Definition of the system vicarious calibration requirements for the EC’s Copernicus programme

Ewa Kwiatkowska
Ocean Colour System Vicarious Calibration (OC–SVC)

- Integral part of Ocean Colour earth observation programmes
- Prerequisite for meeting Ocean Colour mission requirements: accuracy, consistency and stability of data records [S3-MRTD]
- Task in the joint ESA-EUMETSAT Calibration and Validation Plan [S3-CVP] (task OLCI-WLR-CV-200)
- Critical to making the best use of Copernicus Programme assets, i.e. providing quality Ocean Colour Services [CMEMS OC-TAC]
Ocean Colour System Vicarious Calibration needs

• OC–SVC Programme has to satisfy the Copernicus long-term perspective and current/evolving user needs for products & services

• OC–SVC requires minimization of all uncertainties of the “System”

• OC–SVC requires extremely accurate and well characterized FRMs

• OC–SVC FRMs are obtained from specialized infrastructure, typically an instrumented buoy

• Need for sustained and operational OC–SVC infrastructure in Europe
EUMETSAT planning for Copernicus OC–SVC solution

• Planning and development are required for decades of upcoming Copernicus ocean colour operations

• International cooperation is needed to achieve standardization, embedding in existing activities
  • ESA’s FRM4SOC
  • BOUSSOLE experience
  • NOAA’s Marine Optical Buoy (MOBY) operations and technology refresh
  • NASA’s Vicarious Calibration ROSES-14 Call
  • CEOS OCR – VC recommendations
  • EC’s JRC papers and reports

• Planned development phases:
  • Step 1: Scientific, Technical and Operational Requirements (pre-phase A)
  • Step 2: Preliminary Design, Project Plan and Costing (phase-A)
  • Step 3: Technical Definition, Specifications, Detailed Design (phase B)
  • Step 4: Development, Testing and Demonstration in the Field (phase C/D)
  • Step 5: Operations (phase E)

Steps 4 and 5 require a wide programmatic approach and significant investment
Step-1: OC–SVC Requirements

- **Step 1:** Scientific, Technical and Operational Requirements
  - EUMETSAT’s Copernicus study
  - Study deliverables:
    1. requirements document
    2. document review process
  - Requirements document purpose
    - to form the basis for all aspects of the OC–SVC Programme: planning, design, technical definitions, development, testing and long-term operations
    - to justify and outline the OC–SVC Programme for the EC’s Copernicus Office
Step 1 ongoing: Copernicus study OC-SVC requirements

Requirements document to provide

1. Clear justification of OC–SVC for Copernicus missions
2. Listing of OC–SVC science and high-level technical requirements
   - metric that itemizes error budget categories of the OC–SVC System
3. Listing of OC–SVC operational and service requirements
   - in-depth consideration of current and long-term operations and service needs of the Copernicus space and ground segments

Error budget must be justification for the requirements
Step 1 ongoing: Copernicus study OC-SVC reviews

- Two review meetings by a Review Expert Team with the draft document provided in advance
  - 1st review: FRM4SOC workshop (21-23 Feb 2017), 23-24 Feb
  - 2nd review: IOCS’17 breakout workshop

- International Expert Review Team
  - Agnieszka Bialek (cc. Nigel Fox) (NPL) – metrology
  - Bryan Franz (NASA) – vicarious calibration method
  - Carol Johnson (NIST) – metrology, MOBY calibration
  - Craig Donlon (ESA) – FRM4SOC
  - David Antoine (LOV) – in situ infrastructure BOUSSOLE
  - Giuseppe Zibordi (JRC) – in situ infrastructures
  - Hiroshi Murakami (JAXA) – space instruments
  - Menghua Wang (NOAA) – atmospheric correction
  - Vittorio Brando (CMEMS) – Copernicus marine service
  - Young Je Park (KIOST) – operational requirements
Step 1: Copernicus study conclusion

• Final OC–SVC requirement document will be jointly presented to the EC’s DG GROW in July 2017 by
  • EUMETSAT
  • ESA
  • JRC
  • CMEMS
• Options for implementation will be discussed

1. Introduction
2. Traceability chain and uncertainty approach
3. Requirements on the SVC process
4. Requirements on field infrastructure
5. Requirements on the data processing
6. Requirements on the operation and service
7. Conclusion