

Assessment of *In Situ* Radiometric Capabilities for Coastal Water Remote Sensing Applications (ARC)

Genesis:

Cal/Val ocean color activity proposed as a **CEOS/CVWG/IVOS** action, funded by **ESA**, planned and organized by the **JRC** in collaboration with **NPL**.

Objective:

Compare primary ocean color radiometric products (water leaving radiance) from *in situ* optical measurements applying different radiometers and measurement methods

Execution:

Field measurements at the AAOT (July , 19-23-10)
Laboratory calibrations at JRC (July , 26-29-10)



Site: **Acqua Alta Oceanographic Tower (AAOT)**

Region: **Northern Adriatic Sea**

Water type: **Case-1/Case-2**

ARC: Field (AAOT - July , 19-23 2010)

Instruments and Institutes (confined to European institutions contributing to MERIS validation activities):

1. **WiSPER** (in-water multi-spectral winched profiling radiometer system) – JRC (EU);
2. **SeaPRISM** (above-water multispectral system with ~1 degree FAFOV) – JRC (EU);
3. **TACCS-S** (in-water multispectral radiometer buoy) - University of Stockholm (Sweden);
4. **TACSS-P** (in-water hyper-spectral radiometer buoy) - Segre-marisco (Portugal);
5. **TRIOS-B** (above water hyper-spectral radiometer system) – MUMM (Belgium);
6. **TRIOS-E** (above water hyper-spectral radiometer system) - Tartu Observatory (Estonia);
7. **TRIOS-J** (above-water hyper-spectral radiometer system with reduced field of view with ~3 degrees FAFOV) – JRC (EU).
8. **JAWS** (above-water multi-spectral radiometer system with narrow field of view (3 degrees FAFOV)) - JRC (EU);



**TRIOS-B
&
TRIOS-E**

**TRIOS-J
&
JAWS**



TACSS-P

SeaPRISM



ARC: Lab (JRC -July 26-29, 2010)

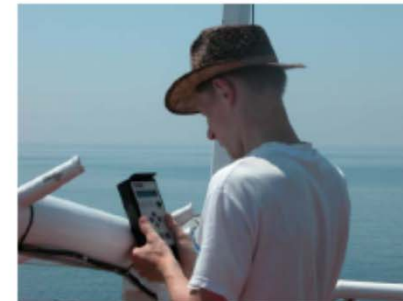
Participating Institutes:

JRC (EU), NPL (UK), MUMM (Belgium), University of Stockholm (Sweden), Tartu Observatory (Estonia), Bio-Optika (UK), Segre-marisco (Portugal), GKSS (Germany), NIVA (Norway).



Calibration and comparisons:

- a. The absolute calibration of the radiometers deployed at the AAOT during the field inter-comparison (plus a number of additional radiometers currently in use for MERIS validation);
- b. The inter-comparison of sun-photometers (additional activity under the responsibility of individual participants);
- c. The inter-comparison of spectrally calibrated 1000W FEL lamps (from NPL and NIST traceable) utilized for absolute radiometric calibration.



***In situ* determination of the remote sensing reflectance: an inter-comparison**

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Submitted to the *Journal of Optics* on February 2, 2012.

Measured differences compared to calculated uncertainties of Remote sensing reflectance

λ	AD [%]			CU [%]		
	443	555	665	443	555	665
<i>TACCS-S</i>	4.5	6.1	<u>21.2</u>	8.3	8.0	9.3
<i>TACCS-P</i>	8.7	7.8	<u>16.1</u>	8.4	7.7	8.8
<i>SeaPRISM</i>	5.7	6.0	7.6	6.7	5.9	11.0
<i>TRIOS-B</i>	7.7	2.7	<u>11.0</u>	8.0	5.5	6.7
<i>TRIOS-E</i>	5.9	3.9	7.2	8.0	5.5	6.7

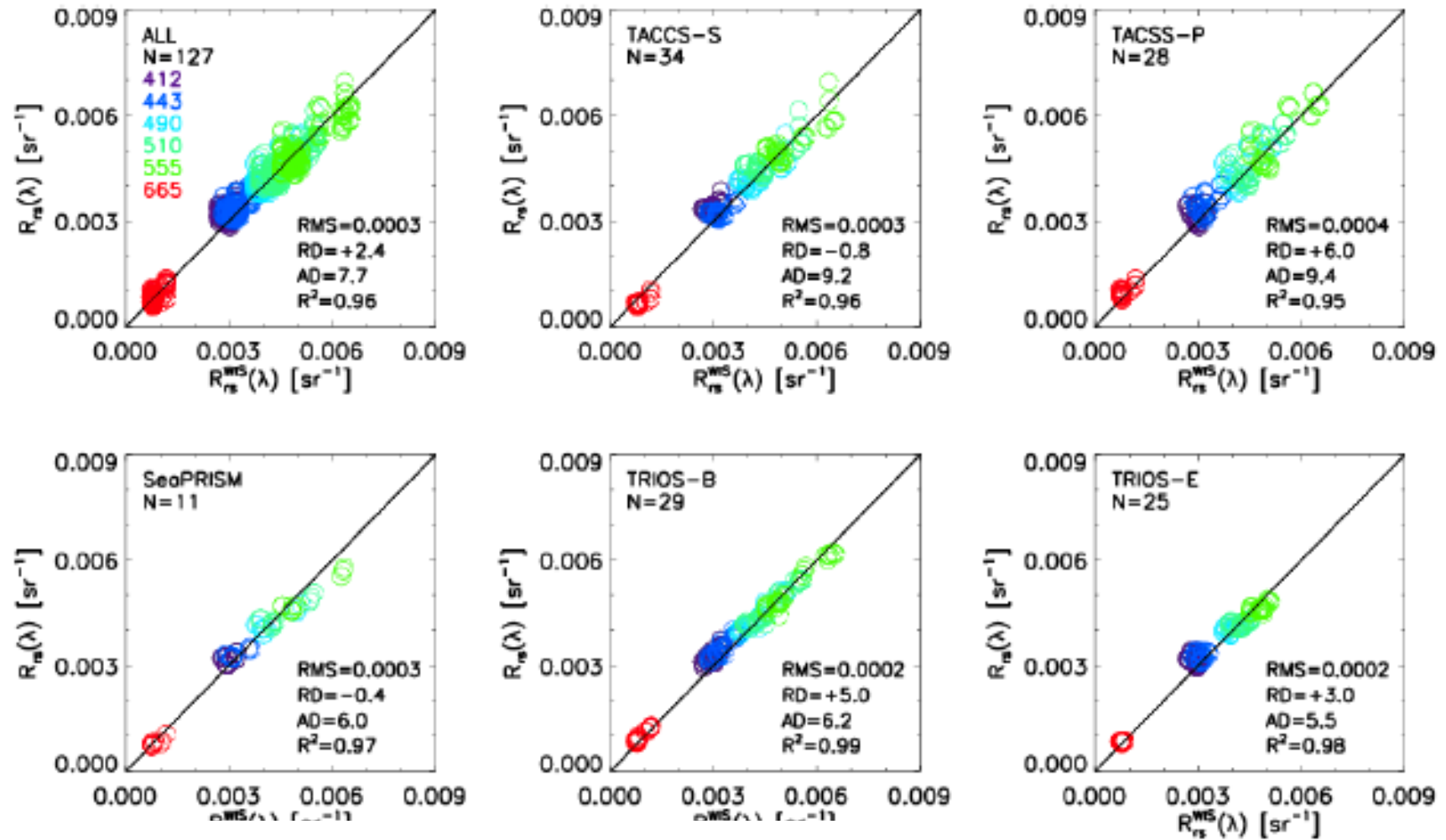
Absolute differences relative to WISPER of “remote sensing reflectance” (sat equivalent propagated to surface)

Instrument biases due to primary calibration traceability removed

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Zibordi et al (JRC)

Scatter plots of all results for reflectance compared to WISPER



Next steps

- **Efforts to improve traceability and uncertainty of OC vicarious methods through (MetEOC project) <http://www.EMCEOC.org>**
 - Radiometric calibration
 - Full uncertainty analysis
 - Aeronet-OC optimisation
 - In-water correction
- **Need full CEOS comparison of vicarious instruments and use**
 - **Need volunteer (s)**
 - **Perhaps in 3 geographical nodes**
- **Encourage on-going efforts to maintain and improve Buoys: MOBY, Bousolle**