Profiling spectro-radiometer data series for cruise Pelagia PE125

Principal Investigator and Data Originator

Dr. Slawomir Sagan, Polish Academy of Sciences (PAS), Sopot, Poland.

Content of data series

Parameter	Unit	Parameter code	Number of stations	Comments
Profile of downwelling irradiance in 10 spectral channels (E_d).	W m^{-2} nm	412ERXUD to 710ERXUD	13	0.75 m above the pressure transducer.
Profile of downwelling PAR.	W m^{-2}	DWIRRXUD	13	as above
Depth (computed from pressure)	metre	DEPHPR01	13	depth at the level of the pressure transducer.
Profile of upwelling radiance in 10 spectral channels (L_u).	W m^{-2} nm sr	412LRXUU to 710LRXUU	13	none
mean downwelling attenuation coefficient (K_d) in 10 spectral channels.	m^{-1}	not loaded in databse	13	on CD-ROM as originator's ASCII files
mean upwelling attenuation coefficient (K_u) in 10 spectral channels.	m^{-1}	not loaded in database	13	as above

Instrumentation and data processing by originator

The profiling spectro-radiometer used was Biospherical Instruments' MER-2040 (Multiwavelength Environmental Radiometer, model 2040). Calibration was carried out by the manufacturer.

The configuration used consisted of 10 channels for downwelling irradiance and 10 channels for upwelling radiance at the following wavelength: 412 nm, 443 nm, 490 nm, 510 nm, 550 nm, 589 nm, 625 nm, 665 nm, 683 nm and 710 nm.

Other optical features were:

- Cosine collector for irradiance sensor: vacuum formed Teflon® supported by quartz (Morrow et al. 1994). The directional response of the MER-2041, deck sensor irradiance collector is specially tailored for operation in air by a metal occluding ring.
- Radiance collector for radiance sensor: equipped with individual baffling and is designed to yield a half-angle field of view of 10° in water and 13.4° in air.
- Bandwidth: Typically 10 nm FWHM; 15 nm at 1% peak; less than 20 nm at .001% peak.
- Stray Light Rejection: Typically better than 1 x 106 per nm relative to peak. Response (per nm) of sensors to wavelengths above 750 nm and below 350 nm is less than 1 x 10^{-8} relative to peak. There is considerably better rejection of shorter wavelengths by sensors above 550 nm.
- Additionally, the instrument had one channel for pressure (depth) 0.25% full-scale accuracy and two channels for platform orientation sensors: accuracy ±1° over ±45°.

The downwelling irradiance sensor was located 0.75 m above the pressure transducer. The upwelling irradiance sensor was close to the pressure transducer.

BODC processing

The data were loaded into a database under the ORACLE Relational Database Management System without modification.

Note that data from each profile were banked as datacycles. Consequently, for each datacycle, irradiance, PAR and radiance values are all linked to the depth measured by the instrument without correction for instrument geometry.

Comments on data quality from data originator

There are often 3 to 4 different values for the same depth (the depth sensor was calibrated to an order of a few centimetres). This is because events on the surface (waves, foam) were on a different time scale than the process of lowering the instrument. It was decided not to average the values on these particular depths taking into account that this is a record of real-time events which might be useful for certain research purposes.

Reference

Morrow JH, Duhig M, Booth CR (1994) Design and Evaluation of a cosine collector for a SeaWiFS-compatible Marine Reflectance Radiometer. SPIE Ocean Optics XII, 2258: 879-886.