Measurement of Instrument Self-Shading in Case 1 Waters using Simultaneous Hyperspectral Acquisition

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Abstract

Keywords

Introduction

Why are we doing this. Overall goals. Need to talk about Theory (Mueller) and Experiment (Clark) concepts.

Equipment

Boat
The Hapa, P&R Water Taxi.. FIS sat inside cabin. Back deck size: 5.55m long x 3.76 m wide. Es collectors at: 3.58 m off the back deck 1.78 m from the top pilot deck; above all but the pole with lights. They were gimbaled. More information: Yarbrough

Fork
Floatation structure for holding the FIS disks and optical fibers, constructed of PVC tubing. Measurements shown in diagram. Describe sundial artifact.

Put summary of measurements in a table.

Field Instrument for Shadowing (FIS) (*need better name*)
The FIS is a fiber-coupled, hyperspectral, simulataneous dual spectrograph sensor. Six 600 um core optical fibers went to the fork channels, one 1 mm (?) optical fiber went to a MOBY – type Es sensor. Used in bare fiber or bare fiber with disks mode. Measured FOV before integration. (Need to calibrate those images). Calibrated Lu with MLML OL420 prior to deployment, measured once during and once after with OL455; calibrated Es once during and once after; wavecals about the same story. Internal LED coupled to specs; second LED used for system level testing, done at the end of the day's trip. Range of integration times. Put all instrument details into a separate paper. Persons: Yarbrough/Feinholz/Johnson/Flora

Es spectrograph
Is a Satlantic HyperOCR-I radiometer, S/N 234, calibrated in Feb 2012. The Es cosine collector is identical to that used in the FIS. Es spectrograph was used in two modes: for Es during the profiling sets, and nearly continuously with frequent occultations using a

black disk on a telescoping rod for quantifying sky conditions and validating Hydrolight modeling. Also used to compare to the FIS Es results, as an independent check of its stability. Persons: Ondrusek/Flora

Optical Profiler
Is a Satlantic free – falling optical profiler (MicroPro, S/N XXX) equipped with a HyperOCR-I radiometer, S/N 233, for Ed and a HyperOCR-R radiometer, S/N 206, for Lu. We think the Lu in water full angel FOV is 17°. Two ECO Pucks™ from WetLabs were mounted to the profiler: one with three active fluorometers for chloryphyll a, CDOM, and phycoerythrin and the other for optical scattering at 117º at three wavelengths: 440 nm, 550 nm, and 865 nm. (Do we have the ECO Puck data? What about temperatures? Internal temp?) Persons: Ondrusek/Flora

In-air Radiometer
Is a HandHeld 2™ portable spectroradiometer, S/N 1847, (325 nm to 1075 nm, reported at 1 nm resolution using a 512 detector array), bandpass is 3.0 nm at 700 nm, field of view (full angle?) is 25º. Has internal GPS sensor. Used with the Mobley method and the gray plaque to measure remote sensing reflectance. Persons: Ondrusek/Flora

Cameras
The MLML GoPro cameras: Four of them. Locations, size of images, purpose, data acquisition mode. Describe method to calibrate time stamp of files. Also photos and video from Iphones. Persons: Houlihan/Flora

CTD (Conductivity, temperature, depth)
The NOAA SeaBird CTD package measured salinity (from conductivity), temperature, depth (from pressure). Incorporated into the package was a fluorometer (passive) for chlorophyll (uses the Chelsea method), an oxygen sensor, and a transmissometer for beam attenuation at 670 nm. Persons: Ondrusek/Flora

Scatterometer
A WetLabs ac-s …. full spectrum transmissometer.. Terry will send data. First cut – the cals are not up to date, and we did not run in air cals. The water cal using the 18mole water (?) here was used, but gave inconsistent results. For the station data, the beam attenuation was positive, but the absorption was negative, typically -0.1. Next steps? Persons: Houlihan/Ondrusek/Flora

Water Samples
Are filtered. Go into the fluorometer for chl. Size of bottles was too small ?

Filtration Rig
Used to filter water samples.

Fluorometer

The NOAA Turner 10-AU fluorometer determines fluorometric chlorophyll from the filtered samples. Dissolves filtered sample with acetone, runs fluormetrics, puts in some acid, reruns flurometrics.

Wind Velocity, Air Pressure, Air Temperature, Visibility,…
Measured with the hand-held Windmate and recorded on the Boat Heading log sheets (manf?). We downloaded the Hawaii airport meteorological data (subset of possible parameters, covers all 10 Hawaii airports) as well as the full (high resolution?) data stream from the Honolulu airport. Full res, hourly, visibility, temperature, dewpoint, RH, wind speed, wind direction

Position, Time, Boat drift
A GPS (model number etc) recorded date, time, latitude, longitude, boat speed, direction, and magnetic variation. Data: Feinholz

Boat heading, sea state, etc
Periodically throughout the station, observers recorded boat heading, wave height and frequency, distance to fork, etc

Analysis

What do we want to do with the different data streams?? Some are for Jim and some are for us – mostly as QC.

Types of data: AOPs, IOPs, information to determine if we met the experimental goals (clear sky, fork pointed south, homogeneous waters, etc.)