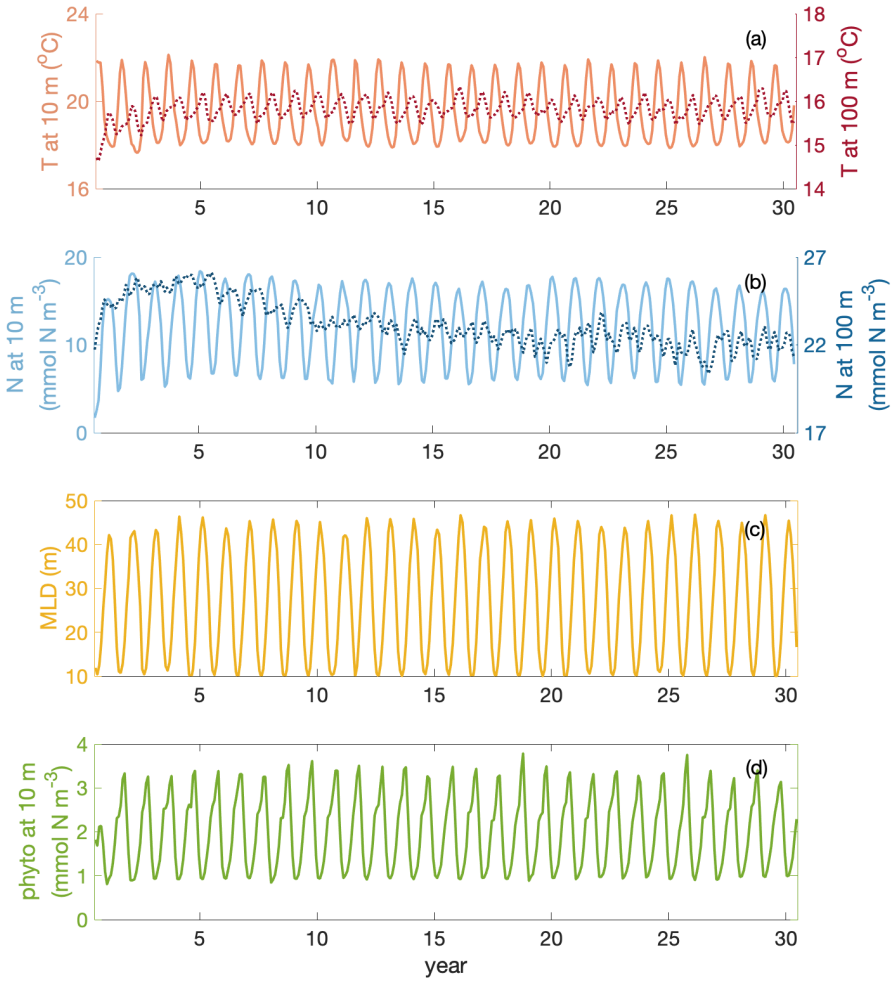

Figure R1.1: Time series of temperature T (at 10 m & 100 m depths in solid and dashed, respectively), nitrate N (at 10 m & 100 m depths, in solid and dashed, respectively), mixed layer depth MLD and phytoplankton phyto (at 10 m) over the simulation period of 30 years in the focus region.

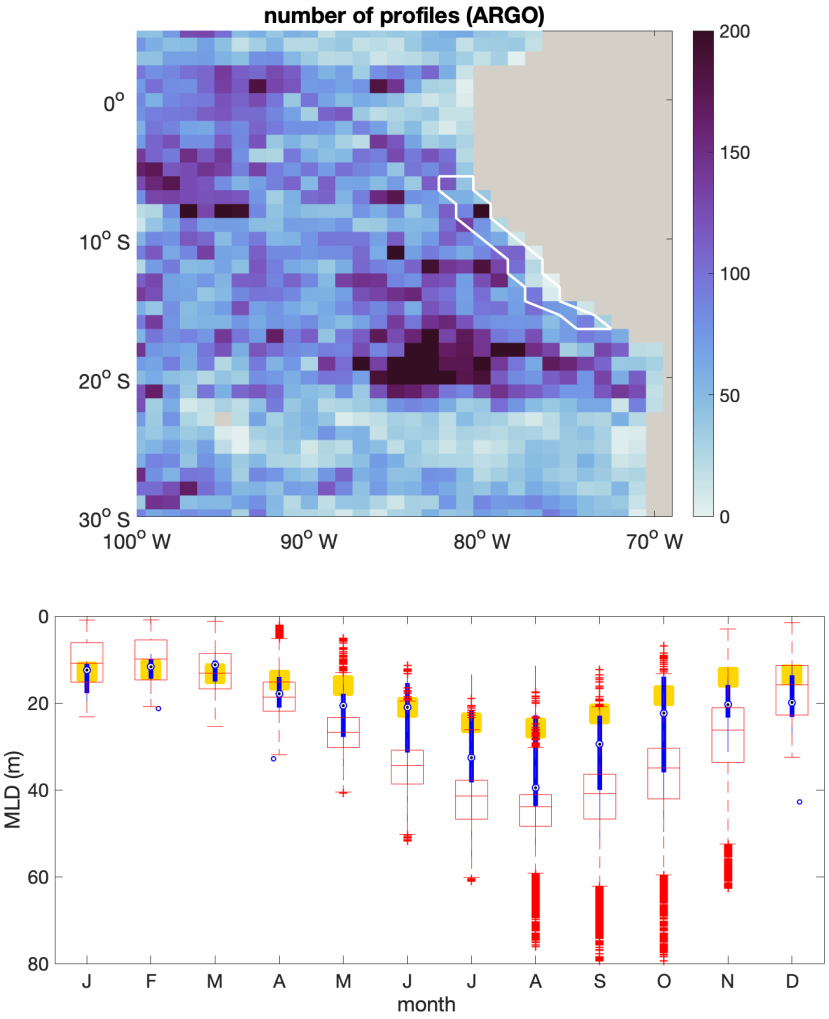

Figure R1.2: Top: Number of Argo profiles per 1x1 degree grid point. The white line highlights the focus region; Bottom: Seasonal variation of the mixed layer depth averaged over the focus region from Argo (blue), de Boyer Montégut climatology data (yellow) and the model simulation (red). The bottom and top edges of the box indicate the 25th and 75th percentiles, respectively. The whiskers extend to the most extreme data points not considered as outliers, and the outliers are plotted individually using the '+' symbol.

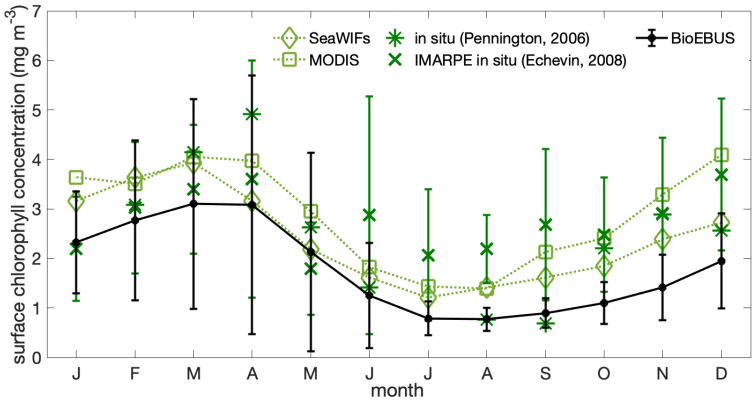

Figure R1.3: Seasonal cycles of surface chlorophyll concentration from the model simulation (black solid line, with bars indicating the spatial standard deviation, and Chl:N=0.795 to convert the model nitrogen output to chlorophyll), satellite data (dotted lines; SeaWIFS (diamond) and MODIS (square), bars indicate the spatial standard deviation) and in situ data (digitized from Pennington et al. (2006, star) and Echevin et al. (2008, cross), with bars indicating the estimates of uncertainty of the in-situ data).

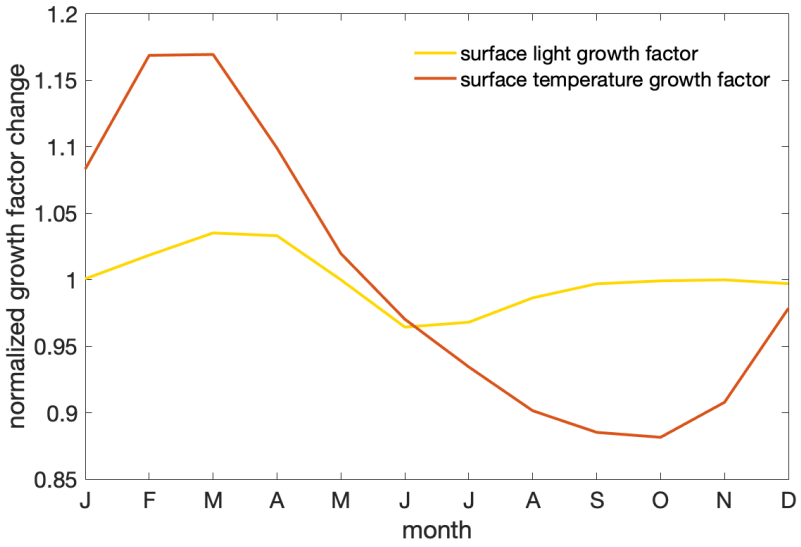

Figure R1.4: Seasonal cycles of surface light (yellow) and temperature (red) growth factor.

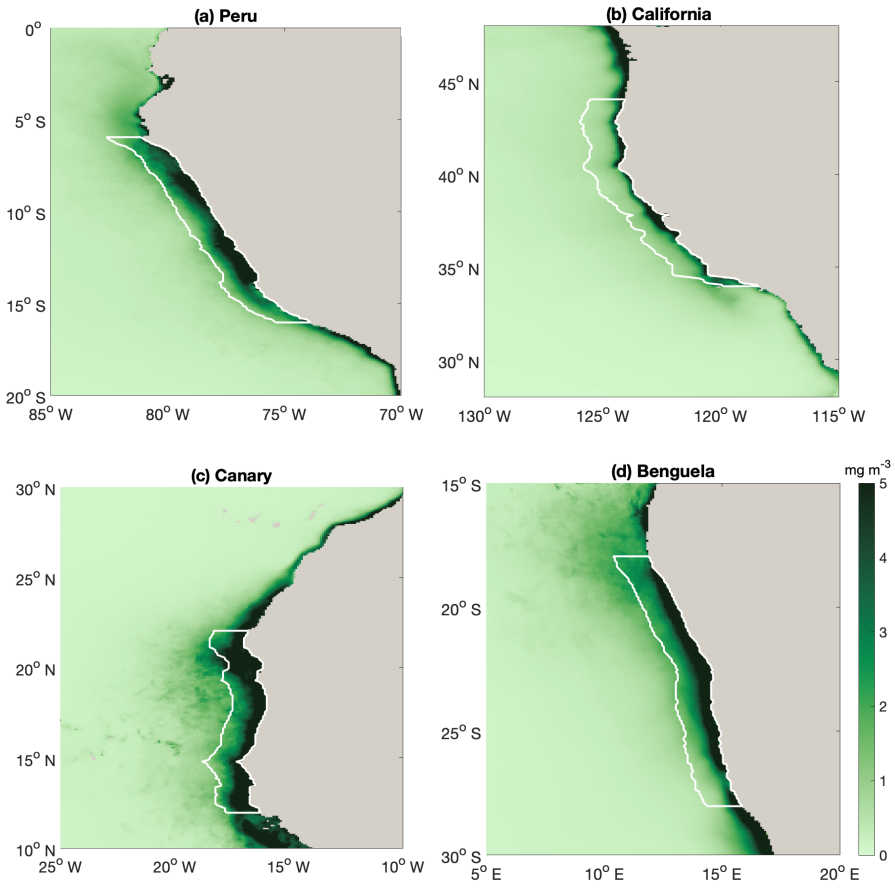

Figure R1.5: Map of annual mean surface chlorophyll ($mg\,chl\,m^{-3}$) with white lines highlight the regions that we average over in our analyses.

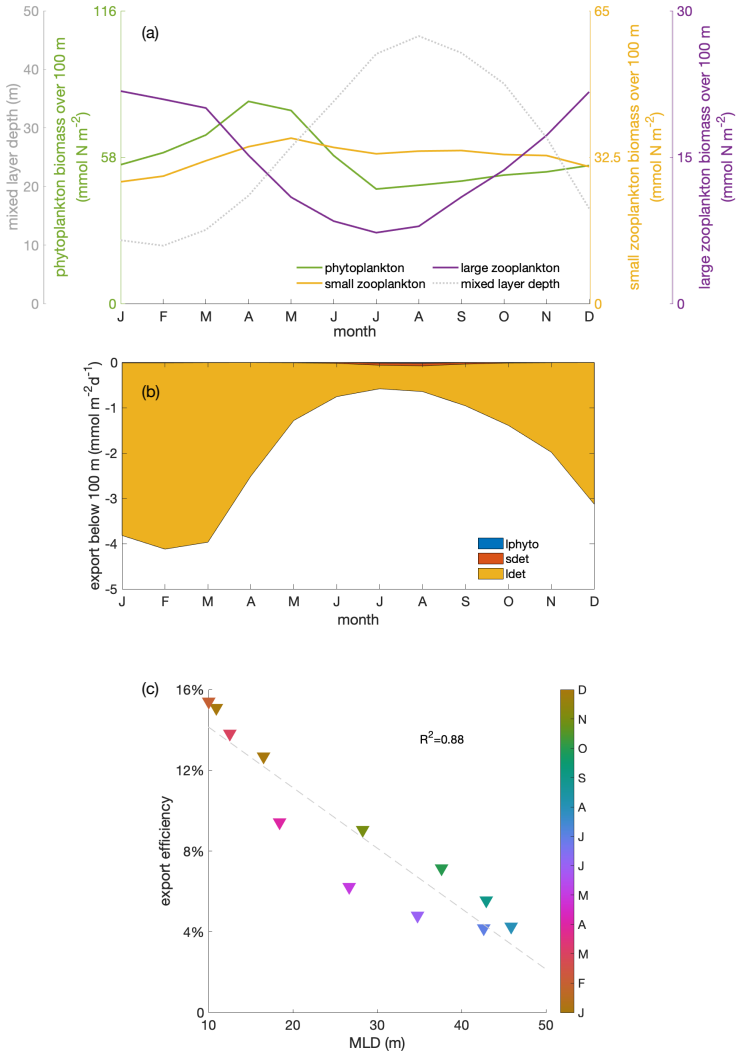

Figure R1.6: (a) Seasonal cycles of phytoplankton (green), small zooplankton (yellow), large zooplankton (purple) biomass integrated over the upper 100 m and mixed layer depth (MLD, grey). Note that the vertical axes are scaled to range the annual mean plus/minus 100% for each of the variables. (b) Seasonal cycle of the sinking fluxes (sink) of large and small detritus and large phytoplankton, and (c) correlation of export efficiency with MLD. The export efficiency is defined as the ratio of primary production in the upper 100 m over export (sum of the sinking fluxes shown in panel (b)) through the 100 m depth level. Colors indicate the month of the year.

$$PP = C \cdot J_{max} \cdot L_{(PAR)} \cdot L_{(T)} \cdot L_{(N)} \tag{R1.1}$$

$$J_{mld} = J_{max} * L_{mld} \tag{R1.2}$$

$$\frac{dz}{dx} = \frac{dy}{dx} \cdot \frac{dz}{dy} \tag{R1.3}$$