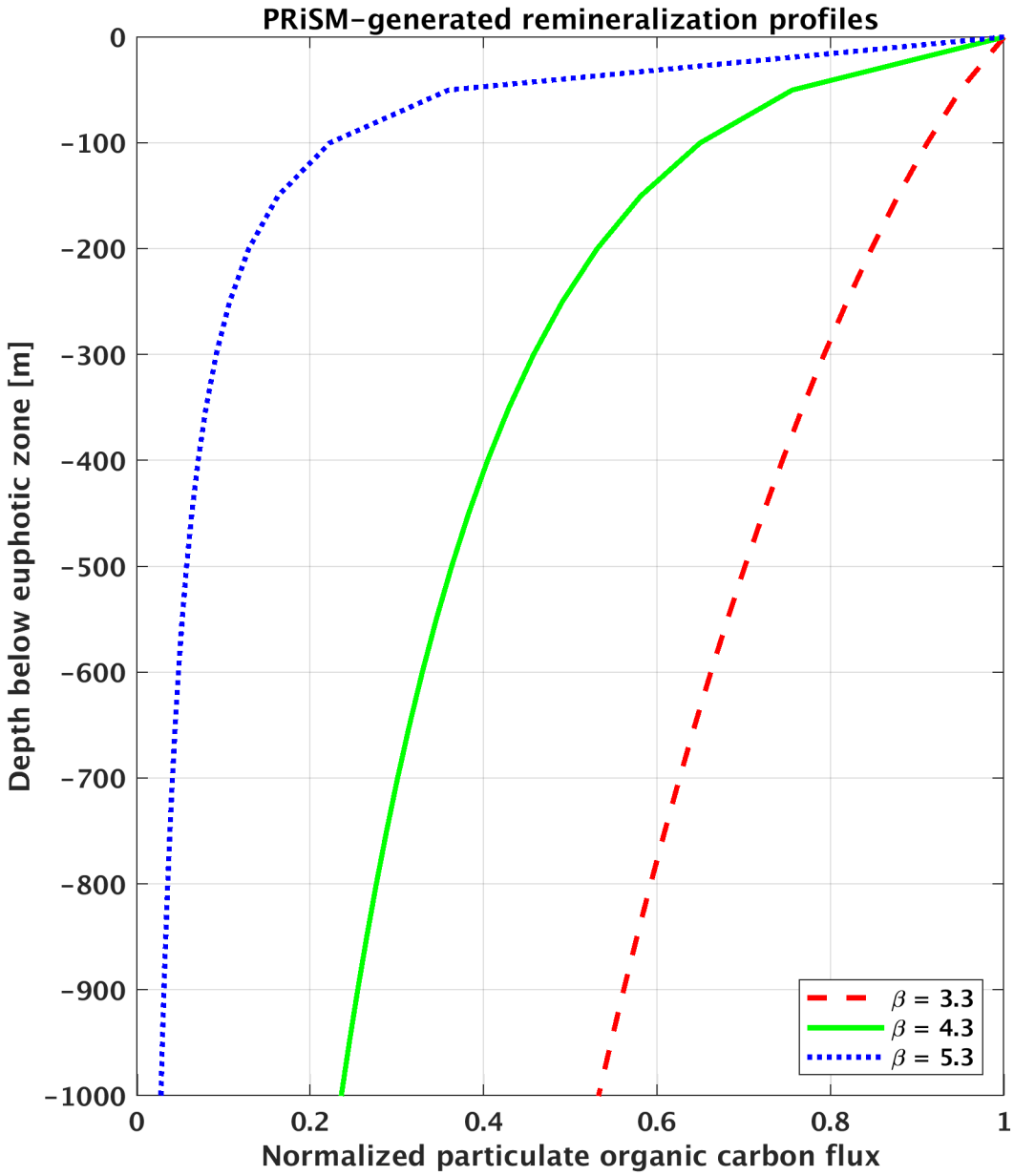

Figure S1: PRiSM-calculated particle flux profiles with varying surface β values.

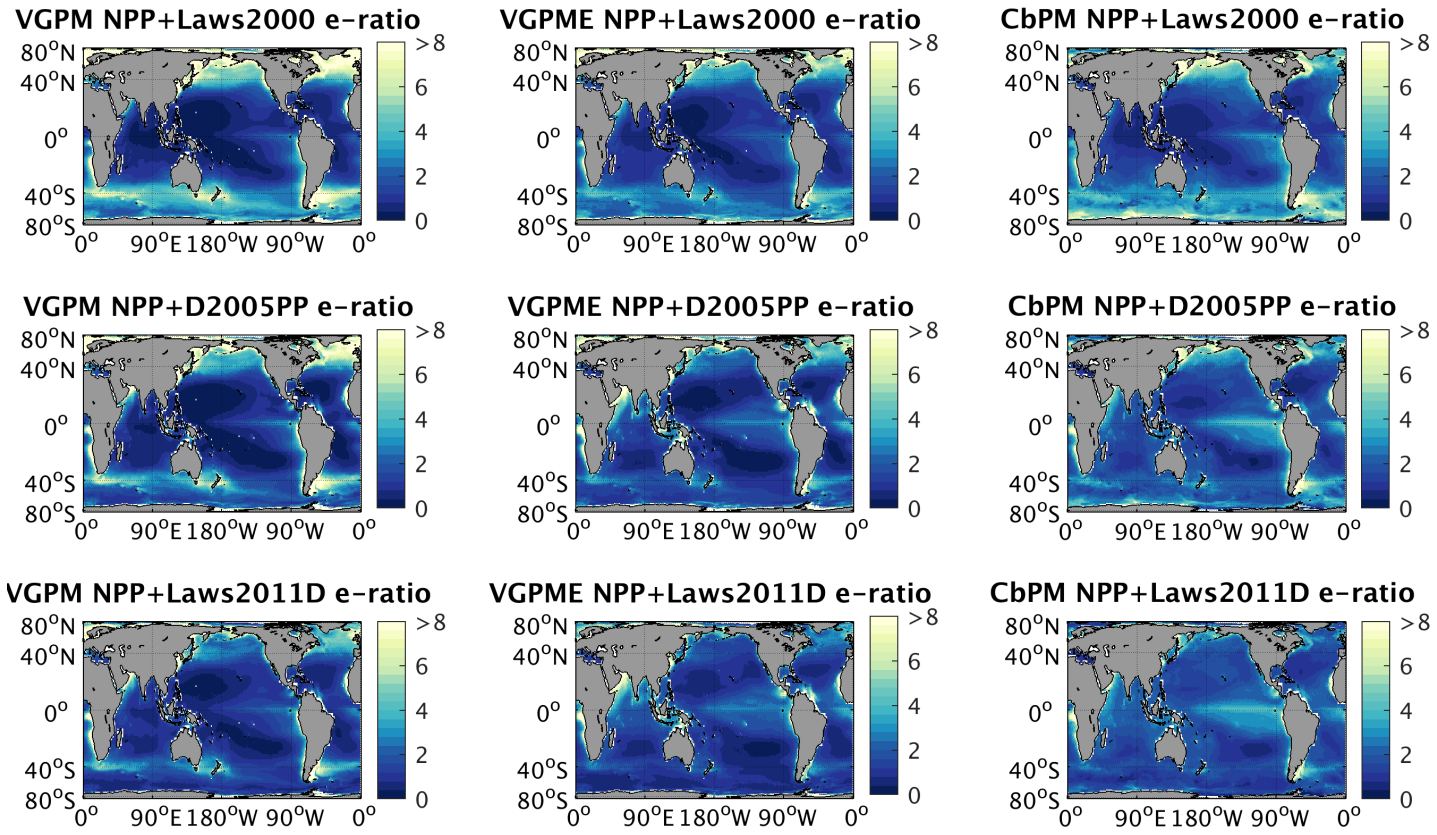

Figure S2: Annual means of all nine monthly time series of global export considered here, computed from all possible permutations of three net primary productivity (NPP) and three e-ratio (export/NPP) algorithms (described in Section 2.2.2). Units are molC m^{-2} yr^{-1}.

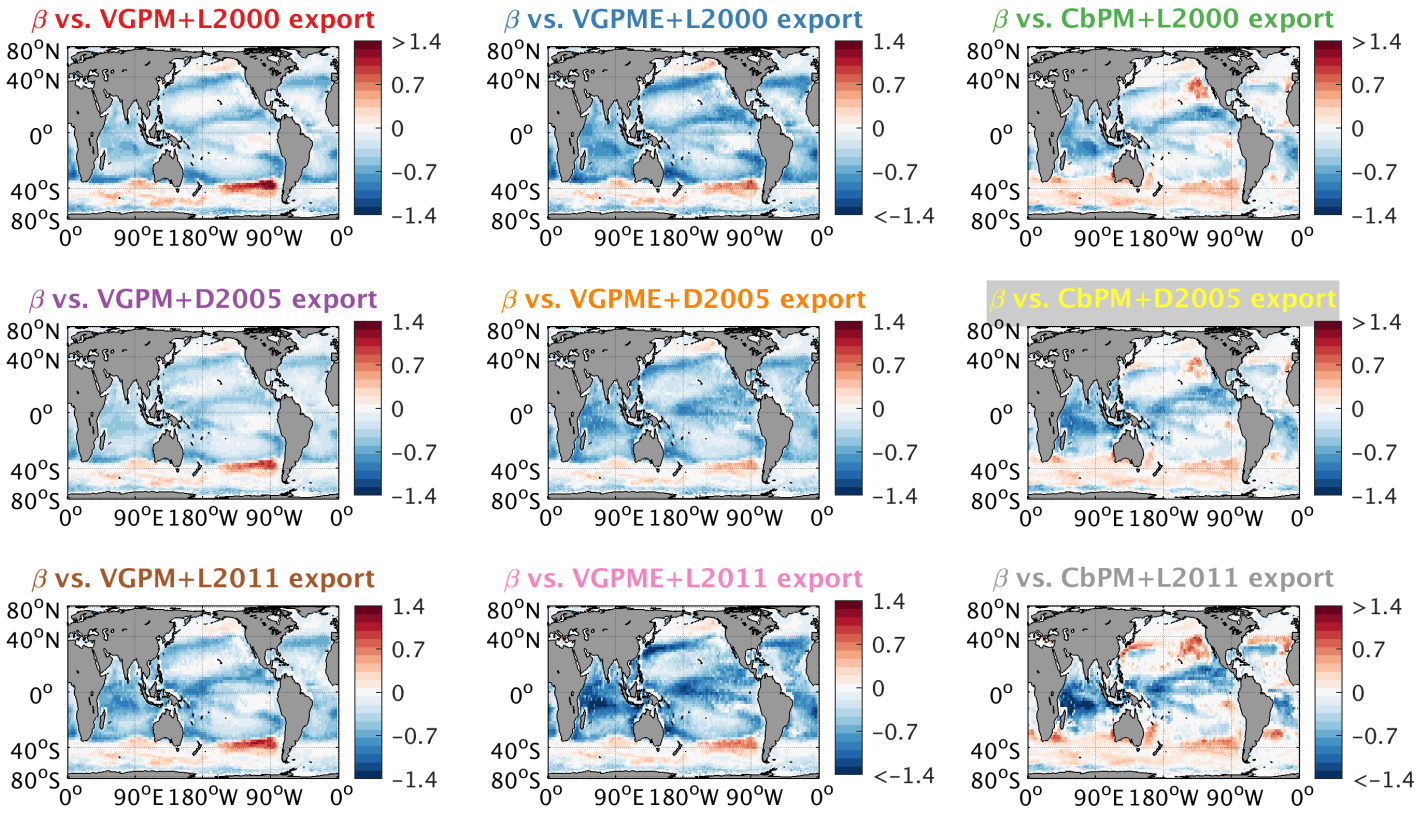

Figure S3: All nine monthly β versus time-mean normalized export ($\frac{d\beta_{obs}}{dE_{n,obs}}$, unitless) maps considered here. Title colors correspond to the NPP and e-ratio export combinations in Fig. 4a.

Particle parameters	
DL(z′ = 0)	2000 um
DS(z′ = 0)	20 um
cw	2.2e5 $m^{(1-\eta)}$ day^{-1}
η	1.17
cr	29^{-1} day^{-1}
ζ	1.62
Biogeochemical parameters	
τ	30 days
κ	0.5 $year^{-1}$
σ	0.1
Zs	115 m

Table S1: PRiSM parameter values (reproduced from Table 1 in DeVries et al., 2014 – see DeVries et al., 2014 for the equations in which the parameters are used)

Parameter	Definition	Units	Value
T_o	Reference temperature	°C	25
μ_{max}	Maximum growth rate at reference temperature	$year^{-1}$	365.25
K_p	Half-saturation coefficient for PO_4 uptake	mmol m^{-3}	0.1
K_I	Saturating light level	W m^{-2}	40
k_T	Temperature sensitivity of growth	Unitless	0.03
m_1	Linear mortality rate	$year^{-1}$	36.525
m_2	Quadratic mortality rate	$year^{-1}$ $mmol^{-1}$ m^3	3652.5

Table S2: Prognostic production scheme parameter values, with minor differences from those used in Weber and Deutsch (2012). These parameter values were re-derived by matching model surface PO_4 values with World Ocean Atlas observations on a 2-degree horizontal grid, in contrast with the 4-degree grid used in Weber and Deutsch (2012).

Export algorithms	AAZ region	SAZ region	STA region	STP region	ETA region	ETP region	NA region	NP region
VGPM NPP + e-ratio from:								
Laws 2000	0.1139	0.3207	0.2308	0.0504	0.0656	0.0656	0.0478	0.0000
Dunne 2005	0.1508	0.2328	0.1677	0.0300	0.0729	0.0729	0.0697	0.0026
Laws 2011	0.0927	0.0454	0.0975	0.0208	0.0445	0.0445	0.1169	0.1855
VGPM-Eppley NPP + e-ratio from:								
Laws 2000	0.1507	0.0420	0.1419	0.0663	0.1213	0.1213	0.1184	0.1197
Dunne 2005	0.1349	0.0212	0.0993	0.0435	0.1516	0.1516	0.1294	0.2379
Laws 2011	0.0622	0.0036	0.0636	0.0292	0.1080	0.1080	0.1308	0.1211
CbPM NPP + e-ratio from:								
Laws 2000	0.0478	0.2014	0.0900	0.2688	0.1667	0.1667	0.1263	0.0107
Dunne 2005	0.1215	0.1141	0.0640	0.2695	0.1047	0.1047	0.1322	0.0978
Laws 2011	0.1255	0.0188	0.0451	0.2216	0.1648	0.1648	0.1286	0.2247
Sum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table S3: Regional weights for export map calculation (reproduced from Table S2 in Weber et al., 2016)