



Supplement of

Phosphorus cycling in the upper waters of the Mediterranean Sea (PEACETIME cruise): relative contribution of external and internal sources

Elvira Pulido-Villena et al.

Correspondence to: Elvira Pulido-Villena (elvira.pulido@mio.osupytheas.fr)

The copyright of individual parts of the supplement might differ from the article licence.

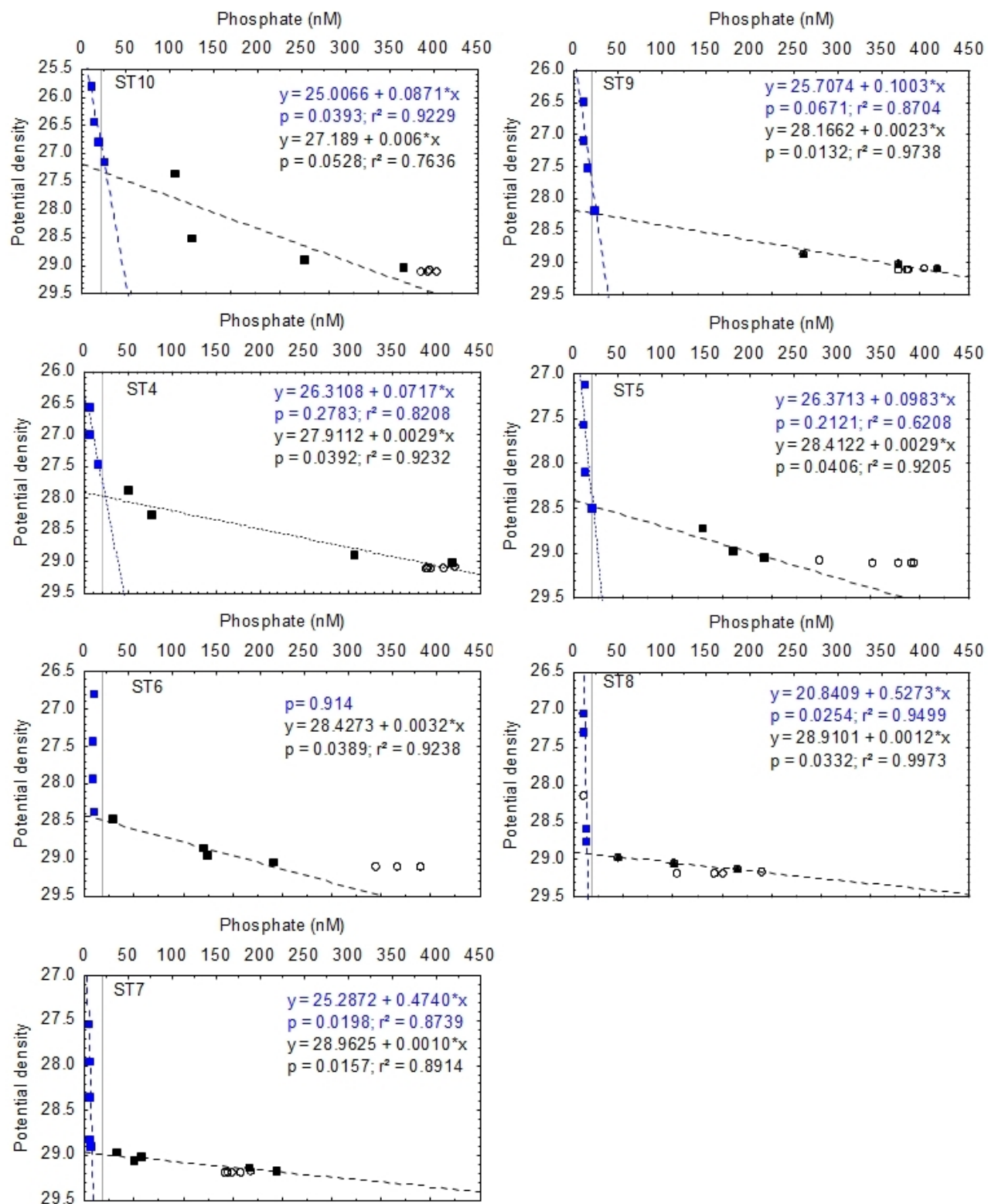


Figure S1. Diagrams of phosphate concentration versus density at short stations from the surface to the bottom and linear regressions between phosphate concentration and density through the phosphacline (black symbols) and inside the PDL (blue symbols). Results of the regression analyses can be found 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 ₁₃₀ | Sustained PP ₂₀₀ | NP | EXT/NP ₁₃₀ (%) | EXT/NP ₂₀₀ (%) |
|---------|------------|-------------------|----------------|-------------------------------|--------------------------|--------------------------------|--------------------------------|-----|------------------------------|------------------------------|
| 10 | 1.57 | 0.16 ± 0.03 | 0.027 ± 0.012 | 0.027 ± 0.012 | 0.190 ± 0.036 | 25 | 38 | 361 | 7 | 11 |
| FAST | 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 new 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 NP₁₃₀) and 200 (sustained NP₂₀₀) (see main text for details). New production (NP) integrated over the mixed layer based on primary production data during the Peacetime cruise (Marañon 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 _{insitu} | TPR _{avg} | TPR _{max} | TPR _{min} | EXT/TPR _{avg} % | INT/TPR _{avg} % |
|---------|------------|--------------------------|----------------------|--------------------|--------------------|--------------------|-----------------------------|-----------------------------|
| 10 | 1.57 | 0.190 ± 0.036 | 27.3 ± 19.7 | 49 | 79 | 29 | 0.39 | 55 |
| FAST | 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_{insitu}) 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 biomass C:P ratios for phytoplankton and heterotrophic bacteria: 130 and 100 for average P requirements (TPR_{avg}), 100 and 50 for maximum P requirements (TPR_{max}), and 200 and 200 for minimum P requirements (TPR_{min}). Contribution to average P requirements TRP_{avg} of external (EXT/TPR_{avg}) and internal (INT/TPR_{avg}) sources, in %.