

The JRC Marine Optical Laboratory



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in collaboration with

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Number of stations

995 1996

997

1999 2000

JRC validation programs

BiOMaP (2000-ongoing)



AERONET-OC (2002-ongoing)





In-water free-fall profilers

CoASTS (1995-2017)





Date

Near-surface systems

2012 2013 2014 2015 2016



In-air references



Above-water systems







Protocols applied





Absolute Irradiance & Radiance Calibrations

Joint Research Centre



- $C_E(\lambda) = E_0(\lambda) (d_0/d)^2 / (D_N(\lambda)-D_0(\lambda))$
- *C_E: Calibration coefficient*
- E_0 : Lamp Irradiance at distance d_0
- D_N : Sensor output with the source at distance d
- D_0 : Sensor output without any source (dark signal)



$C_L(\lambda) = E_0(\lambda) (d_0/d)^2 (\rho(\lambda) / \pi) c_p(\theta) / (D_N(\lambda) - D_0(\lambda))$

- *C_L*: *Calibration coefficient*
- E_0 : Lamp Irradiance at distance d_0
- D_N : Sensor output with the source at distance d from the Plaque
- D_0 : Sensor output without any source (dark signal)
- ρ : Reflectance of the Standard Plaque
- c_p : Correction factor for the Plaque ($c_p=1$ if lambertian)

The JRC Marine Optical laboratory does approximately 20-25 radiance inter-calibrations per year benefitting of independent CE-318T calibrations performed at NASA-GSFC in the 400-1020 nm spectral interval with a 2 m integrating sphere.



Absolute calibration lab











Standards applied





FEL (*NIST, NPL on NIST sockets, Optronics*)





Plaques (LabSphere)





Calibration and characterization capacity at JRC

	Regular	Occasional	Initial	Class-based
Radiometric responsivity	Х			
Spectral response		Х		
Out-of-band & stray-light		Х		
Immersion factor (irradiance)			X	
Immersion factor (radiance)				X
Angular response			Х	
Linearity				Х
Integration time				Х
Temperature response				Х
Polarization sensitivity				Х
Dark signal	Х			
Temporal response				Х
Pressure effects				Х

IOCCG Protocol Series (2019). Protocols for Satellite Ocean Colour Data Validation: In Situ Optical Radiometry. Zibordi, G., Voss, K. J., Johnson, B. C. and Mueller, J. L. IOCCG Ocean Optics and Biogeochemistry Protocols for Satellite Ocean Colour Sensor Validation, Volume 3.0, IOCCG, Dartmouth, NS, Canada.



Temperature response



Zibordi, G., et al., 2017. Response to Temperature of Journal of Atmospheric and Oceanic Technology, 34(8), pp.1795-1805.



Immersion Factor I_f (radiance)



The immersion factor of radiance sensors can be computed. But class-based characterizations are strongly recommended for complex fore-optics.



G.Zibordi. Immersion factor of in-water radiance sensors Journal of Atmospheric and Oceanic Technology, 2006.