

Supplementary Material

Supplementary Table I. Taxonomic content (179 taxa) of the nine microplanktonic taxo-functional groups defined for the analyses of surface micro-planktonic structure (Fig. 3, 4 and 5).

Supplementary Table II. Metadata per station for the 4 instrumental configurations: *Coryphaena* – FlowCam, *Coryphaena* - *PlanktoScope*, DN – FlowCam, DN – *PlanktoScope*. Vol net: total volume of water filtered by the net (m^3), dilution factor: factor of dilution between vol collector and vol imaged, vol collector: total volume in the net cod-end (m^3) and vol imaged: volume corresponding to the imaged portion (m^3).

Supplementary Table III. Normalized Biomass Size Spectra (NBSS) values from 50 to 150 μm per station for the 4 instrumental configurations: *Coryphaena* – FlowCam, *Coryphaena* - *PlanktoScope*, DN – FlowCam, DN – *PlanktoScope*. ESD correspond to the equivalent spherical diameter (μm).

Supplementary Table IV. Single, homogeneous environmental database created from multiple sources; missing TSG and ACS data were first replaced by satellite data, then by Mercator model data. The source of each value is specified by a color code (orange for TSG, yellow for ACS, green for satellite and blue for Mercator).

Supplementary Figure 1. Images from the 3D model: design precision of the *Coryphaena* net.

Supplementary Figure 2. A few representative images are chosen from the two data sets; the black and white images are from FlowCam and the color ones from *PlanktoScope*. First row from left to right: Coscinodiscophyceae spp., Pleurosigma spp., Chaetoceros spp. Second row from left to right: Rhabdonella spp., Ceratocorys spp., Neoceratium spp. Third row from left to right: Hemialus spp., Copepoda spp., Amphibelone spp.

Supplementary Figure 3. Two vignettes from the *PlanktoScope* (from station 23) of a diatom cell of the genus *Hemiaulus* that contains its endosymbiont, the diazotrophic cyanobacterium *Richelia*.