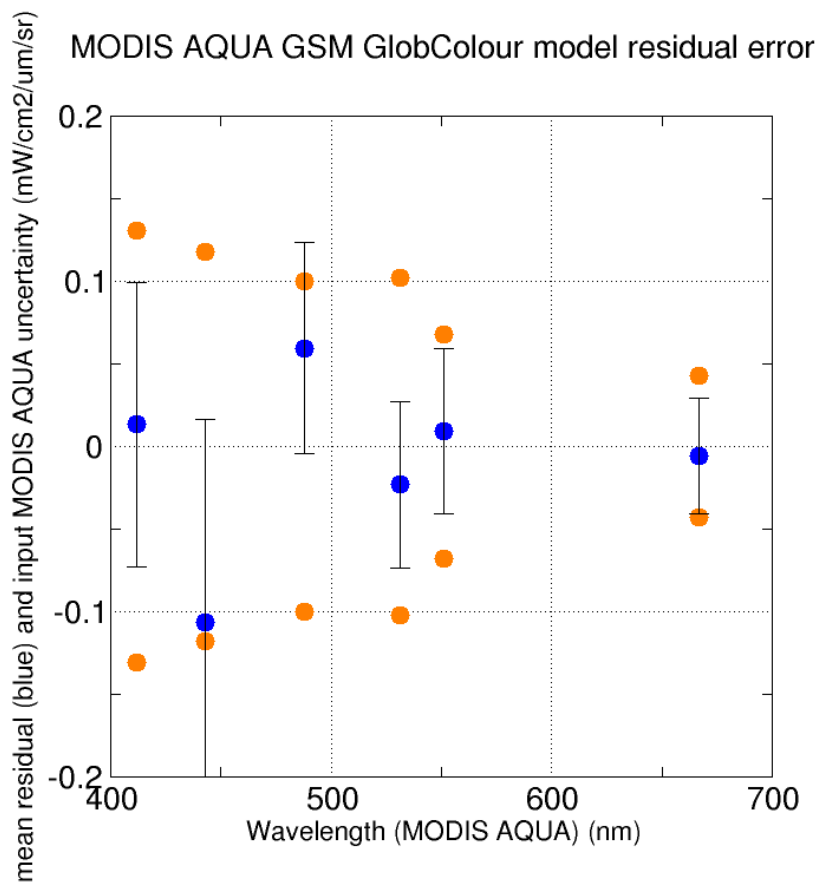


GlobColour uncertainties estimates

Qualification – MODIS – Water leaving radiances

NOMAD – V2.0

16 June 2004 - Global



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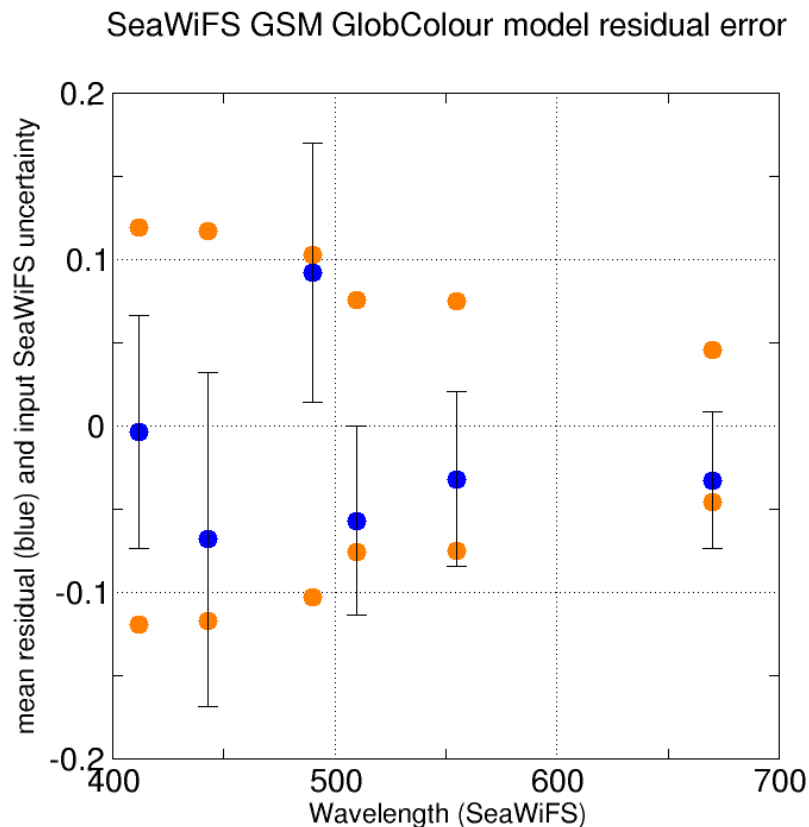
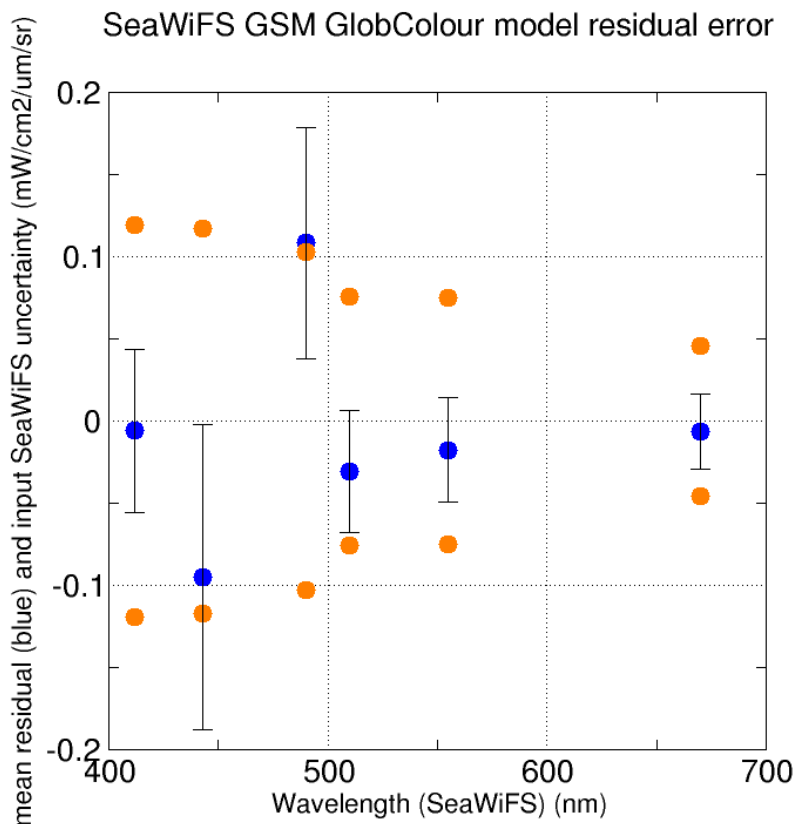


GlobColour uncertainties estimates

Qualification – SeaWiFS – Water leaving radiances

NOMAD – V2.0

16 June 2004 - Global



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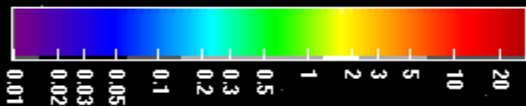


Summary

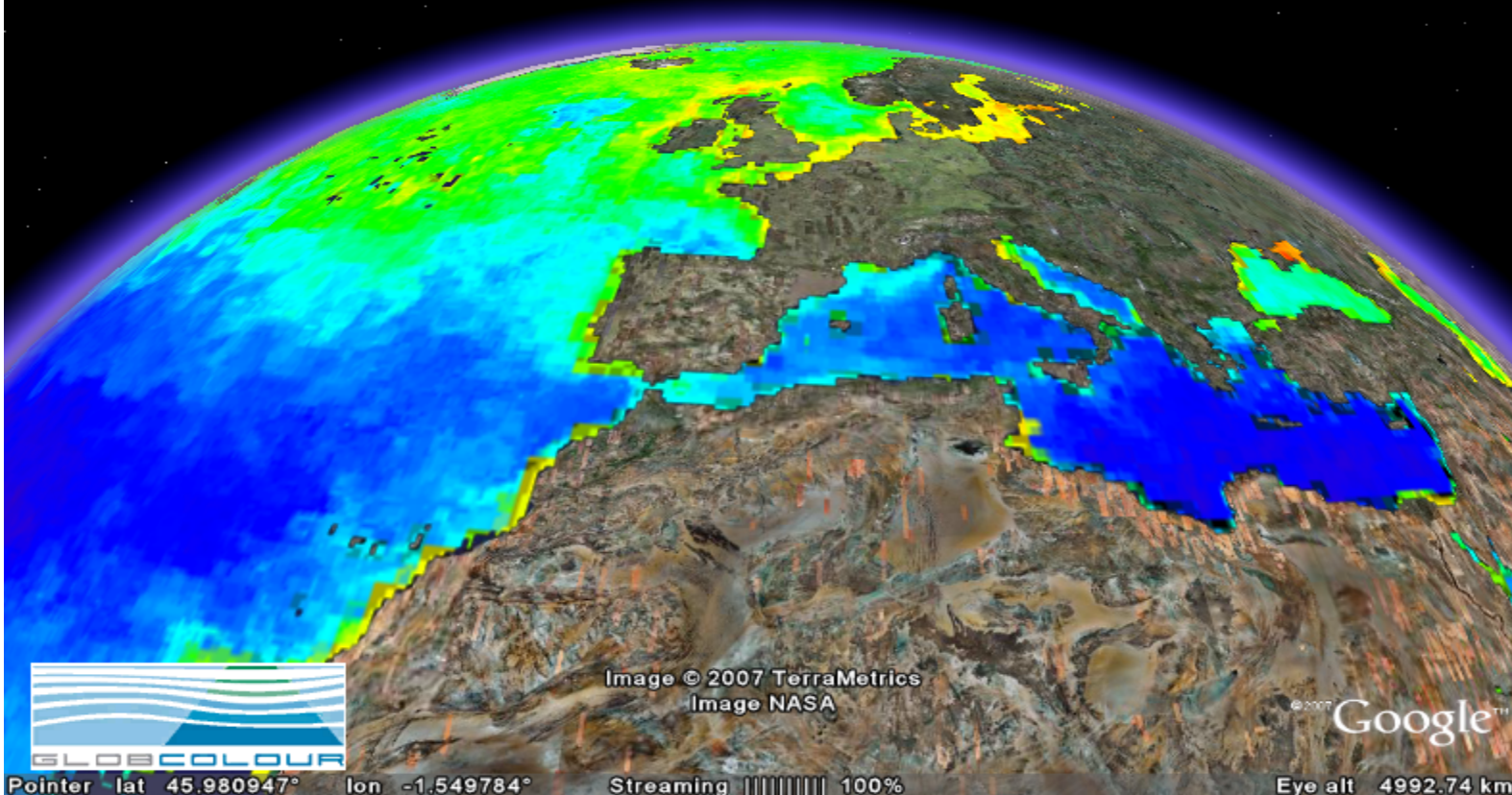
- Lack of in-situ data continues to be an issue for ocean colour product validation
- Argo floats containing biological sensors are one potential source of in-situ data, but needs a funding commitment
- Calculating uncertainty estimates from level3 data looks promising (similar results to validation comparison) for understanding model versus satellite error sources

GlobColour - CHL1 - Merged monthly product (GSM)

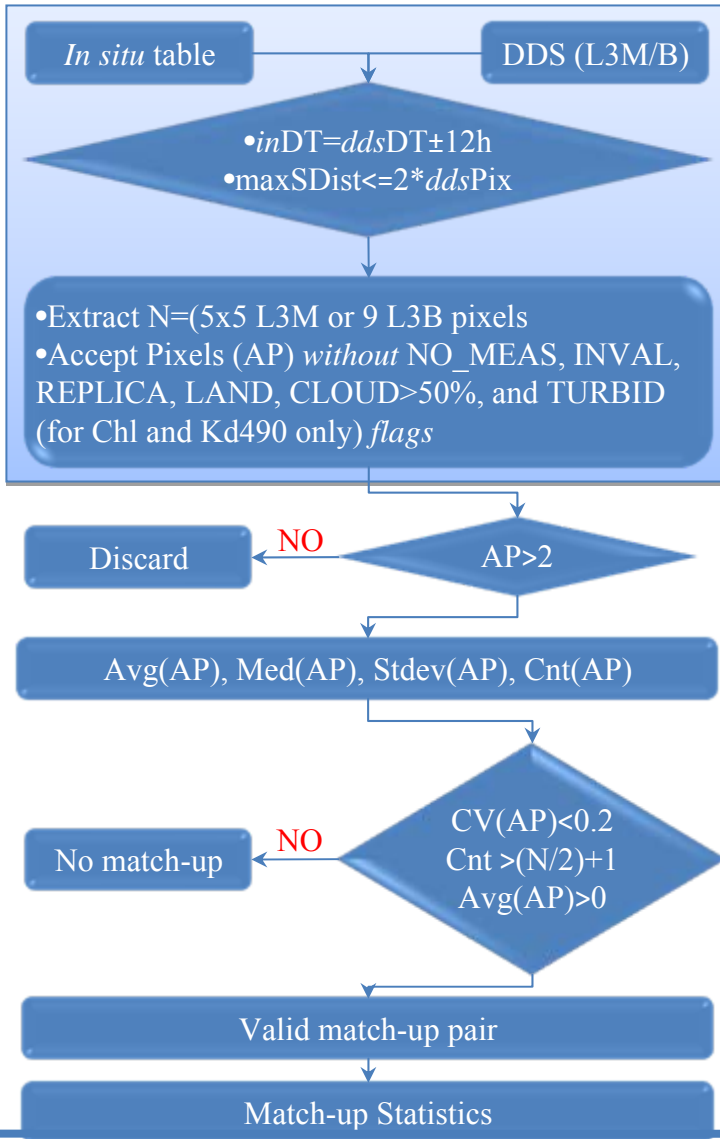
Chlorophyll a concentration (mg/m³)



www.globcolour.info

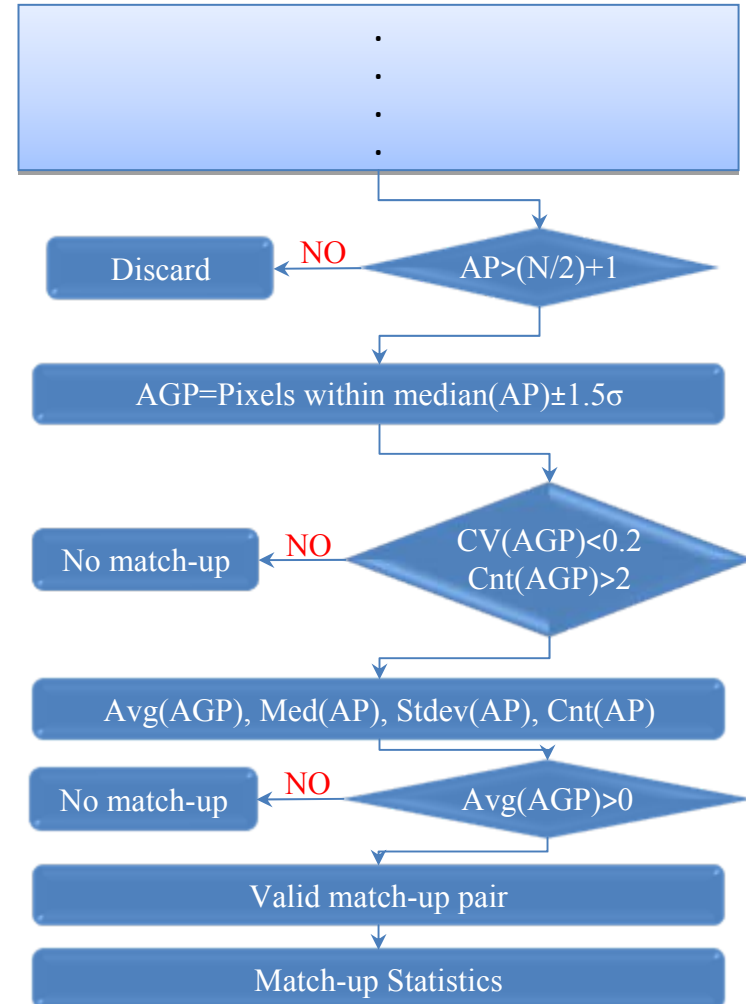


Method-1



Match-up Criteria

Method-2



Match-up Statistics

$$\text{Mean}; \quad \bar{X} = \frac{1}{N} \sum_{i=1}^N X_i$$

$$\text{RMS} = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (y_i - x_i)^2}$$

$$\text{CV} = \frac{S_{N-1}}{\bar{X}}$$

$$\text{STDEV}; \quad S_{N-1} = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (X_i - \bar{X})^2}$$

$$\text{MeanBias} = \frac{1}{N} \sum_{i=1}^N (y_i - x_i)$$

$$\text{MeanRatio} = \frac{1}{N} \sum_{i=1}^N \frac{y_i}{x_i}$$

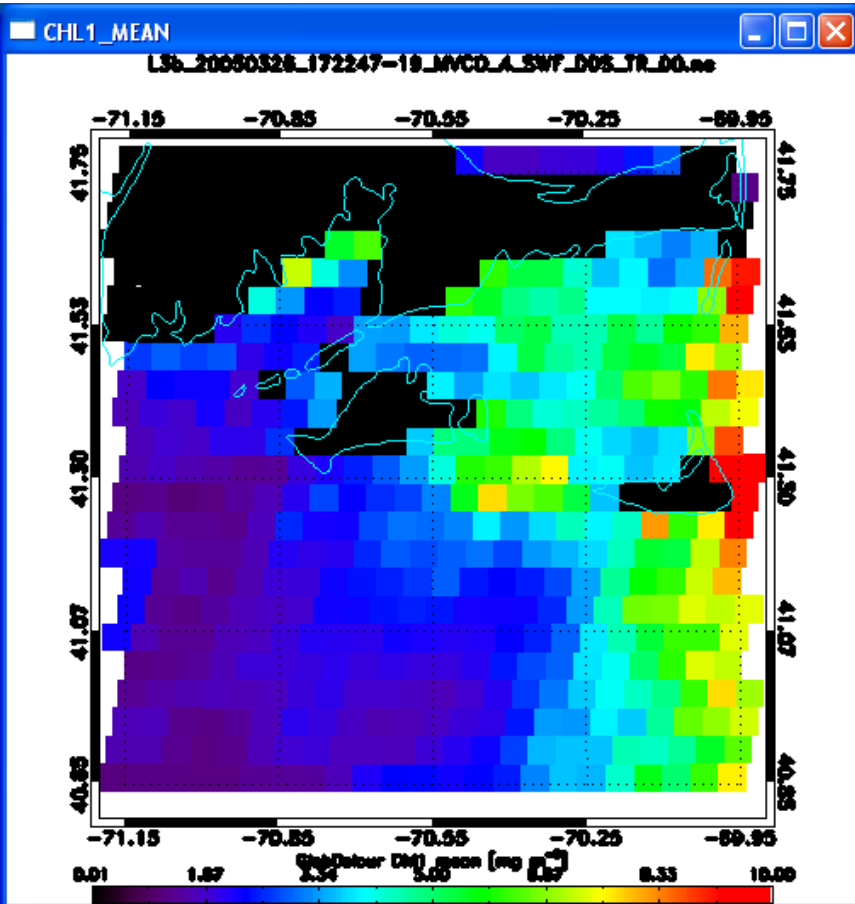
$$\text{CoeffDeterm}; \quad r^2 = \frac{\left[\sum_{i=1}^N (x_i - \bar{x})(y_i - \bar{y}) \right]^2}{\sum_{i=1}^N (x_i - \bar{x})^2 (y_i - \bar{y})^2}$$

$$\text{MeanAbs\%Diff} = \frac{100}{N} \sum_{i=1}^N \frac{|y_i - x_i|}{x_i}$$

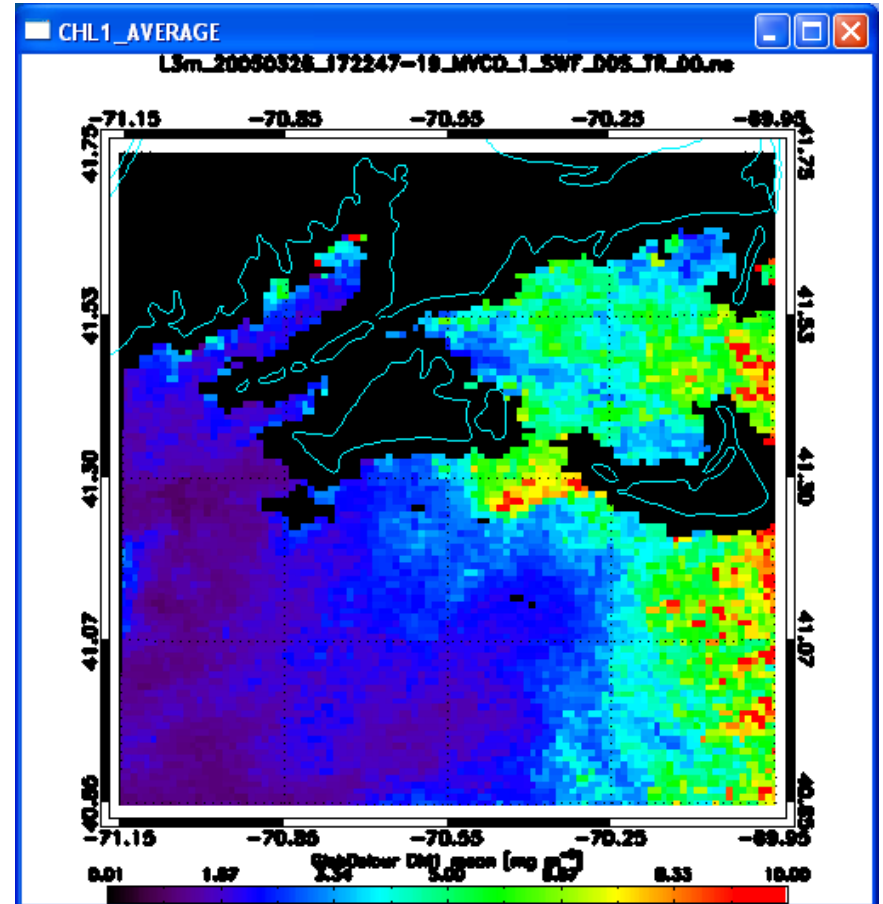
$$\text{MeanAbsDiff} = \frac{1}{N} \sum_{i=1}^N |y_i - x_i|$$

Diagnostic Data Sets (ncdf, CF1.0)

L3Binned (ISIN grid, 4km)



L3Mapped (PC grid, 1km)



Assessment on the Egyptian Mediterranean shelf (Lavender, Moufaddal and Pradhan)

