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## Photoacclimation of picophytoplankton in the central Cantabrian Sea

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**ABSTRACT:** Photoacclimation of picophytoplankton was studied in the mixed layer of 3 stations in the central Cantabrian Sea (southern Bay of Biscay). Picophytoplankton chl a:carbon ratios ( $\theta$ ) presented minimum values during summer, when irradiance, temperature, and biomass of prokaryotes reached maximum values and inorganic nutrient concentrations were low. Conversely, the maximum  $\theta$  were reached during winter, coincident with lowest annual irradiance but maximum concentration of inorganic nutrients and higher relative biomass of eukaryotes. Changes in  $\theta$  were modeled using irradiance as an independent variable. Exponentially decreasing functions of  $\theta$  with irradiance were significant only when the mean temperatures in the mixed layer were above 14°C. These functions presented light-saturated minimum ratios ( $\theta_{\min}$ ) that decreased linearly with temperature and low-light maximum ratios ( $\theta_{\max}$ ) that increased exponentially with temperature. Such relationships were used to establish an empirical model that reproduced the seasonality of picophytoplankton  $\theta$  in the mixed layer, with minima in summer and maxima in winter. A maximum potential  $\theta$ ,  $\theta_{N,T-\max}$ , was determined to estimate picophytoplankton growth rates in the central Cantabrian Sea. Combinations of picophytoplankton growth rates and biomass in the mixed layer were used to estimate areal picophytoplankton primary production rates in the euphotic zone that presented a bimodal seasonal cycle, with maxima in late winter (ca. 100 mg C m<sup>-2</sup> d<sup>-1</sup>) and in late autumn (>200 mg C m<sup>-2</sup> d<sup>-1</sup>) and mean annual values around 120 mg C m<sup>-2</sup> d<sup>-1</sup>.

**KEY WORDS:** Light · Temperature · Nutrients · Picophytoplankton · Chl a:carbon ratio · Modeling

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