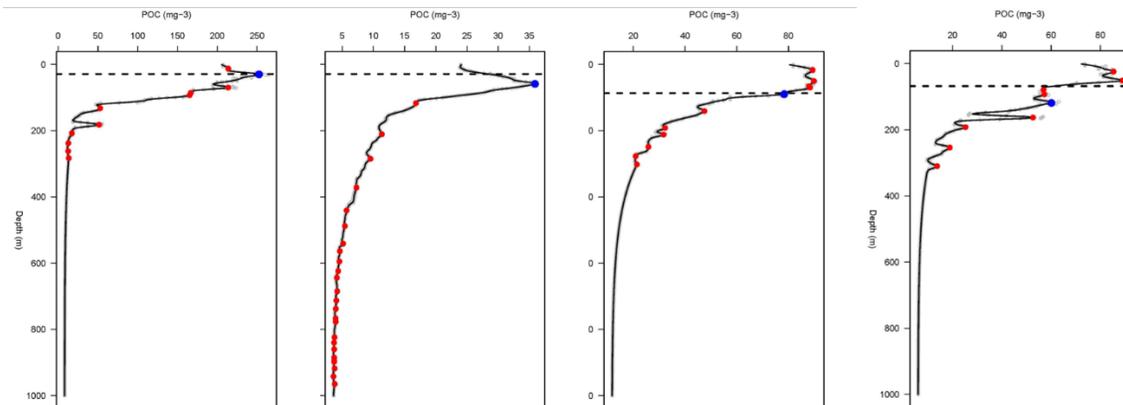


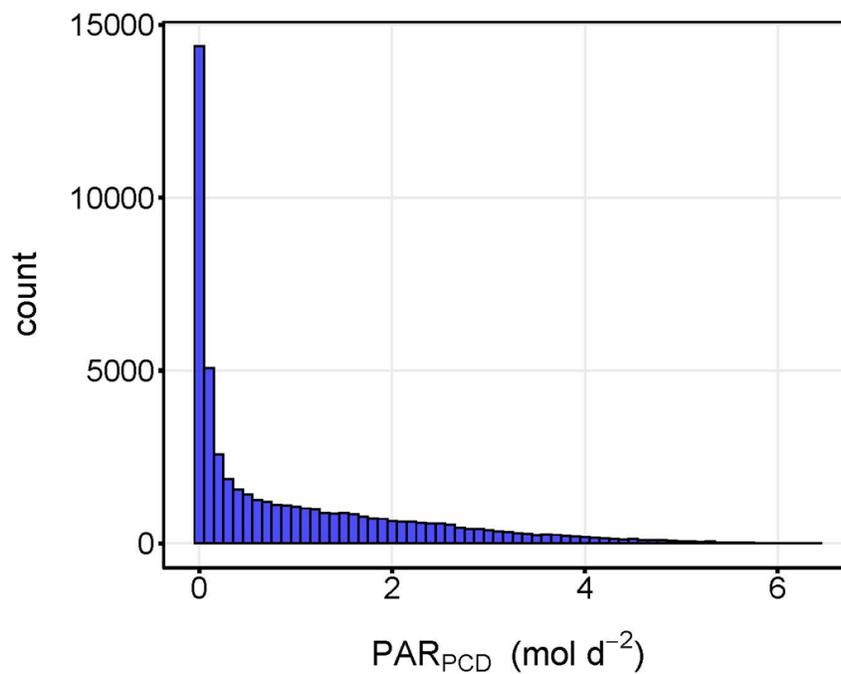
1 **1. Figures**

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4 **Supplementary Figure 1.** Profiles of float-based particulate organic carbon (POC_{float}) fitted with a
5 smoothing function (black line) and a local maximum filter to detect sub-surface peaks in POC
6 concentration. Red circles indicate peak detection and blue circles indicate the POC maximum determined
7 using this approach.



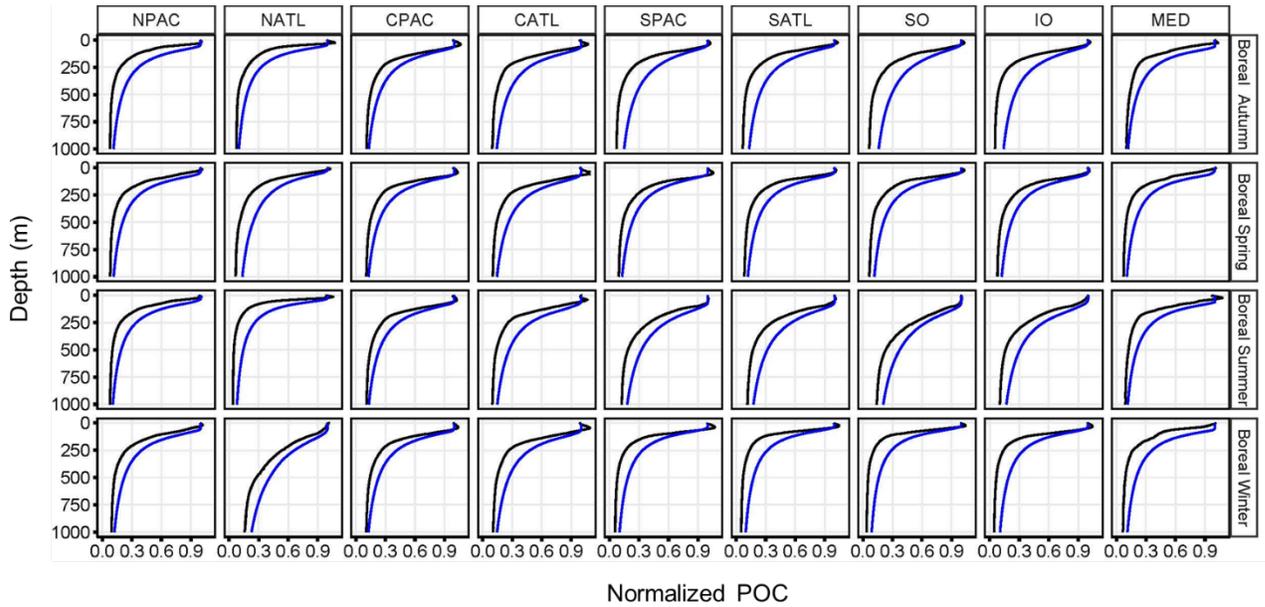
8

9 **Supplementary Figure 2.** Frequency histogram of light levels at the depth of the particle compensation
10 depth (PCD).

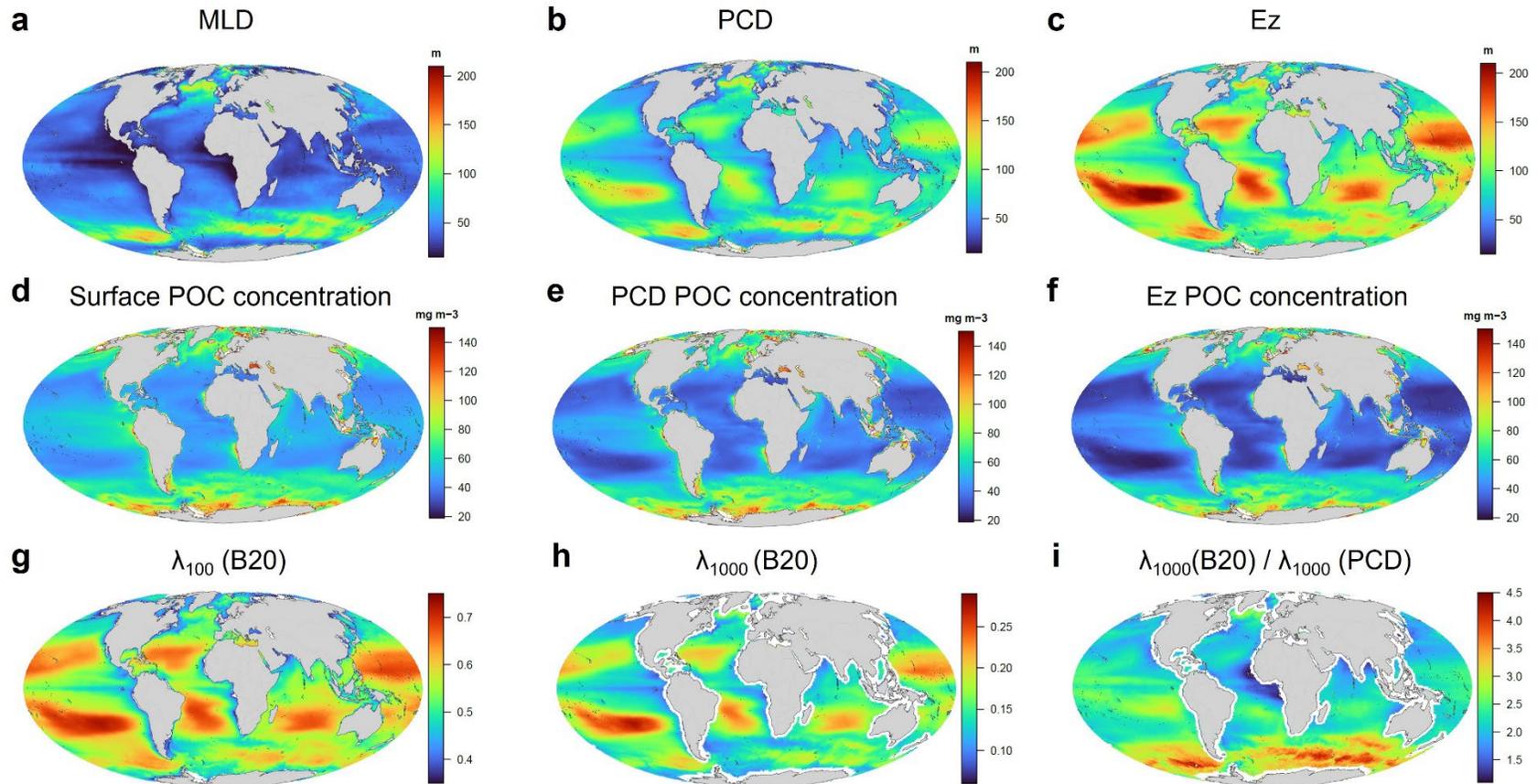
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14 **Supplementary Figure 3.** Seasonal variability in particulate organic carbon (POC) profiles across the
15 global ocean. Depth resolved POC are derived from float profiles of particulate backscatter (POC_{float} ,
16 black line) and the modified Martin approach (blue line) following normalization to the POC_{float}
17 concentration at one optical depth. The regional bins are NPAC = North Pacific, NATL= North Atlantic,
18 CPAC = Central Pacific, CATL = Central Atlantic, SPAC = South Pacific, SATL = South Atlantic, SO =
19 Southern Ocean, IO = Indian Ocean, and MED = Mediterranean.



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22 **Supplementary Figure 4.** Satellite observations of (a) mixed layer depth (MLD, units = m), (b) the particle compensation depth (PCD, units =
 23 m), (c) the 0.1% light depth ($E_{z0.1\%}$, units = m), (d) particulate organic carbon (POC, units mg C m^{-3}) concentration at the surface, (e) POC
 24 concentration at the PCD, (f) POC concentration at $E_{z0.1\%}$, (g) the POC concentration ratio for the PCD and 100 m below the PCD (λ_{100}) made
 25 using the modified Martin approach (B20), (g) the POC concentration ratio for the PCD and 1000 m (λ_{1000}) made using the B20 method, (h) the
 26 difference between λ_{1000} calculated using the B20 method and the new isolume-based model.

