



Figure S1. Diagrams of phosphate concentration versus density at short stations from the surface to the bottom and linear regressions between phosphate concentration and density through the phosphacline (black symbols) and inside the PDL (blue symbols). Results of the regression analyses can be found in Table 2. Vertical grey lines (phosphate concentration = 20 nM) mark the threshold between the nanomolar and micromolar phosphate dataset.

Station	Long °E	Diapycnal flux	Dry deposition	Total (dry+wet) deposition	Total external fluxes	Sustained PP <sub>130</sub>	Sustained PP <sub>200</sub>	NP	EXT/NP <sub>130</sub> (%)	EXT/NP <sub>200</sub> (%)
10	1.57	0.16 ± 0.03	0.027 ± 0.012	0.027 ± 0.012	0.190 ± 0.036	25	38	361	7	11
FA	2.92	0.04 ± 0.01	0.995 ± 0.050	2.153 ± 0.050	2.193 ± 0.052	285	439	315	91	139
9	5.84	0.13 ± 0.04	0.295 ± 0.000	0.295 ± 0.000	0.428 ± 0.036	56	86	189	29	45
4	7.98	0.16 ± 0.09	0.252 ± 0.012	0.252 ± 0.012	0.408 ± 0.095	53	82	179	30	45
5	11.02	0.10 ± 0.05	0.254 ± 0.009	0.254 ± 0.009	0.351 ± 0.054	46	70	82	56	86
TYR	12.59	0.08 ± 0.01	0.457 ± 0.015	0.457 ± 0.015	0.533 ± 0.020	69	107	114	61	93
6	14.50	0.00 ± 0.00	0.378 ± 0.018	0.378 ± 0.018	0.378 ± 0.026	49	75	299	16	25
8	16.63	0.03 ± 0.02	0.120 ± 0.010	0.120 ± 0.010	0.147 ± 0.011	19	29	200	10	15
7	18.15	0.03 ± 0.01	0.083 ± 0.008	0.083 ± 0.008	0.111 ± 0.010	14	22	165	9	14
ION	19.78	0.00 ± 0.00	0.268 ± 0.017	0.931 ± 0.017	0.931 ± 0.017	121	187	164	74	114

Table S1. Summary of external (diapycnal and atmospheric) fluxes of phosphate to the mixed layer at each station ( $\mu\text{mol P m}^{-2} \text{d}^{-1}$ ). Estimated primary production ( $\mu\text{mol C m}^{-2} \text{d}^{-1}$ ) sustained by external fluxes of phosphate assuming variable C:P ratios of 130 (sustained PP<sub>130</sub>) and 200 (sustained PP<sub>200</sub>) (see main text for details). New production (NP) integrated over the mixed layer based on primary production data during the Peacetime cruise (Maranon et al. 2021) and an average f-ratio of 0.1. Contribution (%) of external fluxes of phosphate to new production (EXT/NP) for both C:P ratios considered.

Station	Long °E	Total external fluxes	AP <sub>insitu</sub>	TPR <sub>moy</sub>	TPR <sub>max</sub>	TPR <sub>min</sub>	EXT/TPR <sub>moy</sub> %	INT/TPR <sub>moy</sub> %
10	1.57	0.190 ± 0.036	27.3 ± 19.7	49	79	29	0.39	55
FA	2.92	2.193 ± 0.052	94.1 ± 65.7	41	65	24	0.09	231
9	5.84	0.428 ± 0.036	36.5 ± 23.7	21	31	13	0.68	176
4	7.98	0.408 ± 0.095	75.3 ± 67.3	23	37	14	0.67	394
5	11.02	0.351 ± 0.054	92.3 65.5	9	14	6	0.97	541
TYR	12.59	0.533 ± 0.020	50.0 ± 33.7	13	21	8	0.53	707
6	14.50	0.378 ± 0.026	139 ± 86	38	60	22	0.01	367
8	16.63	0.147 ± 0.011	35.4 ± 21.9	25	39	15	0.10	142
7	18.15	0.111 ± 0.010	225 ± 134	23	38	14	0.10	958
ION	19.78	0.931 ± 0.017	165 ± 98	19	29	11	0.02	874

Table S2. External and internal (AP<sub>insitu</sub>) fluxes of phosphate to the mixed layer at each station ( $\mu\text{mol P m}^{-2} \text{d}^{-1}$ ). Total phosphate requirements by phytoplankton and heterotrophic bacteria integrated over the mixed layer (TPR,  $\mu\text{mol P m}^{-2} \text{d}^{-1}$ ). TPR was calculated assuming varying C/P<sub>biomass</sub> for phytoplankton and heterotrophic bacteria: 130 and 100 for TPR<sub>moy</sub>, 100 and 50 for TPR<sub>max</sub>, and 200 and 200 for TPR<sub>min</sub>, respectively. Contribution to TRP<sub>moy</sub> of external (EXT/TPR<sub>moy</sub>) and internal (AP/TPR<sub>moy</sub>) sources, in %.