

Multi-water algorithms and algorithm performance assessment

IOCS 2017 - Breakout Workshop#7

Co-chairs: Ewa Kwiatkowska (EUMETSAT), Bridget Seegers (NASA/USRA),
Carsten Brockmann (Brockmann Consult), Tim Moore (Uni. New Hampshire),
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Workshop agenda

14:00 - 14:05 Session introduction E. Kwiatkowska (EUMETSAT) and B. Seegers (NASA)

Part I: Multi-Water Algorithms and Algorithm Performance Assessment

14:05 - 14:15 User requirements for blended multi-water products

Stewart Bernard (CSIR)

14:17 – 14:27 Overview of atmospheric correction methods for open-ocean, coastal and inland water transitions

Menghua Wang (NOAA)

14:29 – 14:39 Overview bio-optical algorithms for open-ocean, coastal and inland water transitions

Daniel Odermatt (Odermatt & Brockmann GmbH)

14:41 – 14:51 Assessing algorithm performance and blending in the context of optical water classes

Thomas Jackson (PML)

14:53 – 15:03 Needs and approaches to algorithm assessment

Rick Stumpf (NOAA)

Part II: Moderated Discussion Multi-water and Algorithm Assessment Moderators: co-chairs

15:20 – 15:50 Multi-water algorithms

15:50 – 16:20 Algorithm assessment

16:20 – 16:30 Uncertainty metric for multi-water products

16:30 – 16:45 Formulation of Actions and Recommendations



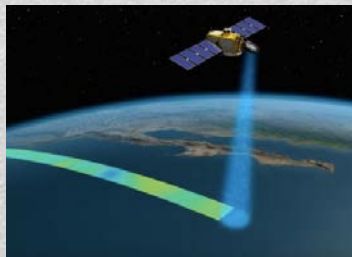
Goals of the workshop – multi-water algorithms

- Need products that can deliver smooth transitions between open ocean, coastal waters, and inland waters; and that can reduce product uncertainties
- Following yesterday's breakout 'Remote Sensing of Inland and Coastal Waters'
- Need specific and prioritised recommendations for multi-water prototype development that will deliver demonstration products
- Short time frame 2-3 years
- Realization of CEOS OCR-VC INSITU-OCR White Paper recommendations
 - R2.2 Permanent working groups on algorithm topics
 - R2.5 Open access to source codes for processing algorithms
- Specific and prioritised development requirements
 - What needs to be done for the atmospheric correction to improve it for coastal and inland waters and to pass smoothly between the water types? What are the main existing approaches? What additional immediate development is required?
 - What needs to be done for water algorithms to improve them for coastal and inland waters and to pass smoothly between the water types? What are the main existing approaches? What additional immediate development is required?
 - What metrics to use to evaluate the fitness of these algorithms?



Goals of the workshop – algorithm assessment

- What statistical metrics should be used to best evaluate algorithm performance?
- What is a strategic approach to combine metrics for overall algorithm evaluation?
- How to evaluate algorithm temporal and spatial stability?
- How best to inspire the community to make changes to assessment approaches?



Part I: Multi-Water Algorithms and Algorithm Performance Assessment

introduction presentations



Part II: Moderated Discussion

Multi-water algorithms



Multi-water algorithms: draft recommendations



1 Develop an atmospheric correction prototype processor for coastal and inland waters

- Set-up as a funded OCR-VC working group with specific deliverables
- Initial timeframe: 2 years
- Specific recommendations:
 - Develop the prototype for missions of participating OCR-VC agencies, at least for VIIRS and OLCI
 - Build on the existing community knowledge and develop new solutions
 - Assure the correction right to the coastline and smooth transitions to the open ocean
 - Exploit specific instrument capabilities (SWIR, absorption bands)
 - Coastal adjacency effects, additional aerosol information (height, other missions, models), better modeling of surface interface, going beyond per-pixel correction



Multi-water algorithms: draft recommendations



Develop a prototype processor that will deliver smooth transitions between open ocean, coastal waters and inland waters

- Set-up as a funded OCR-VC working group with specific deliverables
- Initial timeframe: 2 years
- Specific recommendations:
 - Develop the prototype for missions of participating OCR-VC agencies, at least for VIIRS and OLCI
 - Build on the existing community knowledge and develop new solutions
 - Exploit spectral provinces for a priori knowledge of in-situ constituents
 - Exploit specific instrument capabilities (e.g. 400, 1020 nm)
 - Collaborate with the atmospheric correction prototype development to assure standardization of the surface boundary conditions



Multi-water algorithms: draft recommendations



High resolution global open-ocean/coastal/inland spectral provinces

- Set-up as a funded OCR-VC working group with specific deliverables
- Initial timeframe: 2 years
- Specific recommendations:
 - Expand existing efforts on a global dataset of open ocean, coastal and inland water spectra using in-situ and satellite measurements
 - Define the dataset to include a range of parameters required to connect the spectra with their water constituents
 - Characterize global geographical spectral provinces at high spatial resolution
 - Define geographical and constituent gaps in in-situ measurements
 - Recommend to the community where new/more sampling is required



Part II: Moderated Discussion

Algorithm performance assessment



Algorithm performance: draft recommendations



Achieve community consensus on standardization of statistical metrics to assess algorithm performance in water and on satellite data.

- Define a core set of statistical metrics, with agreement on their meaning
- Establish guidelines on their conditions and appropriateness for use, which may be research question dependent

- Approach: Identify appropriate literature to develop consensus and gaps to guide publishing of new papers that build on the collection of work that has been done thus far



Algorithm performance: draft recommendations



Develop a strategy to inform the community of best practices for performance assessment of algorithms.

- Approach: Create a website providing best practices.
Website should host 2 sections:
 - 1) The most up to date algorithm assessment literature
 - 2) A library of code/packages to ease the implementation of more robust algorithm assessment. And guidance about which metrics are valid and appropriate skill metrics, which is research question dependent.
- Timeframe: 1 year and updated yearly



Part II: Uncertainty metric for multi-water products



Highest priority challenge / aim / ambition

- Multi-water algorithms

Atmospheric correction improvements in coastal and inland waters are urgently required in the short term. Accurate atmospheric correction is a prerequisite to reap the benefit of the new sensors and to provide reliable user services.

- Algorithm performance assessment

Achieve community consensus on standardization of statistical metrics to assess algorithm performance in water and on satellite data and inspire action.

