JPSS Cal/Val VIIRS Meeting
(Ocean Color Session Wednesday 10)

West Coast Ocean Color Products &
NOAA VIIRS Cruise Comparisons

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Outline

1.) **Southern California Aeronet SeaPRISM (Platform Eureka)**

   Comparison of Side-by-Side SeaPRISMS

   Correlations on individual Bands

   Time Series Comparisons: March 2016 - 4 August 2016

2). **2015 October Cal/Val Cruise**

   Satlantic Optical Profiler (‘HyperPro’)

   **SPectral EVolution Above Water Spectrometer (SPEV)**
   SPEV Measurement Protocols
   SPEV Procoessing Protocols
   Automated processing codes
   Assumptions, Settings, Usage

   Comparison of HyperPro and Spectral Evolution at
   2, 6, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27
Comparison of side-to-side SeaPrisms in Southern California

USC NASA Aeronet ‘Platform Eureka’

SeaPRISM

Map

Two SeaPRISM’s
Timeline of recent events at Southern California Aeronet ‘Platform Eureka’ SeaPRISM

02/11/2016: CIMEL #612 was removed from Platform Eureka and sent to GSFC for calibration

03/08/2016: Asea value on CIMEL #58 changed from -50 to -90 (per Giuseppe and Mikhail)

04/27/2016: Requested site access to reinstall #612. Site access rules were changed and new Access Agreement was required

06/20/2016: CIMEL #612 reinstalled after calibration.

Based on this information, the best dates for side by side comparison are from 06/20/2016. That is when #612 has updated calibrations and #58 has correct Asea values.
Level 1.5: Normalized Water Leaving Radiance since 20 June 2016

\[ y = 1.047x - 0.002354 \]

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<th>Wavelengths (nm)</th>
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Time Window - 30 minutes
Level 1.0: Normalized Water Leaving Radiance since 20 June 2016

$y = 1.055x - 0.001677$

Wavelengths (nm)
412  442  489  530  550  667  869  1021

Time Window - 1 minutes
Outliers Removed
Level 1.5: Normalized Water Leaving Radiance since 20 June 2016

\[ y = 1.0471x - 0.0024 \]

\[ y = 1.0427x + 0.0 \]
Regression on Wavelength (nm): 412

\[ y = 0.9739 + 0.0603 \]
\[ y = 1.0718 + 0.0 \]

Regression on Wavelength (nm): 442

\[ y = 0.9587 + 0.0655 \]
\[ y = 1.0656 + 0.0 \]

Regression on Wavelength (nm): 489

\[ y = 0.9154 + 0.0889 \]
\[ y = 1.0484 + 0.0 \]

Regression on Wavelength (nm): 530

\[ y = 0.9595 + 0.0380 \]
\[ y = 1.0320 + 0.0 \]
\[
y = 0.9173 + 0.0464 \\
y = 1.0246 + 0.0 \\
y = 0.8396 - 0.0022 \\
y = 0.7643 + 0.0 \\
y = 0.9997 - 0.0027 \\
y = 0.8690 + 0.0 \\
y = 1.0219 + 0.0004 \\
y = 1.029 + 0.0 \\
\]
NOAA VIIRS nLw < SEAPRISM nLw

nLw        CHL-a   412   444   489   550
Slope       0.69   0.75  0.85  0.93  0.83
20 June - 4 August 2016, 1x1, approx 14 matches
Comments:

SeaPRISM discrepancies at Platform Eureka are resolved since 20 June 2016.

With a bit more L1.5 SeaPRISM data, will track/analyze any systematic discrepancies with NOAA STAR MSL12 and NASA Ocean Color Products.

State of reprocessing old SeaPrism pre June 2016 Platform Eureka SeaPRISM data (both NOAA STAR & NASA)?
December 2015 NOAA Nancy Foster Cruise Measurements

HyperPro Measurements

Spectral Evolution Measurements
Reference  Water  Sky
Spectral Evolution and HyperPRO matches shaded.

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VIIRS NOAA STAR MSL12
Spectral Evolution Automate Processing from Radiance to Rrs

**Settings:** NOAA Cruise Station 6
Year = 2015  Month = 12  Day = 05  Hour = 17  Minute = 35  Seconds = 0
Lat = 24.4867  Lon = -77.3204  Alt = 0  Wind_Speed = 3
Sigma_Water = 2  Sigma_Sky = 1.5  Sigma_Reference = 1
Scale = 3  (0 Fixed-30; 1 Water Max; 2 Sky Max; 3 Reference Max)

![Graph showing spectral evolution](image-url)

- **Reference**
- **Sky**
- **Water**
- **Unused**

**Wavelength (nm):**
350 400 450 500 550 600 650 700 750 800 850 900

**Radiance (uW/cm²/sr/nm):**
0 5 10 15 20

Figure 2
Red Adjustment for Rrs
NOAA Cruise Station 6

Directory: ...

Date: 2015-12-5 Time: 17:35:00

\[ R_{rs} \]

\[ R_{rs} - \min[R_{rs}(601-850)] \]
Spectral Evolution: Automatic Processing

**HyperPro**: OSU Processing; VIIRS Channels Averaged

Blue values are HyperPro Multicast Averages at VIIRS Channels and where used by Mike (NOAA) for instrument comparisons.
Spectral Evolution: Automatic Processing
HyperPro: OSU Processing; VIIRS Channels Averaged

Station: 17

Station: 18

Station: 19

Station: 20

Spectral Evolution: Automatic Processing
HyperPro: OSU Processing; VIIRS Channels Averaged
Spectral Evolution
90/40 Protocol & Automated Processing Reliable

Often anomalously high values above 700 nm (measurement artifacts or instrument?)

Sometimes low values below 400 nm.

Automated processing could be extended to other instruments (ASD).

Questions: Tracking down systematic differences to measurement artifacts; height (boat reflections), ship state (rocking), sea state (white caps),
Oregon State and USC Summary for 2015-2016 West Coast Products: Summary

Resolved USC (‘Platform Eureka’) NASA Aeronet SeaPRISM issues.
(Finally) Getting consistent data from Southern California Platform Eureka SeaPRISM (as of 20 June 2016)!

With reprocessing (Pre June 2016), will redo Platform Eureka comparisons to VIIRS and continue to check consistency.

Developed protocols for above water spectrometry with new instrument:
Spectral Evolution Field Spectrometer, and validated against Satlantic Optical Profiler (HyperPRO).
Automated protocols can be extended to other instruments like ASD.

Supplied ‘SeaBASS’ type data to NOAA (Veronica) for all cruises between 2014-2016 (HyperPro, Spectral Evolution, HPLC, IOP’s)
San Francisco Bay
Newport
Southern California
Hawaii

OSU December 2016 ‘Nancy Foster’ Cruise Report at:
http://meris.coas.oregonstate.edu/tmp/
OSU_NOAA_CRUISE_REPORT_2015_12/