

The collaboration between NASDA and NASA has resulted in an OCTS time series which may be quantitatively compared with the SeaWiFS time series because both were processed using similar vicarious calibration sources (MOBY), atmospheric correction, and chlorophyll algorithms.

Chlorophyll a

Chlorophyll a concentration (Chl_a) was estimated with the bio-optical algorithm 'Ocean Chlorophyll 4-Band OCTS' or OC4O. OC4O and the SeaWiFS algorithm OC4 are empirical algorithms derived from a very large set of *in situ* measurements ($n=2,804$) of remote sensing reflectance (R_{rs}) and chlorophyll a concentration (O'Reilly et al. 2000). Consequently, OCTS estimates of Chl_a based on OC4O should be highly comparable with SeaWiFS estimates based on the OC4 algorithm.

OC4O is a 4th-order polynomial function relating the maximum of three band ratios (R_{rs443}/R_{rs565} , R_{rs490}/R_{rs565} , and R_{rs520}/R_{rs565}) to Chl_a . The equation for OC4O version 4 (OC4O v4; O'Reilly et al., 2000, Table 7) is:

$$\text{Chl}_a = 10.0^{(0.405 - 2.900R + 1.690R^2 + 0.530R^3 - 1.144R^4)}$$

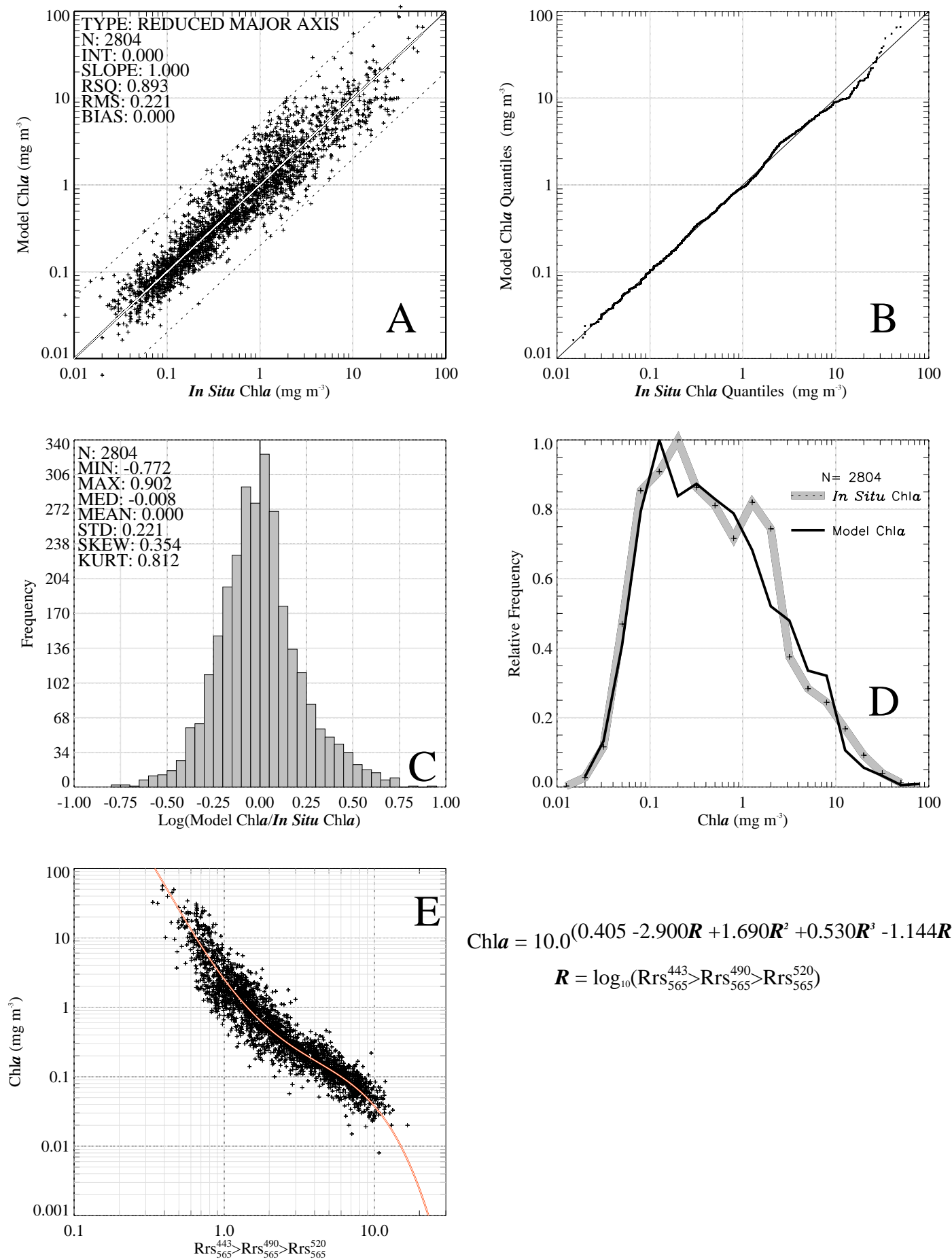
$$R = \log_{10}(\text{Rrs}_{565}^{443} > \text{Rrs}_{565}^{490} > \text{Rrs}_{565}^{520})$$

A 'v4' is appended to the algorithm name (OC4O v4) to indicate that the data set used to derive the algorithm is the fourth version. The statistical characteristics of OC4O v4 are illustrated in **figure 1**. The coefficient of determination (R^2) between log-transformed *in situ* measurements of Chl_a and log-transformed Chl_a estimates based on OC4O is 0.893, and the RMS error is 0.221. **Figure 2** illustrates the relationship between the Maximum Band Ratio (MBR) and Chl_a and **figure 3** shows the relative frequency of the MBR versus Chl_a for the *in situ* data set used to develop the algorithm. Below chlorophyll concentrations of approximately 0.33 mg m^{-3} the R_{rs443}/R_{rs565} band ratio is the most frequently used MBR in the OC4O equation (**fig. 3**). Above Chl_a 0.33 mg m^{-3} R_{rs490}/R_{rs565} begins to dominate, and above 1.60 mg m^{-3} the R_{rs510}/R_{rs565} band ratio is usually the MBR. These statistical and MBR characteristics of OC4O are very similar to those of OC4.

References

O'Reilly, J.E., S.Maritorena, D.Siegel, M.O'Brien, D.Toole, B.Greg Mitchell, M.Kahru F.Chavez, P.Strutton, G.Cota, S.Hooker, C.McClain, K.Carder, F.Muller-Karger L.Harding, A.Magnuson, D.Phinney, G.Moore, J.Aiken, K.Arrigo, R.Letelier and M.Culver, (2000), Ocean color chlorophyll a algorithms for SeaWiFS, OC2, and OC4: Version 4. In: O'Reilly, J.E., and 24 Coauthors, 2000: SeaWiFS Postlaunch Calibration and Validation Analyses, Part 3. NASA Tech. Memo. 2000-206892, Vol. 11, S.B. Hooker and E.R. Firestone, Eds., NASA Goddard Space Flight Center, Greenbelt, Maryland, 9-23.

OC40 v4



$$Chla = 10.0^{(0.405 - 2.900R + 1.690R^2 + 0.530R^3 - 1.144R^4)}$$

$$R = \log_{10}(Rrs_{565}^{443} > Rrs_{565}^{490} > Rrs_{565}^{520})$$

Figure 1

OC4O v4

In Situ Maximum Band Ratio versus Chlorophyll a

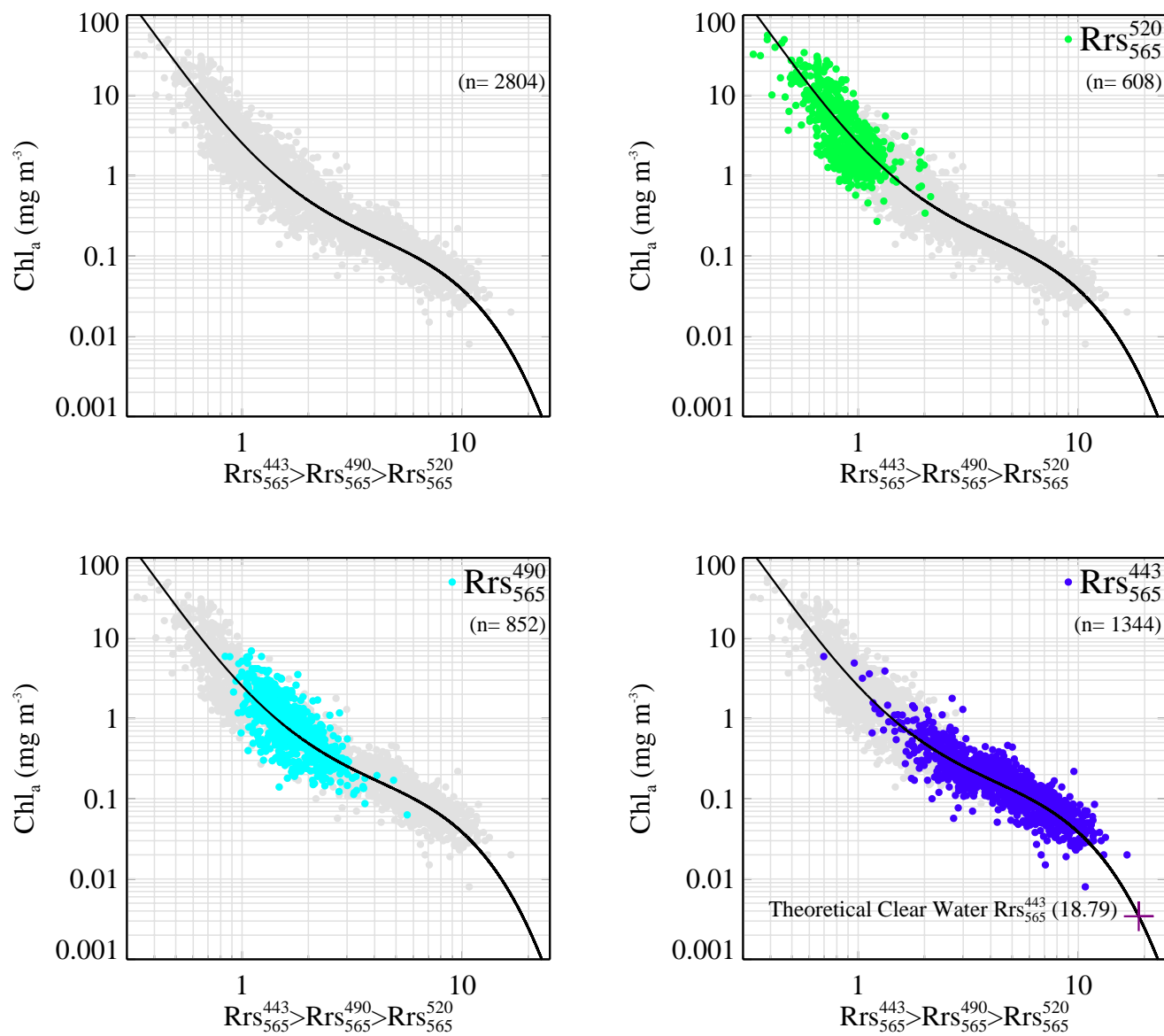


Figure 2

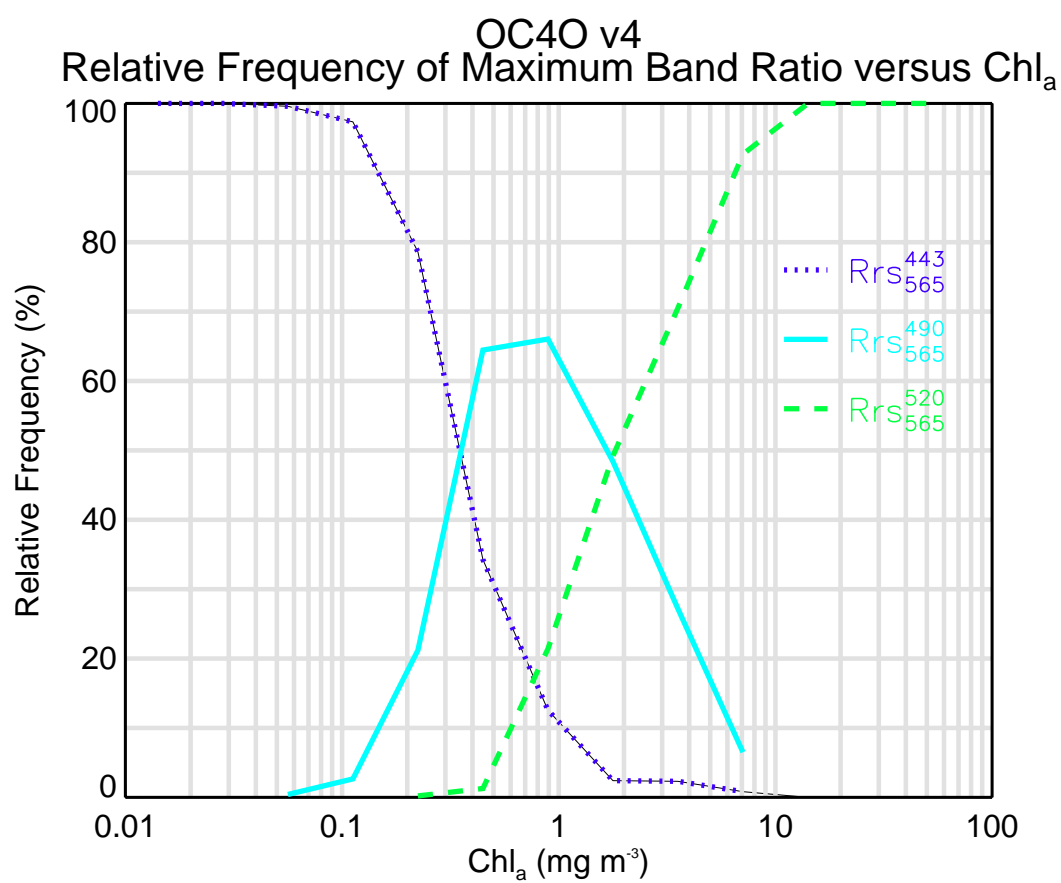


Figure 3