International Network for Sensor InTercomparison and Uncertainty assessment for Ocean Colour Radiometry (INSITU-OCR)

working toward high accuracy and consistency of essential climate variables from multiple satellite ocean color missions
…a joint CEOS (OCR-VC) & IOCCG initiative…

Co-leads: Giuseppe Zibordi (EC/JRC)
Sean Bailey (NASA)

CEOS
Committee on Earth Observation Satellites

cited from S. Bailery, OCRT meeting April 2012

IOCCG

INSITU-OCR evolution

- January 2010
  - ✓ Proposal for an international SIMBIOS-like activity at IOCCG#15
- April 2010
  - ✓ Meetings at Oceans from Space conference in Venice:
    - Town Hall meeting on OCR-VC
    - Dedicated side-session on INSITU-OCR
- October 2010
  - ✓ OCR workshop in conjunction with WGCV-IVOS conference at JRC
  - ✓ INSITU-OCR was introduced to space agency principals in the CEOS plenary in Rio, Brazil
- February 2011
  - ✓ Discussion continued at IOCCG#16
- March 2011
  - ✓ …and at CEOS SIT – Tokyo
- November 2011
  - ✓ Working group formed
- February 2012
  - ✓ Workshop held at Goddard
- April 2012
  - ✓ Ocean color research team meeting

INSITU-OCR white paper:

- First draft review by the working group (March 15, 2012)
- Anticipated delivery by the end of May 2012

Working group participants

Agency Representatives

- EC/JRC – Giuseppe Zibordi (co-lead)
- NASA – Sean Bailey (co-lead)
- *IOCCG – David Antoine*
- ESA – Philippe Goryl
- CNES – Bertrand Fougnie
- NOAA – Menghua Wang
- NASA – Bryan Franz
- NIST – Carol Johnson
- JAXA – Hiroshi Murakami
- *EUMETSAT – Ewa Kwiatkowska*
- *KORDI – Yu-Hwan Ahn*
- *ISRO – Prakash Chauhan*

Discussions in INSITU-OCR WG

- Blend IOCCG plans with OCR workshop and WGCV-IVOS workshop recommendations
  - ✓ Review of current "best practices"
  - ✓ Discussion of gap-analysis for INSITU-OCR/CalVal
  - ✓ Cooperate to the next WGCV/IVOS comparisons (OCR)
- Goal – a community white-paper on requirements for inter-agency initiative on INSITU-OCR
  - ✓ Harmonize existing OCR programs and identify gaps of networking as per schematic
  - ✓ Integrating and rationalizing inter-agency efforts for:
    - satellite sensor inter-comparisons
    - uncertainty assessment for remote sensing products
    - emphasis on requirements for the generation of Ocean Color Radiometry Essential Climate Variables (ECV)
  - ✓ A prioritized effort of the CEOS Ocean Color Radiometry Virtual Constellation (OCR-VC)

Recommendations in the White Paper

i. Space sensor radiometric calibration, characterization and temporal stability;
   - ✓ *comprehensive calibration and inter-comparisons*

ii. Development and assessment of satellite products
   - ✓ *algorithm, validation, and their inter-comparison*

iii. in situ data generation and handling
   - ✓ *measurement protocols, QA, and coordination of field campaign*

iv. information management and support
   - ✓ *accessibility, format, and community processor*

Special consideration is given to traceability, application and accessibility of the in-situ measurements, which are a fundamental element of any ocean color mission.

IOCCG working groups

- *Current working groups*

  http://www.ioccg.org/groups_ioccg.html
- *Standing working group for the ECV generation*

  Co-Chairs: Jim Yoder (WHOI) and Nicolas Hoepffner (JRC)

cited from J. Yoder, OCRT meeting April 2012

Current IOCCG working groups

- *Ocean Colour from a Geostationary Platform* *(chaired by David Antoine, LOV, France)*

  This WG is addressing requirements of ocean-colour observations from a geostationary orbit. The complementarities between LEO and GEO missions will also be examined. The report will be published in 2012.

- *Assessing Requirements for Ocean-Colour Missions* *(co-chaired by Chuck McClain, Gerhard Meister and Paula Bontempi, NASA)*

  The WG update the current suite of requirements including the relevant science questions, ocean properties that can be measured, and pre/post-launch calibration. The report will be published in 2012.

- *Harmful Algal Blooms* *(chaired by Stewart Bernard, CSIR, South Africa)*

  The WG aims to produce a report summarising the different techniques available for detecting HABs, and reviewing the characteristics of different types of ecosystems where HABs might occur. The monograph will be prepared by the end of 2012.

- *Uncertainties in Ocean-Colour Remote Sensing* *(chaired by Roland Doerffer, and Frédéric Mélin)*

  The goal of this working group is to develop procedures to detect algorithm limitations, to determine the remaining uncertainties on a pixel-by-pixel basis, and to present the errors and uncertainties in a proper form. A WG meeting and the first draft of report will be reviewed in 2012. A final version should be ready in 2013.

- *Ocean-colour remote sensing in Polar Seas* *(chaired by Marcel Babin, Kevin Arrigo and Simon Bélanger)*

  This WG investigates limitations of using OC remote sensing in polar seas including low sun elevation, ice-related adjacency effects, a pronounced deep Chl maximum related to stratification, cloud cover, and optical peculiarity. The first draft of the report will be prepared in 2012.

- *Phytoplankton functional types* *(chaired by Shubha Sathyendranath)*

  The report will include in-situ methods of measuring PFTs, satellite detection of single algal blooms, multiple functional types, and phytoplankton size structure in cooperate with a PFT inter-comparison workshop held at the end of 2011. A complete draft report was expected in 2012.

- *Standing WG on ECV assessment* *(chaired by Nicolas Hoepffner and Jim Yoder)*

  The goal of the new WG is to undertake a critical comparison of ocean-colour ECV data products and provide confidence limits for the establishment of a long and coherent time-series of global ocean-colour ECV products. The ECV working group will focus on the most useful aspects avoiding overlap.

From GCOS report with Respect to Satellite OCR

FCDR for ocean colour is the time series of calibrated TOA radiances, which are then corrected for the atmospheric contribution to the signal to obtain the water-leaving radiance suite, from which data products such as chlorophyll-a concentration are derived.
The most important ocean-colour ECV products are the normalized water-leaving radiances and chlorophyll-a concentration.
Other products are in development, such as coloured dissolved organic matter and particulate backscatter (used to estimate total suspended material).

Variable	Horizontal	Vertical	Temporal	Accuracy	Stability
Lw	4km	N/A	Daily	5%*	0.5%
Chl-a	30km	N/A	Weekly	30%	3%

*this 5% requirement is specifically for the blue and green wavelengths

Mission Statement of IOCCG ECV Standing Working Group

The goal of this international scientific expert group is to undertake a critical comparison of available ocean-colour ECV data products and provide guidance on the generation of better, long-term OCR climate data records.

Proposed initial members (* indicates that they have accepted):

- *Jim Yoder –WHOI and Nicolas Hoepffner – JRC, co-Chairs **
- *Frédéric Mélin – EU (based at JRC) **
- *Ewa Kwiatkowska – Eumetsat*
- *Stephanie Henson – National Oceanography Centre, UK **
- *Stéphane Maritorena – UCSB **
- *Brian Franz – NASA-GSFC **
- *Menghua Wang – NOAA-NESDIS **
- *Hiroshi Murakami – JAXA **
- *Hubert Loisel – CNES **
- *ISRO recommended person*

DRAFT List of Tasks in First 2 Years

- Develop a roadmap for completion of the first ECV assessment (present draft at IOCCG annual meeting in 2014).
- Recommend comparison/evaluation metrics (in particular with respect to long-term trends) and define comparison protocols.
- Record and evaluate the differences among existing OCR ECV products (basin to global scales), and recommend how to resolve.
- Establish criteria for OCR ECV products and recommend actions needed to ensure the quality and consistency required by GCOS.
- Respond to CEOS requests for review of OCR ECVs.
- Establish contact with SST-VC which may have some comparable ECV challenges and solutions.
- Evaluate agency efforts to develop and archive ECVs, including agency actions to archive raw data and associated metadata that are needed for full reprocessing.