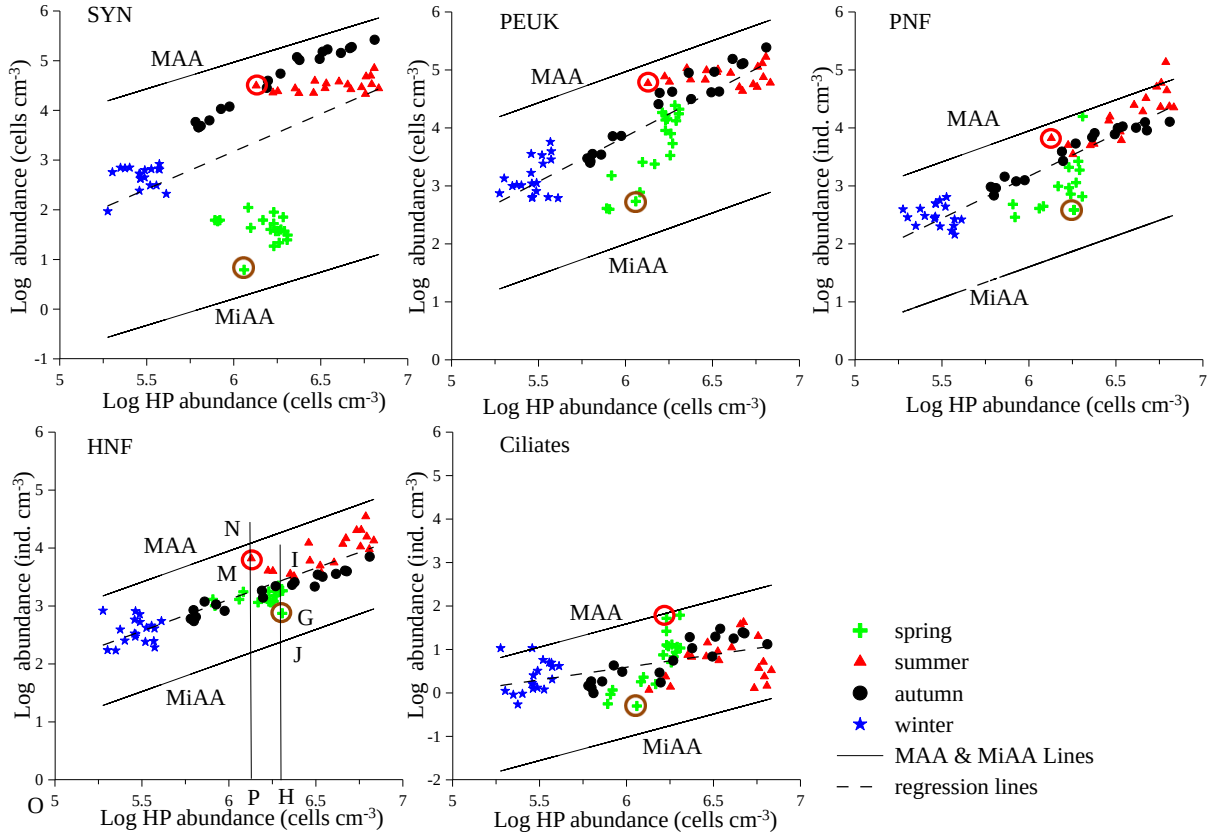
S1 Construction of the empirical boundary lines




From Fig. 7. Scatter graphs between Log HP abundance (cells $cm^{-3}$) and Log abundance (cells $cm^{-3}$ or ind. $cm^{-3}$) of the other five biological groups by taking into account data from the whole survey. Note that the scale is logarithmic.

SYN: *Synechococcus*; PEUK: picoeukaryotes; PNF: pigmented nanoflagellates; HP: heterotrophic prokaryotes; HNF: heterotrophic nanoflagellates. MAA: maximum attainable abundance line; MiAA: minimum attainable abundance line.

We firstly took the ordinate value (PM, assuming P on the x axis issued from the origin point) of the point M in the red circle, and compared it to the ordinate value (PN) of the point N belonging to the MAA line at the same abscissa (OP) as M. The ratio $L_{ma}$ = PN / PM ($L_{ma}$ > 1) was considered. (The choice of points M is justified by the fact that they correspond to the center (or so) of the HP abundance variation range.) Now we took SYN and HP as an example: we obtained the intercept of the MAA line from the coordinates of the $N_{SYN}$ point defined by $(PN)_{SYN} = (PM)_{SYN} \times L_{ma}$ and $OP_{SYN}$.

To define the MiAA line, we selected the point G in the brown circle (minimum y value whose associated x value (OH) was in the vicinity of the center (or so) of the HP abundance variation range. Point I was the intersection of GH with the linear regression line. Similarly, the ratio $R_{min}$ = HG/HI ($R_{min}$ < 1) was defined. The ordinate of the point J that represented the MiAA value for the HP abundance (OH) associated to G could be defined by $HJ = HG \times R_{min}$. The coordinates of J defined the intercept of the MiAA line by entering them in the Gasols's equation.

We applied the same process to define the other MAA and MiAA lines.

Table S1. Maximum, minimum and average values of temperature (T, °C), salinity (S), Chl *a* (μg $dm^{-3}$), nutrient concentrations (μM), abundance and biomass (μg C $dm^{-3}$) in Sanggou Bay at four consecutive seasons

| | | spring | | summer | | autumn | | winter | |
|---|---|---|---|---|---|---|---|---|---|
| | | range | mean ± sd | range | mean ± sd | range | mean ± sd | range | mean ± sd |
| T | | 5.50 ~ 11.61 | 9.00 ± 2.12 | 18.50 ~ 24.20 | 21.36 ± 2.02 | 14.90 ~ 7.50 | 16.47 ± 0.79 | 1.90 ~ 5.60 | 3.76 ± 1.22 |
| S | | 30.21 ~ 30.74 | 30.51 ± 0.12 | 26.17 ~ 31.41 | 29.39 ± 1.78 | 30.57 ~ 31.37 | 31.18 ± 0.23 | 31.32 ~ 31.57 | 31.52 ± 0.06 |
| Chl *a* | | 0.70 ~ 2.70 | 1.27 ± 0.55 | 5.72 ~ 38.74 | 14.41 ± 9.74 | 0.67 ~ 19.62 | 6.49 ± 6.01 | 0.42 ~ 2.88 | 0.90 ± 0.55 |
| DIN | | 2.38 ~ 10.79 | 6.24 ± 2.63 | 1.57 ~ 11.75 | 4.83 ± 2.69 | 0.96 ~ 32.15 | 10.44 ± 10.10 | 2.34 ~ 7.65 | 4.88 ± 1.72 |
| $PO_4^{3-}$ | | 0.03 ~ 0.23 | 0.11 ± 0.07 | 0.02 ~ 0.10 | 0.04 ± 0.02 | 0.00 ~ 0.05 | 0.02 ± 0.02 | 0.00 ~ 0.06 | 0.02 ± 0.01 |
| SYN | abundance ($10^3$ cells $cm^{-3}$) | 0.01 ~ 0.11 | 0.05 ± 0.03 | 21 ~ 71 | 33 ± 12 | 5 ~ 264 | 84 ± 81 | 0.09 ~ 0.83 | 0.51 ± 0.20 |
| | biomass | 0.00 ~ 0.02 | 0.01 ± 0.01 | 4.26 ~ 14.13 | 6.64 ± 2.44 | 0.92 ~ 52.84 | 16.81 ± 16.15 | 0.02 ~ 0.17 | 0.10 ± 0.04 |
| PEUK | abundance ($10^3$ cells $cm^{-3}$) | 0.40 ~ 25 | 9 ± 8 | 43 ~ 168 | 83 ± 32 | 3 ~ 245 | 57 ± 66 | 1 ~ 6 | 2 ± 1 |
| | biomass | 0.55 ~ 34.14 | 12.75 ± 11.13 | 60.53 ~ 233.64 | 115.01 ± 44.10 | 3.49 ~ 340.85 | 79.99 ± 92.49 | 0.86 ~ 7.99 | 2.51 ± 2.02 |
| HP | abundance ($10^5$ cells $cm^{-3}$) | 8 ~ 20 | 15 ± 4 | 13 ~ 68 | 41 ± 18 | 6 ~ 64 | 23 ± 17 | 2 ~ 4 | 3 ± 1 |
| | biomass | 26.86 ~ 40.65 | 30.87 ± 8.34 | 26.86 ~ 135.77 | 81.54 ± 35.81 | 12.03 ~ 128.60 | 46.71 ± 34.53 | 3.77 ~ 8.16 | 6.00 ± 1.23 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| HNF | abundance (ind. $cm^{-3}$) | 746 ~ 2251 | 1430 ± 389 | 3251 ~ 35183 | 10841 ± 8102 | 549 ~ 7111 | 2298 ± 1664 | 171 ~ 831 | 418 ± 207 |
| | biomass | 3.19 ~ 10.69 | 5.26 ± 1.82 | 14.57 ~ 116.19 | 50.86 ± 28.83 | 1.83 ~ 33.90 | 13.75 ± 9.65 | 0.38 ~ 2.13 | 0.94 ± 0.42 |
| PNF | abundance (ind. $cm^{-3}$) | 289 ~ 15797 | 1951 ± 3896 | 3516 ~ 136442 | 26671 ± 31248 | 684 ~ 12782 | 5647 ± 4381 | 144 ~ 643 | 333 ± 141 |
| | biomass | 3.44 ~ 83.70 | 20.15 ± 20.54 | 19.41 ~ 512.52 | 166.08 ± 138.07 | 4.08 ~ 67.85 | 30.59 ± 19.07 | 0.38 ~ 8.43 | 2.48 ± 2.17 |
| Tintinnids | abundance (ind. $dm^{-3}$) | 0 ~ 380 | 95 ± 88 | 15 ~ 7144 | 2054 ± 2321 | 127 ~ 1760 | 602 ± 512 | 0.00 ~ 163 | 42 ± 52 |
| | biomass | 0.00 ~ 0.76 | 0.14 ± 0.17 | 0.02 ~ 9.11 | 2.43 ± 2.90 | 0.06 ~ 2.45 | 0.63 ± 0.63 | 0.00 ~ 0.38 | 0.07 ± 0.10 |
| Total ciliates | abundance (ind. $dm^{-3}$) | 500 ~ 61667 | 12461 ± 16995 | 1174 ~ 2315 | 9671 ± 11797 | 993 ~ 30038 | 10061 ± 9569 | 544 ~ 10730 | 3348 ± 3045 |
| | biomass | 0.76 ~ 7.12 | 3.71 ± 1.77 | 0.63 ~ 33.09 | 8.70 ± 8.46 | 0.78 ~ 20.70 | 7.20 ± 6.55 | 0.44 ~ 3.79 | 1.41 ± 0.93 |

sd: standard deviation

Table S2. Average relative biomasses of *Synechococcus* (SYN), picoeukaryotes (PEUK), pigmented nanoflagellates (PNF), heterotrophic nanoflagellates (HNF) and ciliates normalised by heterotrophic prokaryote (HP) biomass at the four successive seasons according to the cluster analysis.

| | Spring | Summer | Autumn | Winter |
|---|---|---|---|---|
| SYN | 0.002 | 0.071 | 0.262 | 0.033 |
| PEUK | 0.285 | 0.868 | 2.039 | 0.449 |
| PNF | 0.663 | 2.451 | 0.915 | 0.460 |
| HNF | 0.223 | 0.640 | 0.494 | 0.180 |
| Ciliates | 0.182 | 0.127 | 0.135 | 0.216 |