

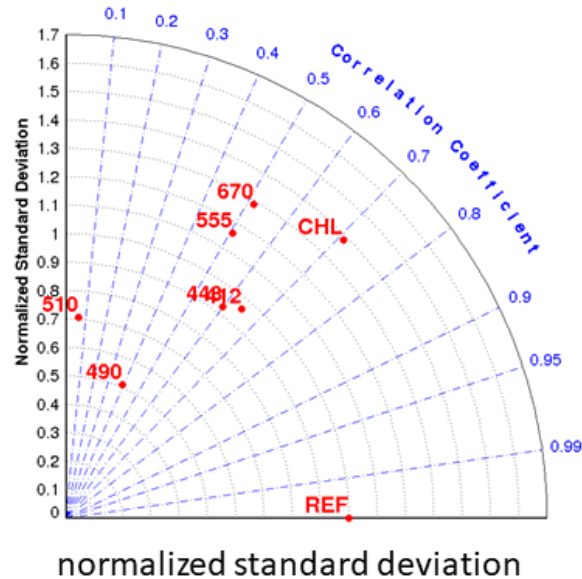
SUPPLEMENTARY MATERIAL

for

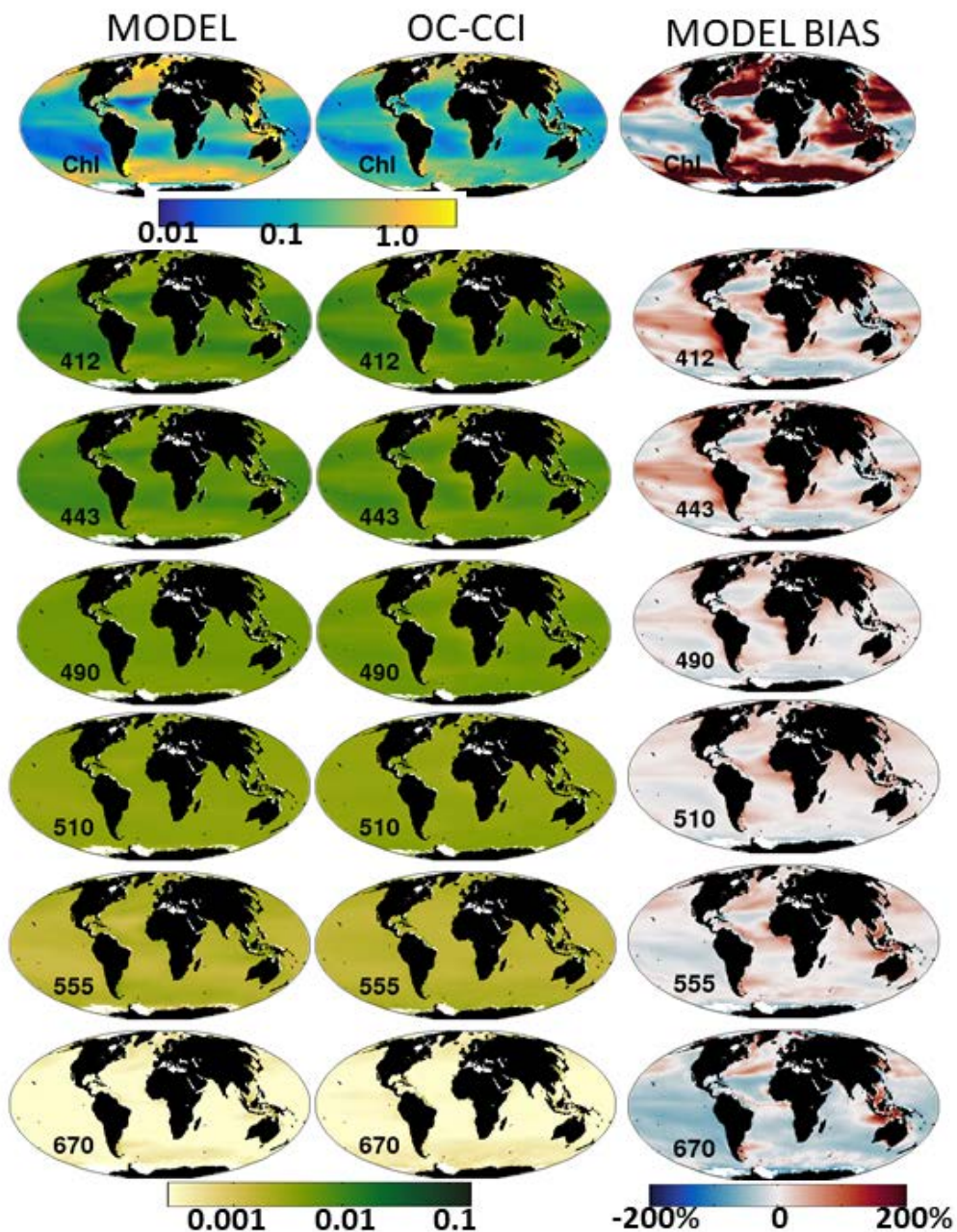
Ocean Colour Signature of Climate Change

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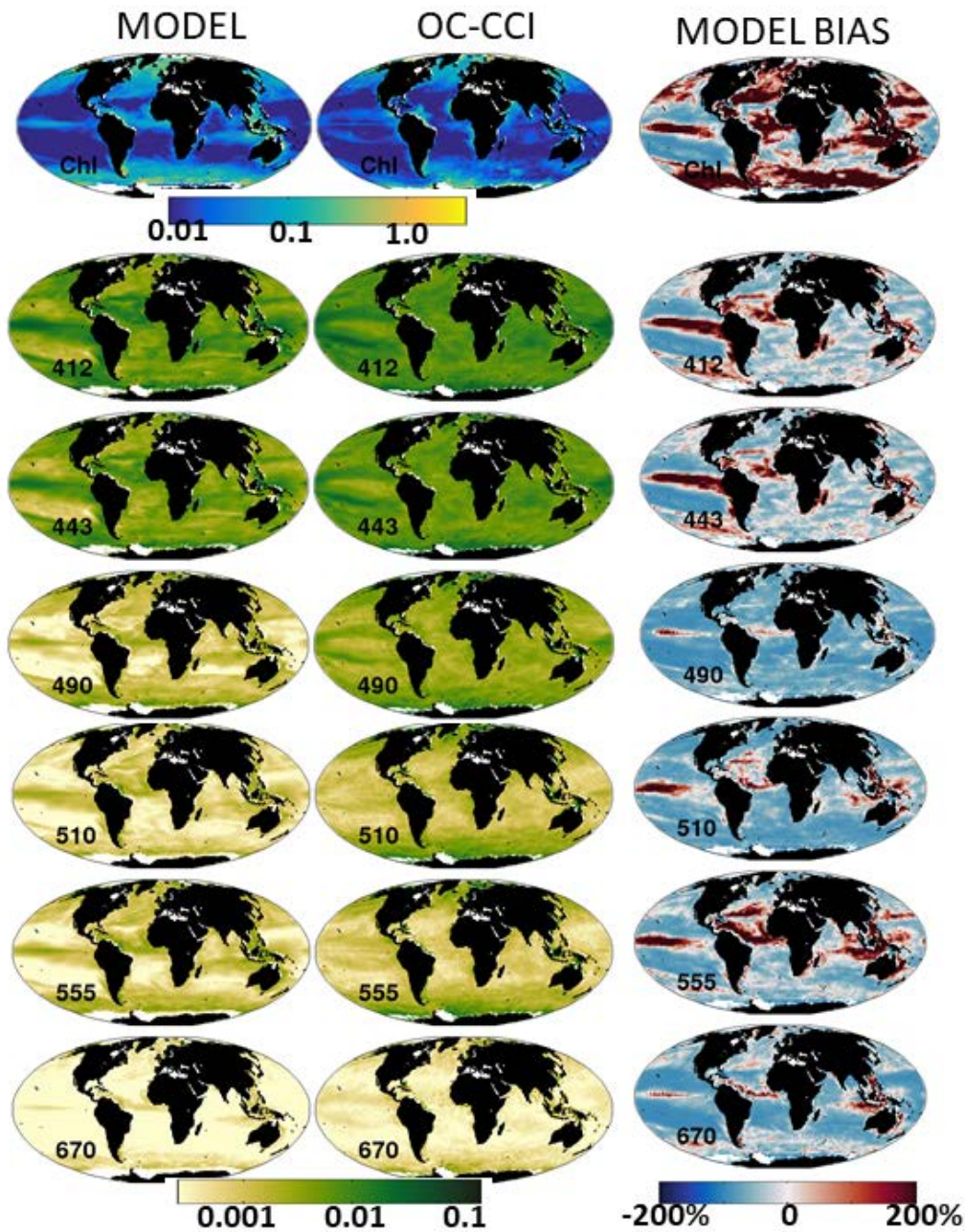
SUPPLEMENTARY FIGURES:



Supplementary Figure 1: Taylor diagrams of model global composite relative to OC-CCI products (1998-2015). This polar coordinate plot shows correlation (angular position) and the normalized (by observed spatial STD) spatial standard deviation (radial position). Statistics are performed on log-normalized fields. REF indicates a perfect match between model and observations. CHL refers to the model derived Chl-a, and the numbers refer to the model R_{RS} interpolated to the same wavebands as the OC-CCI products (412, 443, 490, 510, 555, 670nm). This interpolation is problematic in the 490 and 510nm bands where the patterns of high/low shift between those seen in the blue and the green (see Supplementary Figure 2), and likely skew the results here.



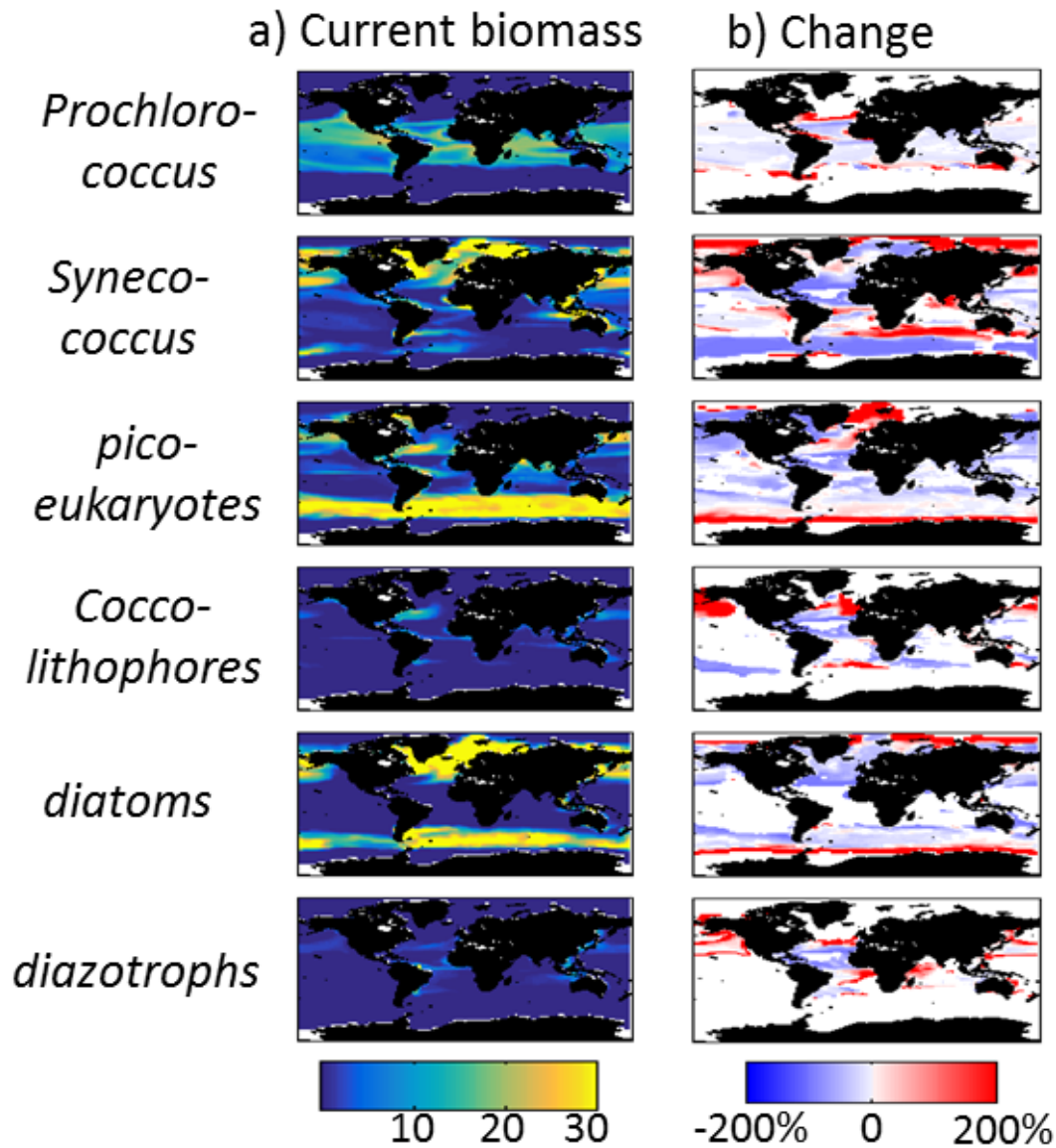
Supplementary Figure 2. Comparison of 18 year mean composites (1998-2015). Left column is model, middle column is OC-CCI products and right column is the % bias. “Chl” refers to the model “derived” Chl-a, and the numbers refer to the model R_{RS} interpolated to the same wavebands as the OC-CCI products (412, 443, 490, 510, 555, 670nm). Chl-a in left and middle columns has units of mg Chl m^{-3} , R_{RS} has units of sr^{-1} .



Supplementary Figure 3. Comparison of 18 year annual variability (1998-2015). Shown are the temporal standard deviation of the de-trended, log-normalized annual composites over the 18 year study period. Left column is model, middle column is OC-CCI products and right column is the % bias. “Chl” refers to the model “derived” Chl-a, and the numbers refer to the model R_{RS} interpolated to the same wavebands as the OC-CCI products (412, 443, 490, 510, 555, 670nm). Chl-a in left and middle columns has units of mg Chl m^{-3} , R_{RS} has units of sr^{-1} .



Supplementary Figure 4. Ratio of interannual variability to the climatological composite mean (1998-2015). Shown are the ratio of the temporal standard deviation of the de-trended, log-normalized annual composites over the 18 year study period to the 18 year mean composite. Left column is model, middle column is OC-CCI products and right column is the % bias. “Chl” refers to the model “derived” Chl-a, and the numbers refer to the model R_{RS} interpolated to the same wavebands as the OC-CCI products (412, 443, 490, 510, 555, 670nm). Left and middle columns are unitless ratios. Global median values are shown in Fig 3.



Supplementary Figure 5. Model phytoplankton types. (a) Left panels show the 1998-2015 mean of the phytoplankton types biomass (mgC/m^3). (b) Right panels show the biomass difference (mgC/m^3) between the 2085-2100 mean and the current day mean (i.e. the left panel). Areas in (b) where the differences between the two periods are not significant ($p > 0.05$) or where the particular phytoplankton group biomass is below a critical threshold are left blank.