

Calibration report of the PR-655 SpectraScan (surface spectroradiometer) used at CARIACO

Instrument Details:

Name: Photoresearch, Inc.

Model: PR-655 and PR-650 (no longer in use as of 2009)

Serial Number: 65090503 (PR-655) and 60921603 (PR-650)

Purchase date: 2009 (PR-655) and 1994 (PR-650)

Last manufacturer's calibration: October 8, 2012

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1. Introduction

The PR-650 and PR-655 SpectraScan spectroradiometers are portable battery powered, fast-scanning spectrometers with a spectral resolution of 3.12 nm per pixel and an automated measure shutter. The PR-655 (shown in Figure 1) replaces the PR-650 which is no longer in production. The PR-655 is equipped with a touch screen which is used to access the menus. Following a measurement, the PR-655 displays the data on the small LCD display, as well as color spectral graphs. The spectroradiometers are additionally equipped with a cosine receptor for irradiance. For more details please visit Photoresearch page:

<http://www.photoresearch.com/current/pr655.asp>



Figure 1: Close-up of the PR-655 used at CARIACO

2. Calibration / Maintenance

Field calibration: The PR-655 is only calibrated when it is sent back to the manufacturer (see below). However, data collected monthly are compared with historical spectral profiles with the aim of identifying possible significant drift in the data.

Manufacturer's calibrations: Due to logistical constraints (shipping to and from Venezuela), the PR-655 system is sent back to the manufacturer for calibration roughly every 2 years unless a significant issue is observed in the data/system operations.



Figure 2: Ramon Varela, one of the Venezuelan CARIACO PI's, takes radiance (left) and irradiance measurements (right) at the CARIACO station with the PR-650.

3. Deployment / Sample collection

- All measurements are collected from the forward deck of the ship between 11:30 and 1pm.
- Together with the actual measurements, information on the water color, turbidity, sea conditions, wind velocity, cloud type and %, and other atmospheric conditions are annotated.
- All angles are measured with an inclinometer so as to ensure the correct angle is being used (30 degrees from the vertical)
- 3 sequential measurements of the water are taken using the MS75 lens; this is followed by one sky measurement and one irradiance measurement. For this last one, the lens is changed to the CR-650 and the instrument is pointed vertically towards the sky (Figure 2).
- Care is taken of not taking the water measurements where there is ship shadow.
- Rrs measurements are done with the PR-655 at the same time the PRR is being deployed and are later compared.

4. Data processing

- Software used in IDL based, originally written by Chuanmin Hu (USF), later modified by John Akl (USF).
- Data is downloaded from the PR-655 as a text file through hyperterminal and ingested into the IDL program.
- The IDL program allows for each spectra (e.g. water, sky, ed) to be checked individually. If one of the spectra looks suspicious, it is not used for the final data calculations (there are generally 3 spectra to choose from for each variable, from the 3 sequential measurements done). If all spectra look good, 3 individual Rrs files will be submitted to SeaBASS (no averaging is done).
- We compare the calculated Rrs from the PRR-600 with the Rrs obtained from the PR-655 (Figure 3). This serves as a quick check of the quality of the data. We also use historical information to

determine the quality of the data. With over 10 years of measurements we know what the values and curve shapes should be according to season.

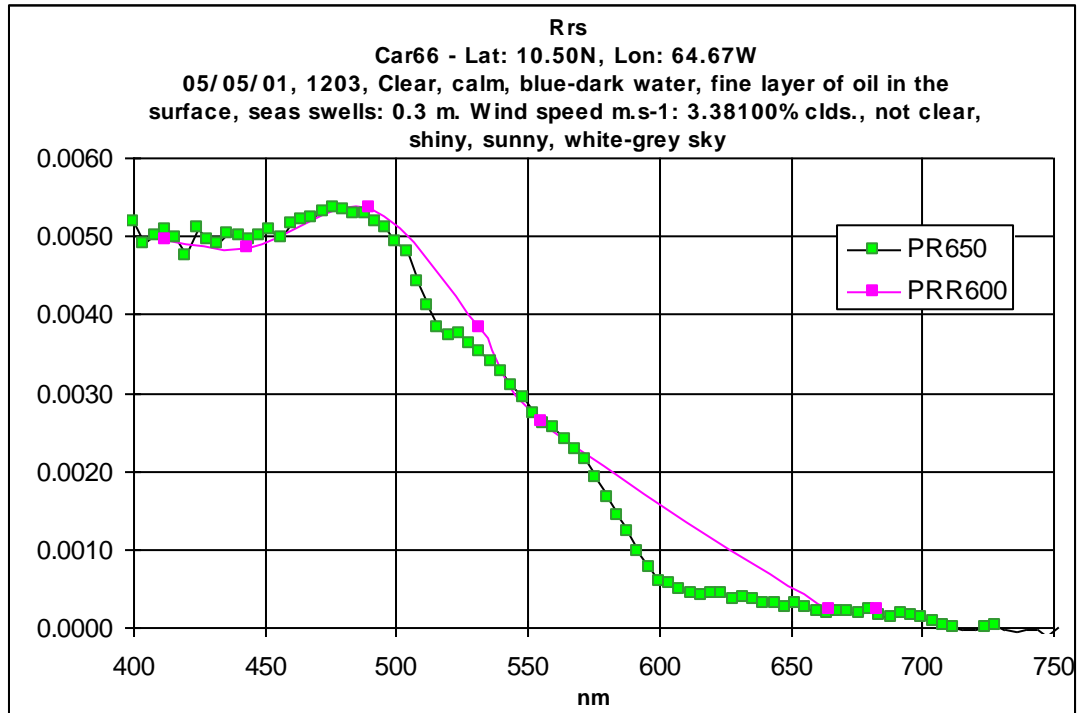


Figure 3: Data comparison between the submersible PRR-600 (in pink) and the PR650 (in green).