Chlorophyll-a Algorithm Assessments

Ocean Chlorophyll 2
Version 3

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- Version 3 Includes L. Harding Data (Chesapeake Bay and adjacent shelf waters)
- OC2 Version 2 described in Maritorena & O'Reilly, SeaWiFS Post-Launch Series (In Press) (Figure OC2_2_stats_plot.gif)
- SEABAM-2 (N= 1174) : Not many observations exceeding (> 8 ug Chl a /l)
- Uncertainty about OC2 v2 representing data above 8 ug Chl a /l
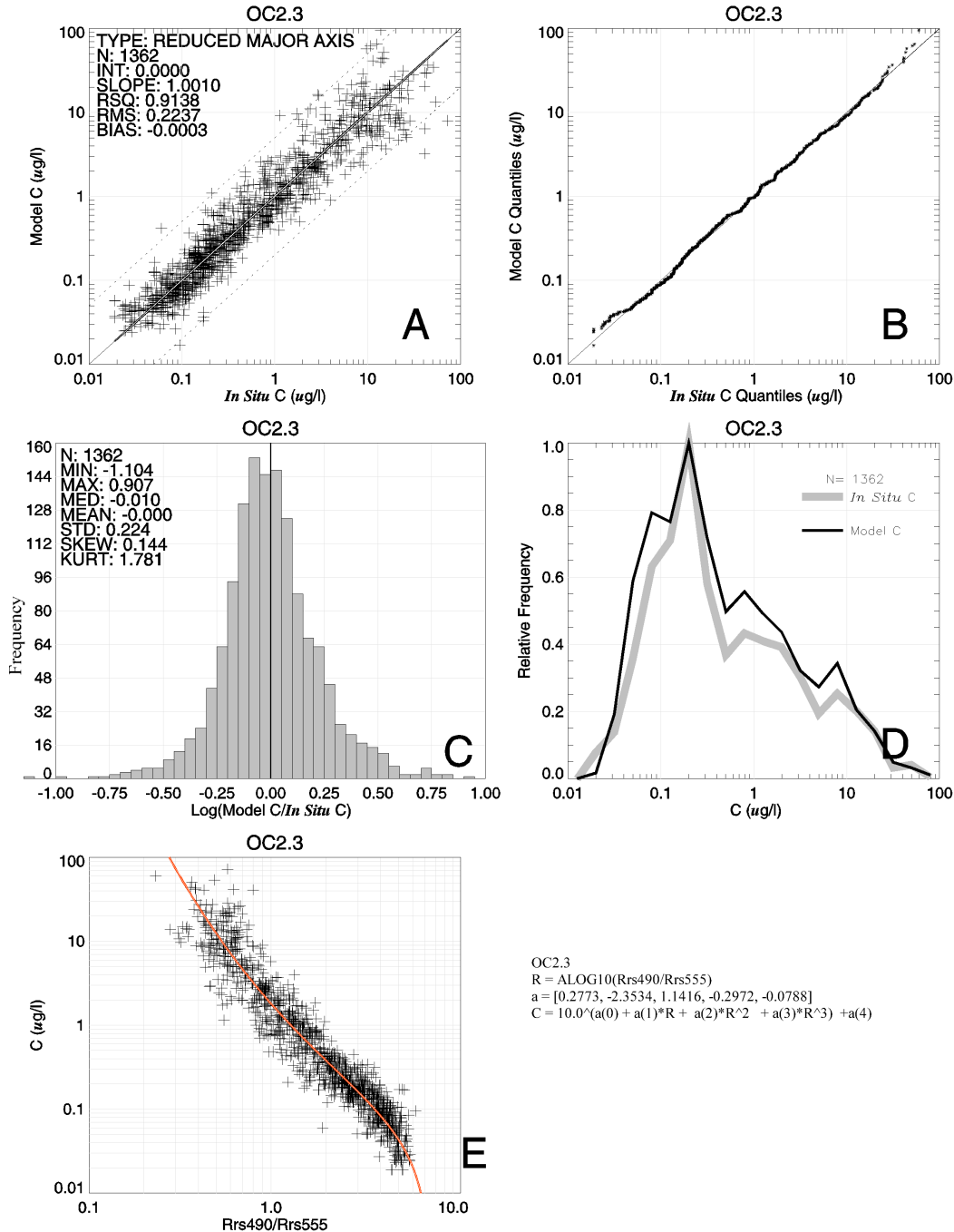
SEABAM-2 +
Harding Data Set

- **Harding Data Set:**
- (**Chesapeake Bay and adjacent shelf water**)
- L. Harding and A. Magnuson
- G. Zibordi Code was used for Self-Shading Correction:
  - Zibordi, G. and G.M. Ferrari, 1995, Instrument self-shading in underwater optical measurements: experimental data, Applied Optics 34(15):2750-2754.
  - Gordon, H.R. and K. Ding, 1992, Self-Shading of in-water optical instruments, Limnol. Oceanogr.,37(3):491-500.
- Inputs To Instrument Self-Shading Model
  - Solar_zenith_angle
  - Total seawater_absorption (aw,ad,ap)
  - Ratio of diffuse/direct sun irradiance
  - Diameters of instrument housing and optical collector

- Self-Shading Correction Code (IDL) is available (Program Files: self_shade_zibordi.pro, self_shade_zibordi_demo.pro)
- Harding Data Screening Criteria:
  - Solar zenith angle < 70
  - Chl a < 100 ug/l
  - Spectral Index 1324:
    - (Rrs412/Rrs490) versus (Rrs443/Rrs510)
  - Originally 308 observations in Harding Data Set
    - 215 obs had all inputs needed for self shading correction
    - 18 obs were discarded based on data screening criteria
    - Final observations for Harding data (n= 197)
    - Highest chlorophyll: 72 ug/l

Summary
- OC2 version 3 (N= 1362)
- SEABAM-2 + 197 measurements from chlorophyll-rich waters (Harding data)
- Radiometer Self-Shading Correction changed Rrs490/Rrs555 as expected

Harding Data: Self-Shading Correction

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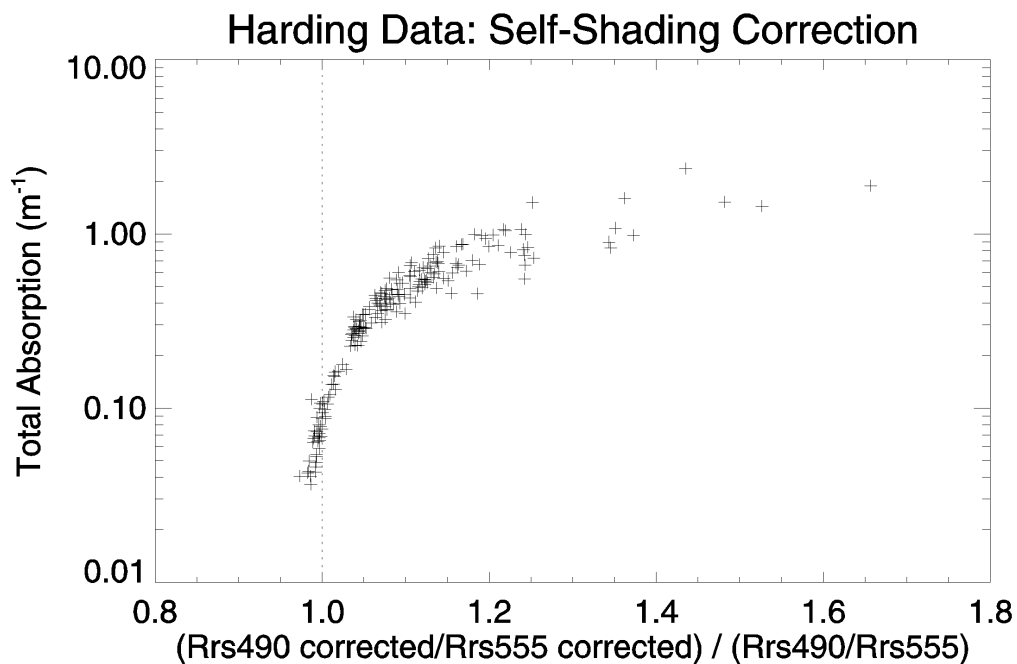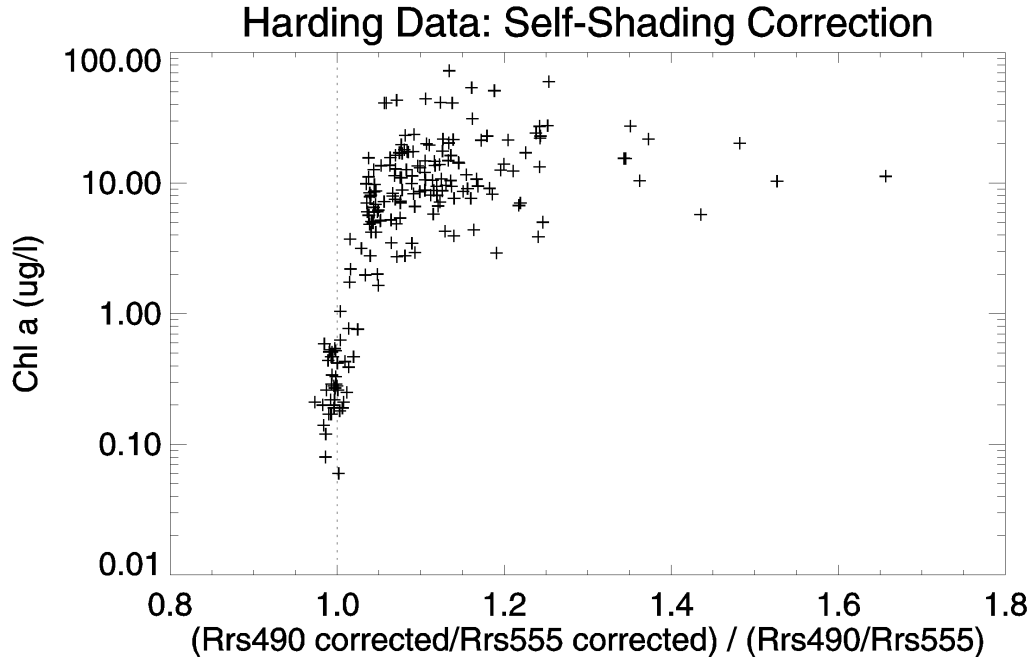
- Rrs490/Rrs555 for OC2 v3 (**6.647** at C=0.01 ug/l) agrees with expected clear water reflectance ratio (**6.13-6.66**) and similar to OC2 v2

OC2.3
R = ALOG10(Rrs490/Rrs555)
a = [0.2773, -2.3534, 1.1416, -0.2972, -0.0788]
C = 10.0^(a(0) + a(1)*R + a(2)*R^2 + a(3)*R^3) +a(4)

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- OC2 version 3 and version 2 are also NOT much different from 0.01 to 10 ug/l Chl a

- Above 10 ug Chl a/l, version 3 exceeds version 2 (Figure OC2C_1_2_3.gif)
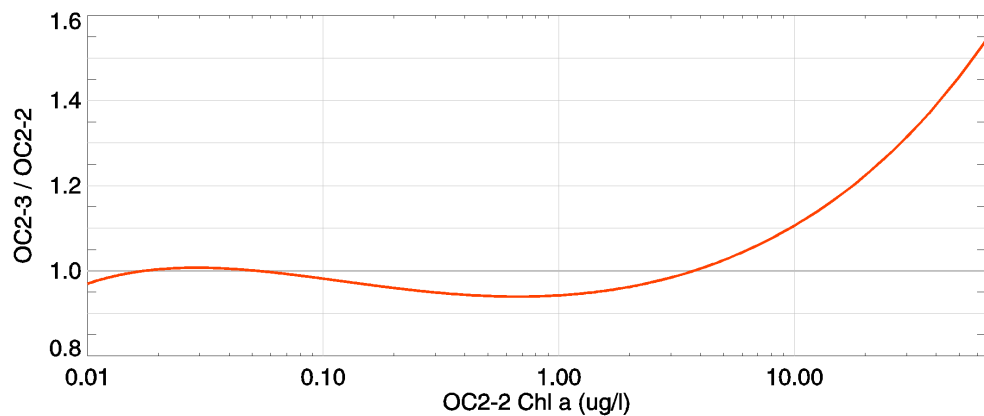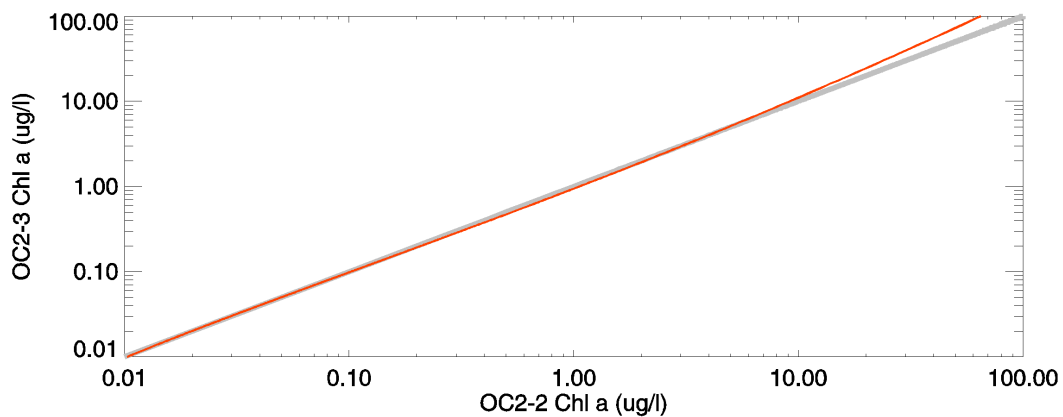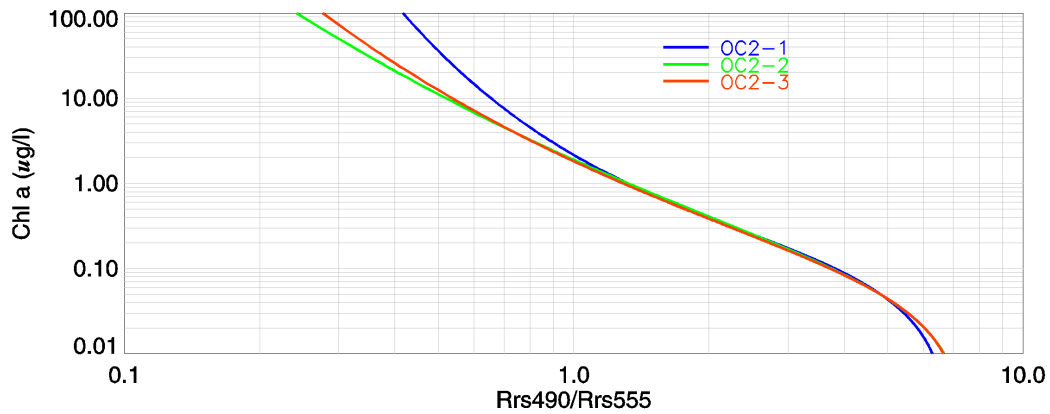
- Updated (version 3) Maximum Band Ratio algorithms also available for testing (OC4, OC3b, OC3c)