

Sensitive determination of dissolved phosphate pools for an improved resolution of the N:P ratios in the surface oligotrophic ocean: a case study in the Mediterranean Sea

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N and P shape the marine biogeochemistry and determine the strength of the oceanic carbon uptake. Accounting for variable N:P ratios in biogeochemical models requires a large observational data coverage of N and P concentration in both inorganic and organic pools. However, in upper waters of the vast oligotrophic ocean, there is a critical lack of N and P data because of the low sensitivity of classical methods (detection limit usually around 20 nM). In this study, we report data on soluble reactive phosphate (SRP) and dissolved organic phosphate (DOP) concentration in surface vertical profiles (0 - 100 m) of the oligotrophic P-depleted Mediterranean Sea. Samples were obtained from 31 stations during two research cruises, BioArgoMed and MOOSE-GE, in May and July 2015, respectively. SRP and DOP (analyzed as SRP after UV-digestion) were measured by using a sensitive method (Liquid Waveguide Capillary Cell, LWCC, detection limit = 0.8 nM) and were compared to concentrations analyzed with a classical method. The use of the LWCC method resulted in a 71 % increase of valid SRP and DOP data. SRP varied between 3 and 194 nM and did not exceed 35 nM above the mixed layer depth. DOP ranged between 4 and 141 nM. The obtained data were used to revisit the spatial distribution of surface N:P ratios in the Mediterranean Sea which ranged between 3 and 164 and between 35 and 1939 for inorganic and organic pools, respectively. These results highlight the need to use sensitive methods in order to enlarge the data coverage of nutrient concentration in the surface oligotrophic ocean and better resolve the variable N:P ratios at the global scale.