

Ocean Colour Radiometry (OCR) Virtual Constellation Proposed by International Ocean Colour Coordinating Group (IOCCG)

Objectives

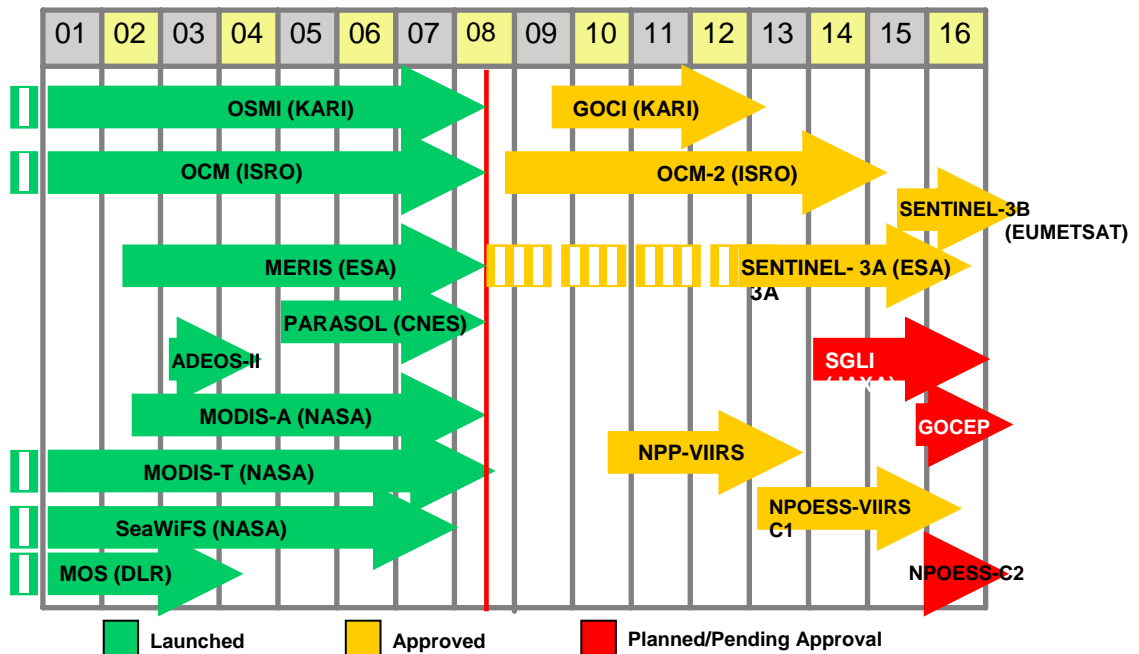
The OCR Virtual Constellation (OCR-VC) will provide calibrated ocean colour radiances (OCR) at key wavelength bands. Cross-calibrated OCR from multiple satellites will be merged to provide scientific data products related to marine ecosystems and ocean biogeochemistry for near-surface global ocean and coastal waters. The most important OCR data products currently in use are phytoplankton chlorophyll a, colored organic matter (COM), particulate carbon, and suspended sediment. Other products are in development.

The key space segment capabilities are the current and future polar-orbiting global OCR satellite missions (see figure). Of specific interest are SeaWiFS, MERIS on Envisat, MODIS-Aqua, OCM on Oceansat-2, OCR instrument on Sentinel 3A and 3B, SLGI on GCOM-C, VIIRS on NPOESS-C1, possibly VIIRS on NPP, and future NASA and CNES instruments under consideration. Other instruments such as China's COCTS and Korea's GOCI are also of interest but are not collecting global data.

In addition to the space segment, projects such as the former NASA-supported SIMBIOS project, the current ChloroGIN (multiple sponsors) and the ESA-supported GlobColour and the European Commission/ESA/EUMETSAT-supported GMES Marine Core Service will be required to calibrate across sensors, validate data products and generate global and regional products from merged data sets.



Ocean Colour Radiometry Missions



Vision

The purpose and value of OCR-VC is to ensure a long-term record of calibrated ocean color radiances to determine the impact of ocean climate signals and climate change on ocean ecosystems and biogeochemical cycles.

Statement of Need

The GCOS implementation plan (GCOS – 107, WMO/TD No. 1338, September, 2006) states: “Chlorophyll a is a critical parameter to characterize the ecosystem and as such represents essential information for natural living-resource management and monitoring of the health of coastal seas. At a global level, chlorophyll a is related to cycling of carbon between the ocean and atmosphere”.

Products derived from OCR are either explicitly or implicitly specified in the GEO 2007-2009 Work Plan, “Towards Convergence” (30 March 2007) under 6 societal benefit areas: health, energy, climate, ecosystems, agriculture and water.

- Health. Task HE-07-02 (Environment and health monitoring and modeling related to coastal pollution).
- Energy. Task EN-07-02 (Environmental Impact Monitoring), related to impacts on ocean ecosystems.
- Climate. Task CL-06-05 (GEOSS IPY Contribution), enhance the utilization of Earth observations including for marine ecosystem change.
- Task CL-06-06 (Global ocean observation system), enhance and improve coordination of coastal and marine climate observations.
- Ecosystems. Task EC-06-01 (Integrated global carbon observations), support integrated global carbon observations.
- Task EC-06-02 (Ecosystem classification), establishment of an ad hoc ecosystems classification task force (IOCCG currently supports an ocean ecosystem classification working group).
- Task EC-06-07 (Regional networks for ecosystems). ANTARES, which is cited as an example under this task, was founded by IOCCG.
- Task EC-07-01 (Global Ecosystem Observation and Monitoring Network). OCR is the only global measurement related to ocean ecosystem processes.
- Task AG-06-02 (Data Utilization in Aquaculture). To identify opportunities for enhanced utilization of Earth observations in fisheries and aquaculture. IOCCG is one of the co-sponsors of the project SAFARI (Societal Applications in Fisheries & Aquaculture using Remote Sensing Imagery).
- Water: Task WA-07-01 (global monitoring of water quality). OCR is a fundamental data source for the systematic monitoring of relevant variables

CEOS can make a unique contribution by encouraging member agencies to participate fully in this virtual constellation and to create/sustain the space and ground segments required.

Measures of success

Assuming that most or all of the sensors illustrated in the figure are successfully launched, the potential impediments to success are: (1) lack of timely access to and sharing of data, including Level-0 satellite data, (2) lack of developing and sharing in-situ data bases, ocean color radiances and derived products of sufficient quality to use for calibrating and validating satellite data products (such as was done by NASA's SIMBIOS project and currently by ChloroGIN) and (3) difficulty of sustaining projects such as GlobColour for merging data across satellite sensors to support global and regional scientific data products. CEOS can help avoid the impediments to success by encouraging member agencies to promote timely access to and sharing of data, and to cooperate to establish appropriate ground segments required to overcome impediments (2) and (3) listed above. The OCR-VC will complement the ocean topography and atmospheric composition (particular related to aerosols) constellations. OCR-VC will also complement and benefit from the proposed Ocean Vector Wind Constellation. Data from these constellations will be extremely helpful for interpreting results from OCR-VC.

Collaborators

International Ocean Colour Coordinating Group (IOCCG)
International Ocean Carbon Coordination Project (IOCCP)
GlobColour (ESA-funded for merging OCR data from current sensors)
ChloroGIN (multiple sponsors, in situ and satellite data)
SAFARI (CSA-funded project for Earth observations to support fisheries).
NOAA, Navy, NASA – in the U.S.
ESA, European Commission/JRC, GKSS, EUMETSAT – in Europe
JAXA in Japan
ISRO/NCOIS – in India
CSA – in Canada
CNSA – in China
KORDI/KARI in South Korea
CNES – in France

Schedule

IOCCG proposes that it take the lead for implementation planning of the OCR-VC. IOCCG includes representatives from important OCR user communities and well as from all major space agencies including ESA, NASA, CNES, NOAA, ISRO, KORDI, JAXA, CSA, CNSA, and INPE.

Our proposed near-term timeline is:

April 2008. SIT asks IOCCG to form a constellation Study Team to begin to prepare a Full Proposal.

July 2008. IOCCG submits a Full Proposal for an OCR-VC.

September 2008. If the full proposal is approved, IOCCG will send a representative to the September SIT meeting to discuss the timeline of future activities and the budget that will be required to begin to implement the OCR-VC.