

*CEOS WGCV 30<sup>th</sup> Meeting*  
*Ocean Color Radiometry Virtual Constellation (OCR-VC)*

*Ilhabela, Sao Paulo, Brazil*  
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Source information: IOCCG-14 presentation by Paul DiGiacomo, NOAA, April 2009; SIT-21, 22, & 23 presentations by Jim Yoder, IOCCG Chair, April 2008, September 2008, & March 2009

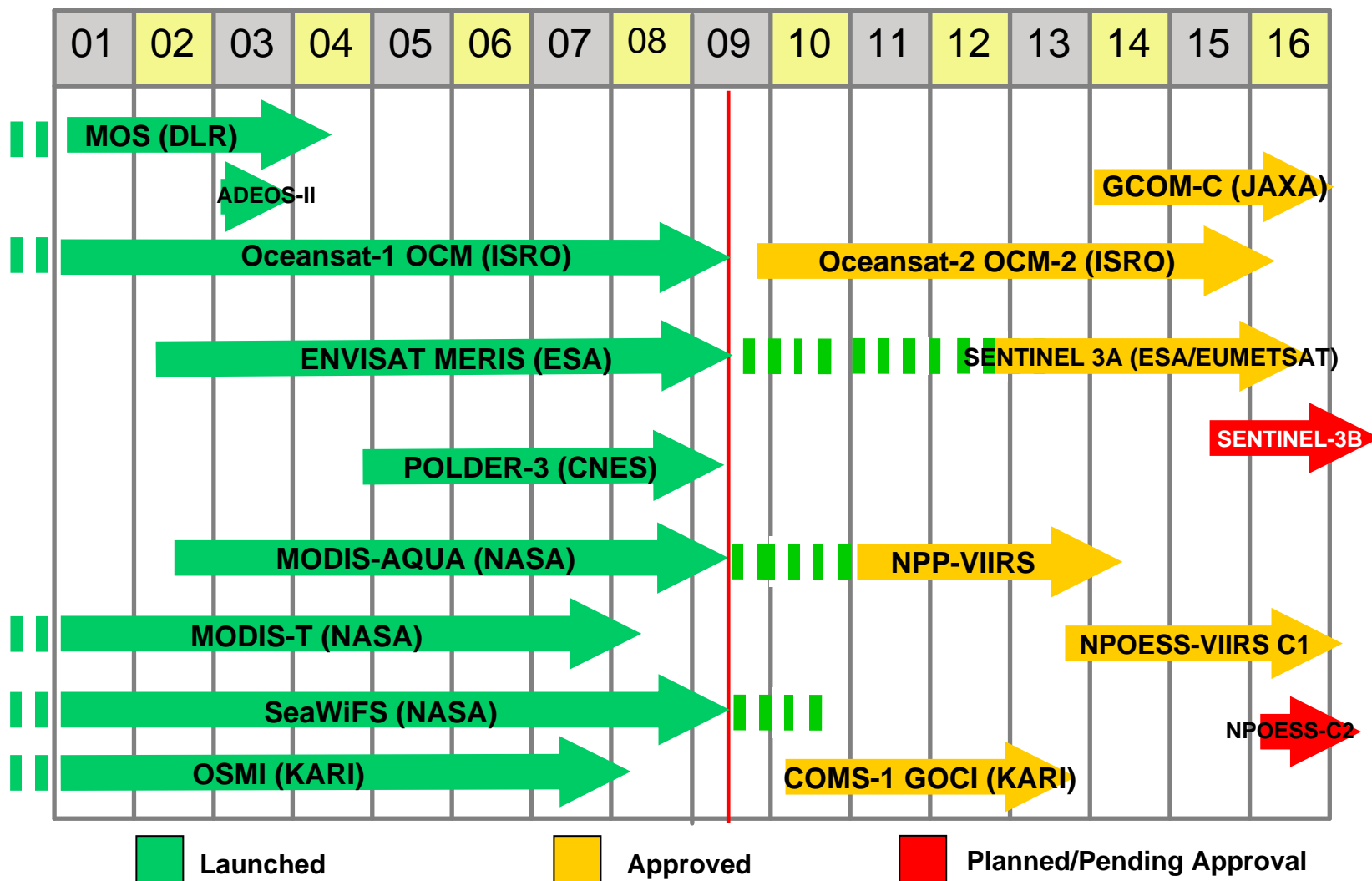
# Ocean Color Radiometry - Virtual Constellation (OCR-VC)

- “A VC is an international science program where multiple space agencies work together to add value to individual missions to support research and the operational needs of GEOSS & the Global Climate Observing System” (Siegel, Yoder, McClain, OCB News, October 2008)
- Formation process, as explained in the “CEOS Constellations for GEO Process Paper” involves these steps:
  - Submit concept to SIT. *OCR-VC proposed by IOCCG to SIT-21, April 2008 at Woods Hole, presented by Jim Yoder;*
  - Receive approval from SIT to proceed. *The OCR-VC proposal was approved by SIT-22, Sept. 2008 Tokyo.*
  - Develop an Implementation Plan. *A draft implementation plan was presented at SIT-23, March 2009, Florida. The plan will be finalized and submitted to SIT-24, Germany, Sept. 2009.*
  - Promote the OCR-VC among space agency principals and user communities, including potential contributors. *This is already occurring.*

# The OCR-VC Proposal

- OCR-VC will provide calibrated Lw values as the primary ocean color bands for global ocean color satellite data
- Satellite sensors: SeaWiFS, MERIS on Envisat, MODIS-Aqua, OCM on Oceansat-2, OLCI on Sentinel 3, SGLI on GCOM-C, VIIRS, & other future systems.
- Additional program elements will be required to calibrate across sensors, validate data products, and generate products from merged data sets (e.g., ChloroGIN Project, GlobColour Project, Mermaid, stronger interactions with GCOS, etc.)
- Ultimate outcome will be cross-calibrated & merged Lw values, the basis of data products for marine ecosystems and ocean biogeochemistry

## Ocean Colour Radiometry Missions



# GEO Requirements Addressed in OCR-VC

- Health: river and coastal pollution, e.g. eutrophication; harmful algal blooms; and issues relating to the hazards of aerosols (HE-07-02,03)
- Climate: a primary goal of OCR-VC is the provision of consistent, long time series of satellite records; provide key data and forecasting; enhance the utilization of Earth observations; improve coordination of coastal and marine climate observations (CL-06-01,02,05,06)
- Ecosystems: integrated global carbon, combine with SST for pCO<sub>2</sub>; ecosystem classification; regional networks; ocean ecosystem processes (EC-06-01,02,07 & EC-07-01)
- Agriculture: enhance utilization of Earth observations in fisheries and aquaculture; improve measurements of marine biomass (AG-06-02, AG-07-01)
- Water: support remote sensing of water quality monitoring (WA-08-01g).

# Potential Impediments to Success

- Lack of timely access to data and sharing of data, including Level-0 satellite data
- Lack of developing and sharing in situ data bases, e.g. ocean color radiances and derived products of sufficient quality to use in cal/val research
- Difficulty in sustaining projects such as SIMBIOS or GlobColour
- CEOS Role
  - Encourage member agencies to promote timely data access
  - Encourage cooperation with an eye to the issues of sharing of ground segment data and longevity of data analysis and merging efforts

# Cooperating/Supporting Programs with OCR-VC

OCR-VC components: provide calibrated and validated data, link and merge measurements across multiple satellite instruments for long time series, and refine data products for scientific and operational users, including some GEO societal benefit areas.

- SIMBIOS (NASA, 1998-2003). SeaBASS database, sun photometer calibration, measurement protocols, web-based diagnostic data set comparisons, evaluation of merged satellite products
- SAFARI (GEO Task AG-06-02, 2007--). Identifies opportunities for enhanced utilization of Earth Observation data in fisheries and aquaculture. Funded by CSA, IOCCG, B.I.O. and GEO.
- ChloroGIN Network (GEO Task EC-06-07). Combines in situ & satellite chlorophyll measurements to strengthen observing capacity in developing countries.
- GlobColour Project (ESA, 2005--). Developed a satellite-based ocean-color data set to support global carbon cycle research for long time series by merging data from SeaWiFS, MODIS-Aqua, and MERIS. Involved participation from IOCCG, IOCCP, and NCOF.

# OCR-VC Study Leads

- IOCCG members who confirmed that their agency will participate in OCR-VC (September 2008)
  - Yu-Hwan Ahn, KORDI (Korea)
  - Hans Bonekamp, EUMETSAT
  - Paula Bontempi, NASA (USA)
  - Yves Crevier, CSA (Canada)
  - Paul DiGiacomo, NOAA (USA)
  - Nicholas Hoepffner, Joint Research Centre (EU)
  - Milton Kampel, INPE (Brazil)
  - Hiroshi Murakami, JAXA/EORC (Japan)
  - Rangnath Navalgund, ISRO (India)
  - Peter Regner, ESRIN (ESA)
  - Eric Thouvenot, CNES (France)



Update of Draft Implementation Plan  
Covering the Interval 2008 to launch of  
Sentinel-3 (late 2012)

From SIT-23 Presentation by Jim  
Yoder

## Objective 1: Ensuring OCR continuity

- Activities to improve VIIRS (Bontempi, NASA and DiGiacomo, NOAA).
- GCOM-C Phase 1 development (Murakami, JAXA).
- OCM-2. Launch of ISRO's OCM-2 is anticipated for 2009. ISRO and other agencies have agreed to work together in broad areas of Cal/Val and OCM-2 data processing for Level-2 and Level-3 product generation. (Kumar, ISRO, Bontempi, NASA).
- Pre-launch activities for Sentinel-3 (Regner, ESA).

## Objective 2: Provide high quality data sets

- Continue support for MOBY (optical buoy for vicarious calibration of OCR satellites) (Digiaco, NOAA).
- Continue interaction between NASA and ESA related to MERIS calibration and characterization and extend to Sentinel-3 (Bontempi, NASA and Regner, ESA).
- Support ChloroGIN - (Dowell and Hoepffner, JRC).

## Objective 3: Data Harmonization

- Collaboration for a multiple sensor comparison involving MERIS, SeaWiFS, MODIS-Aqua, and OCM-2 (Bontempi, NASA; Navulgund, ISRO; Regner, ESA).
- ESA's *GlobColour* project demonstrated the benefits of multiple sensor data merger working towards an ocean color Essential Climate Variable (ECV) for global products. ESA is currently planning *CoastColour* for several coastal study areas using MERIS 300-m data. (Regner, ESA)
- IOCCG Working Groups (WG) for bio-optical sensors on Geostationary platforms (WG Chairs plus Ahn, KORDI, Navalgund, ISRO).
- IOCCG WG for evaluating possibilities for bio-optical Sensors on ARGO floats (WG Chair: Claustre, Laboratoire d'Océanographie de Villefranche).

## Objective 4: Facilitate timely and easy access to data (user interface)

- Societal Applications in the Fisheries and Aquaculture using Remotely-Sensed Imagery (SAFARI) to accelerate the assimilation of Earth observation data into fisheries research and ecosystem-based fisheries management on a world scale. (Crevier, CSA and Platt, IOCCG)
- Canadian Space Agency (CSA) has invested in the upgrade of the Canadian ground infrastructure at the Canada Centre for Remote Sensing (CCRS) for the reception and processing of full resolution (300-m) MERIS data (Crevier, CSA).
- Support GEO Coastal Zone Community of Practice- CZCP (DiGiacomo, NOAA and Dowell, JRC).

## Objective 5: Capacity building and Outreach

- IOCCG and JRC capacity building activities in Africa and elsewhere.
- Present white paper describing the OCR-VC at the Oceanobs09 conference in Venice, September, 2009. See <http://www.oceanobs09.net/index/php>