JRC Agency Report:

1. Land Activities
2. Ocean Color Activities

Giuseppe Zibordi
LAND ACTIVITIES:

1. **RAMI** (Radiative Transfer Model Intercomparison)

2. **QA4ECV** (Quality Assurance for Essential Climate Variables)

Prepared by Nadin Gobron (May 2015)
The fourth phase of the “Radiative Transfer Model Intercomparison (RAMI) exercise: Actual canopy scenarios and conformity testing” by Widlowski, et. al. has been submitted to Remote Sensing of Environment.
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The dispersion of simulation results was found to be rather large both for flux simulations and for BRFs. In addition, there were rarely any obvious clusters of simulation results that might help to guide the analysis.

Possible causes for the substantial dispersion among the simulation results could be:
1) operator choices when transferring the prescribed test site properties to the needs and capabilities of a given RT model,
2) operator errors during this scene creation process, and/or during the setup of the actual model run, and/or any eventual post-processing steps, and
3) software “bugs” and conceptual/theoretical errors in the RT formulation of the model.
A series of ‘virtual’ validation sites are constructed using *specific scene* (spectral values of each elements, 3-D architecture etc ...)

1-Simulate Top Of Atmosphere Bidirectional Factors for several sensor/satellite data → *benchmark land variables retrieval algorithms.*
JRC QA4ECV Activities

A series of ‘virtual’ validation sites are constructed using specific scene (spectral values of each elements, 3-D architecture etc …)

2-Reproduce various measuring protocols of in-situ measurements

→ Assess error budget of in-situ products
OCEAN COLOR ACTIVITIES:

1. JRC Field Measurement Programs
2. AERONET-Ocean Color
3. Recent Relevant Publications

Prepared by Giuseppe Zibordi (May 2015)
**Ongoing JRC Ocean Color Field Programs**

**CoASTS**: Coastal Atmosphere and Sea Time Series (1995-present)  
(time-series data for regional OC applications)

**BiOMaP**: Bio-Optical Marine Properties (2000-present)  
(spatially distributed data for continental OC applications)

**AERONET-OC**: AERONET- Ocean Color (2002-present)  
(spatially distributed time-series data for global OC applications)

Primary objective of these JRC field programs is to support ocean color standardization and validation activities in view of the generation of **highly accurate satellite ocean color data products for Climate Data Records** applicable at regional, continental and global scale.
AERONET - Ocean Color is a sub-network of the Aerosol Robotic Network (AERONET), relying on modified sun-photometers to support ocean color validation activities with highly consistent time-series of $L_{WN}(\lambda)$ and $\tau_a(\lambda)$.

**Rationale:**

- Autonomous radiometers operated on fixed platforms in coastal regions;
- Identical measuring systems and protocols, sensor calibrated using a single reference source and method, and data processed with the same code;
- Standardized products of normalized water-leaving radiance and aerosol optical thickness.

AERONET-OC sites

AERONET-OC generates globally distributed highly consistent time-series of standardized $L_{WN}(\lambda)$ and $\tau_a$ measurements.

- NASA manages the network infrastructure (i.e., handles the instruments calibration and, data collection, processing and distribution within AERONET).
- JRC has the scientific responsibility of the processing algorithms and performs the quality control of data products (in addition to the management of 5 out of 15 sites).
- PIs establish and maintain individual additional AERONET-OC sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>Region</th>
<th>Lat.</th>
<th>Lon.</th>
<th>Structure</th>
<th>Responsible Institution</th>
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<tr>
<td>AAOT</td>
<td>Adriatic Sea</td>
<td>45.314°N</td>
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<td>Jetty</td>
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</table>
Examples of AERONET-OC Sites

Site: AAOT
Location: Northern Adriatic Sea
Water type: Case-1/Case-2
Period: 2002-present

Site: GDLT
Location: Northern Baltic Proper
Water type: Case-2
Period: 2005-present (summer)

Site: AABP
Location: Persian Gulf
Water type: Case-1 (?)
Period: 2005-2008

AERONET-OC: Legacy

- **AERONET-OC is a framework for the generation and distribution of standardized ocean color data products (relying on identical radiometers, calibration, measurement protocol, data reduction, quality assurance and quality control).**

- **AERONET-OC had long development and assessment phases:**
  - 4-year (1999-2002) development phase (for measurement protocol, QA/QC and data reduction) distinct from AERONET and without any specific funding;
  - 4-year (2003-2006) implementation and testing phase within AERONET without any specific funding;
  - 13-year (2002-2014) operational phase fully relying on the AERONET infrastructure (with incremental number of deployment sites and continuous revisions of code and hardware) with little funding from Space Agencies solely addressed to PIs.

**In conclusion, any new development is constrained (but not prevented) by:**

- network legacy (hardware & software, methods & protocols);
- the main network objective of ensuring continuity of data collection and consistency over time to the current quality of data products (i.e., new technology does not automatically mean higher data quality);
- the large resources and long time required to take into operation any new method/systems (and not simply the costs of new hardware).
The book presents the state-of-the-art of optical remote sensing applied for the generation of marine climate-quality data products. The chapters embrace:

i. requirements for the generation of climate data records from satellite ocean measurements;

ii. satellite visible and thermal infrared radiometry embracing instrument design, characterization and, pre- and post-launch calibration;

iii. in situ visible and thermal infrared radiometry including overviews on basic principles, technology and measurements methods;

iv. simulations as fundamental tools to support interpretation and analysis of both in situ and satellite radiometric measurements;

v. strategies for in situ radiometry to satisfy mission requirements for the generation of climate data records; and

vi. methods for the assessment of satellite data products.
The work indicates that the creation of ocean color CDRs should ideally rely on:

i. one main long-term in situ calibration system (site and radiometry);

ii. a unique (i.e., standardized) atmospheric model and algorithms for atmospheric correction. Finally, requirements and recommendations for system vicarious calibration sites and field radiometric measurements, are streamlined.
Thank you!