

# Trophic diversity of plankton in epipelagic and mesopelagic layers of the tropical and equatorial Atlantic determined with stable isotopes

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## Supplementary tables

**Table S1.** Mean and standard error (se) of temperature (°C), in vivo fluorescence (relative units), particulate organic carbon (POC, mg C m<sup>-3</sup>) and particulate organic nitrogen (PON, mg N m<sup>-3</sup>) in the epipelagic, upper mesopelagic and lower mesopelagic layers of the zones identified in Figure 1. Number of stations: 2 (zone 1), 4 (zone 2) and 6 (zone 3). Different letters indicate significantly different zonal means (ANOVA and C-Dunnnett a posteriori test, P<0.05). Temperature and fluorescence values are shown only for the epipelagic layer because in deep layers temperature differences between zones were small, and fluorescence values were near zero, (Fig. 2).

| Layer             | Variable     |       | zone 1 |      | zone 2 |      | zone 3 |   |
|-------------------|--------------|-------|--------|------|--------|------|--------|---|
| Epipelagic        | temperature  | mean  | 16.941 | a    | 16.333 | a    | 20.832 | b |
|                   |              | se    | 0.748  |      | 0.124  |      | 1.240  |   |
|                   | fluorescence | mean  | 0.418  | b    | 0.356  | a,b  | 0.271  | a |
|                   |              | se    | 0.050  |      | 0.020  |      | 0.031  |   |
|                   | POC          | mean  | 89.96  | b    | 58.32  | a    | 35.86  | a |
|                   |              | se    | 19.90  |      | 6.64   |      | 6.27   |   |
| PON               | mean         | 13.36 | b      | 8.78 | a,b    | 5.06 | a      |   |
|                   | se           | 3.05  |        | 1.36 |        | 0.90 |        |   |
| Upper mesopelagic | POC          | mean  | 27.48  | a    | 20.88  | a    | 22.09  | a |
|                   |              | se    | 7.39   |      | 7.38   |      | 3.00   |   |
|                   | PON          | mean  | 3.48   | a    | 2.09   | a    | 3.03   | a |
|                   |              | se    | 0.81   |      | 0.36   |      | 0.46   |   |
| Lower mesopelagic | POC          | mean  | 18.93  | a    | 14.66  | a    | 16.11  | a |
|                   |              | se    | 1.75   |      | 1.21   |      | 2.06   |   |
|                   | PON          | mean  | 2.67   | a    | 1.99   | a    | 2.04   | a |
|                   |              | se    | 0.20   |      | 0.14   |      | 0.23   |   |

**Table S2.** Summary of samples (n: total number) analyzed for stable isotope composition collected during day (D) and/or night (N) sampling events at epipelagic (E), upper mesopelagic (UM) and lower mesopelagic (LM) layers in the different stations and grouped by taxonomic and trophic guild categories (Copepod H: herbivorous copepods; Copepod OC: omnivorous and carnivorous copepods; Large mesoz.: large crustacean mesozooplankton; Chaetognatha).

| sample type                      | taxonomic    |              | stations | time | layers    | n   |
|----------------------------------|--------------|--------------|----------|------|-----------|-----|
|                                  | group        | guild        |          |      |           |     |
| seston                           | ---          | seston       | 1-12     | D, N | E, UM, LM | 61  |
| <i>Calanoides</i> sp.            | Copepoda     | Copepod H    | 2-12     | D, N | E         | 102 |
| <i>Calanus helgolandicus</i>     | Copepoda     | Copepod H    | 3, 4     | D, N | E, UM, LM | 3   |
| <i>Metridia</i> sp.              | Copepoda     | Copepod H    | 2-7, 10  | D, N | E, UM, LM | 25  |
| <i>Subeucalanus crassus</i>      | Copepoda     | Copepod H    | 3        | D    | E         | 1   |
| <i>Candacia</i> sp.              | Copepoda     | Copepod OC   | 2-8, 10  | D, N | E         | 14  |
| <i>Centropages</i> sp.           | Copepoda     | Copepod OC   | 11, 12   | D, N | E, UM     | 8   |
| <i>Corycaeus</i> sp.             | Copepoda     | Copepod OC   | 1        | D    | E         | 1   |
| <i>Eucalanus</i> sp.             | Copepoda     | Copepod OC   | 9,10     | D, N | E, UM     | 14  |
| <i>Euchirella</i> sp.            | Copepoda     | Copepod OC   | 9-12     | D, N | E, UM, LM | 24  |
| <i>Paraeuchaeta</i> sp.          | Copepoda     | Copepod OC   | 2-12     | D, N | E, UM, LM | 78  |
| <i>Pleuromamma</i> sp.           | Copepoda     | Copepod OC   | 2-12     | D, N | E, UM     | 60  |
| <i>Rhincalanus</i> sp.           | Copepoda     | Copepod OC   | 2-12     | D, N | E, UM, LM | 91  |
| Amphipoda (other)                | Amphipoda    | Large mesoz. | 2-11     | D, N | E, UM, LM | 18  |
| <i>Themisto libellula</i>        | Amphipoda    | Large mesoz. | 2, 4-9   | D, N | E, UM     | 10  |
| <i>Vibilia</i> sp.               | Amphipoda    | Large mesoz. | 11       | D    | E         | 1   |
| <i>Heterocarpus</i> sp.          | Decapoda     | Large mesoz. | 11, 12   | D, N | E, UM     | 7   |
| Euphausiacea (other)             | Euphausiacea | Large mesoz. | 2-12     | D, N | E, UM, LM | 84  |
| <i>Meganyctiphanes norvegica</i> | Euphausiacea | Large mesoz. | 3, 5     | D, N | E, UM     | 4   |
| <i>Thysanoessa</i> sp.           | Euphausiacea | Large mesoz. | 3, 5     | N    | E         | 2   |
| Mysidacea                        | Mysidacea    | Large mesoz. | 3, 7, 8  | D    | E         | 3   |
| Chaetognatha                     | Chaetognatha | Chaetognatha | 2-12     | D, N | E, UM, LM | 77  |

**Table S3.** ANOVA of seston C:N ratio across zones and depth layers. SS: sums of squares, df: degrees of freedom, MS: mean squares, F: variance ratio, P: significance

| <b>Source</b> | <b>SS</b> | <b>df</b> | <b>MS</b> | <b>F</b> | <b>P</b> |
|---------------|-----------|-----------|-----------|----------|----------|
| Model         | 4624.208  | 9         | 513.801   | 228.763  | 0.000    |
| zone          | 2.774     | 2         | 1.387     | .618     | 0.543    |
| layer         | 15.167    | 2         | 7.584     | 3.377    | 0.042    |
| zone by layer | 13.006    | 4         | 3.252     | 1.448    | 0.232    |
| Error         | 116.792   | 52        | 2.246     |          |          |
| Total         | 4740.999  | 61        |           |          |          |

**Table S4.** ANOVA of Bayesian estimates of standard ellipse areas by zones and layers.

| <b>source</b> | <b>SS</b> | <b>df</b> | <b>MS</b> | <b>F</b> | <b>P</b> |
|---------------|-----------|-----------|-----------|----------|----------|
| Model         | 6140208   | 9         | 682245    | 168486   | 0.000    |
| zone          | 240646    | 2         | 120323    | 29715    | 0.000    |
| layer         | 108600    | 2         | 54300     | 13410    | 0.000    |
| zona by layer | 513878    | 4         | 128467    | 31727    | 0.000    |
| Error         | 145737    | 35991     | 4         |          |          |
| Total         | 6285945   | 36000     |           |          |          |