Data Article

Dataset of seasonal mean volumes of phytoplankton cell size classes in Mediterranean shallow coastal lagoons

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A B S T R A C T

In this article, the floristic lists and the seasonal mean cell volumes of phytoplankton taxa observed in three Mediterranean lagoons are reported. These datasets include 40 species, 67 other taxa identified at least at genus level, and further 13 taxa attributed only at order or class level. These data are associated with Pulina et al. “Seasonal variations of phytoplankton size structure in relation to environmental variables in three Mediterranean shallow coastal lagoons” (Pulina et al., 2018) \cite{1}, where phytoplankton taxa were included in two different cell size classes (Utermöhl fraction of phytoplankton, cell size \(> 3 \mu m\); Picophytoplankton, cell size \(< 3 \mu m\)) and in which their seasonal variations were interpreted and discussed. © 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Specifications Table

| Subject area                  | Biology |
|------------------------------|---------|
| More specific subject area   | Phytoplankton ecology |
| Type of data                 | Tables, text file |

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2352-2409/© 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
How data was acquired

Inverted microscope (Zeiss, Axiovert 25), epifluorescence microscope (Zeiss, Axiovert 100)

Data format

Analyzed

Experimental factors

Water samples were collected and immediately fixed in 2% acid Lugol’s solution and in 2% formaldehyde for microscopic analyses

Experimental features

Phytoplankton cells were identified at microscope and measured with a manual micrometer. Cell volumes were calculated approximating the shape of each taxon to known solids or to solid compositions and applying the corresponding calculation formula

Data source location

University of Sassari, Sassari, Italy

Data accessibility

Data is with this article

Related research article

S. Pulina, C.T. Satta, B.M. Padedda, N. Sechi, A. Lugliè, Seasonal variations of phytoplankton size structure in relation to environmental variables in three Mediterranean shallow coastal lagoons, Estuar Coast Shelf Sci [1].

Value of the data

- Seasonal mean volumes of taxa from two different phytoplankton size classes were shown for the first time for Mediterranean transitional ecosystems.
- Floristic lists reported improve the overview on phytoplankton biodiversity in transitional ecosystems worldwide.
- The data presented can be compared to those of other transitional ecosystems worldwide for further insights on effects of seasonal environmental variations on phytoplankton size structure.

1. Data

In this paper, we report phytoplankton floristic lists and mean cell volumes from three shallow coastal lagoons located in north west Mediterranean Sea: Calich (CA), Santa Giusta (SG) and Corru S’Ittiri (CI) lagoons (Sardinia, Italy) [2] (Tables 1–3). These datasets include information on 40 species (10 species in CA, 19 in SG and 23 in CI), 67 taxa identified at least at genus level (25 genera in CA, 30 in SG and 35 in CI), and further 13 taxa attributed only at order or class level (6 taxa in CA, 9 in SG and 7 in CI). These data are associated with Pulina et al. “Seasonal variations of phytoplankton size structure in relation to environmental variables in three Mediterranean shallow coastal lagoons” [1]. Two cell size classes were considered, Utermöhl fraction of phytoplankton (UFP, cell size > 3 μm) and picophytoplankton (Pico, cell size < 3 μm). For each site, seasonal mean cell volume of every taxon observed was reported to show seasonal variation in values. The means were accompanied by standard deviations of different sampling stations in each lagoon and different months in each season.

2. Experimental design, materials and methods

Monthly samplings were performed from May 2011 to April 2012 in the three lagoons. Water was collected from superficial layers (~0.20 m) in different sampling stations (3 in CA and CI, 5 in SG) located following the salinity gradient in each site. Part of samples was immediately fixed with a 2% acid Lugol’s solution for UFP analyses, and with 2% formaldehyde for Pico analyses.

Lugol fixed samples were prepared according to Utermöhl technique [3] and were observed with an inverted microscope (Zeiss, Axiovert 25), using 100X and 200X of magnifications for the smaller UFP species, and 400X for the larger ones. UFP species were identified observing both fresh and fixed samples, following the taxonomic guides listed in Ref. [4]. Flagellate and not flagellate cells from 5 to
20 μm in size, not identified at least at class level, were grouped as Flagellates and Nanoplankton, respectively. For each sample, at least 20 randomly selected cells of each taxon were measured with a manual micrometer. Mean cell volume of each taxon was obtained associating its shape to a known solid or to a solid composition and applying the corresponding calculation formula [5].

Formaldehyde fixed samples were filtered onto 0.2-μm black-stained polycarbonate membranes (Nucleopore) to observe Pico with a microscope (Zeiss, Axiovert 100) equipped with green (BP520–560 nm/FT580 nm/LP590 nm) and blue (BP450–490 nm/FT510 nm/LP520 nm) filters set. For

| Table 1 | Mean volume (V, μm$^3$) and standard deviation (SD) of Uthermöhl fraction of phytoplankton and picophytoplankton taxa observed in Calich Lagoon during the study period (- = the taxon has been observed once). BAC, Bacillariophyceae; CHL, Chlorophyceae; CHR, Chrysophyceae; CRY, Cryptophyceae; CYA, Cyanophyceae; DIC, Dictyochophyceae; DIN, Dinophyceae; EUG, Euglenophyceae; PRA, Prasinophyceae; RAP, Raphidophyceae; FLA, Flagellates; PICO, picophytoplankton. |
| Summer | Autumn | Winter | Spring |
| BAC Asterionella formosa Hassall | 1274 – | 13,528 – | 524 – |
| BAC Cerataulina pelagica (Cleve) Hendey | 697 – | 3414 – | 144 – |
| BAC Chaetoceros peruvianus Brightwell | 21 – | 312 – | 111 – |
| BAC Chaetoceros sp. | 70 12 | 30 – | 48 36 |
| BAC Cyclotella sp. 1 | 114 – | 16,934 – | 14,977 – |
| BAC Cyclotella sp. 2 | 198 – | 228 – | 207 227 153 148 |
| BAC Cylindrotheca closterium (Ehrenberg) Reimann & J.C. Lewin | 2085 – | 4786 – | 2958 – |
| BAC Skeletonema sp. 1 | 198 – | 228 – | 207 227 153 148 |
| BAC Skeletonema sp. 2 | 63 – | 111 – | 278 – |
| BAC Syne tro sp. | 11,546 – | 327 – | 13,930 – |
| BAC Thalassionema nitzschioides (Grunow) Mereschkowsky | 866 68 914 – | 387 – | 1123 – |
| BAC Thalassiosira sp. | 513 46 – | 724 – | 1919 2089 |
| BAC Pseudonitzschia spp. | 88 64 65 – | 63 2 65 19 |
| BAC Nitzschia sp. | 2842 – | 315 – |
| BAC Nitzschia sp. | 224 – | 15 – |
| BAC Chryso phyceae undetermined | 165 153 265 127 130 35 219 25 |
| BAC Cryptophyceae undetermined | 26 – |
| BAC Cyanophyceae undetermined | 4 – |
| BAC Oscillatoriales undetermined | 43 – |
| BAC Dinophyceae undetermined | 175 67 174 – |
| BAC Dinophyceae undetermined | 307 – | 233 – |
| BAC Dinophyceae undetermined | 6593 21 7044 2514 5189 121 |
| BAC Dinophyceae undetermined | 6367 – |
| BAC Peridinum quinquecorne (F. Stein) Lindemann | 3062 – | 942 – |
| BAC Peridinium quinquecorne Abé | 1040 1057 | 1564 – |
| BAC Scrippsiella sp. | 3757 – |
| BAC Dinophyceae undetermined | 3757 – |
| BAC Dinophyceae undetermined | 1192 496 290 – |
| BAC Dinophyceae undetermined | 2451 95 |
| BAC Dinophyceae undetermined | 1757 1433 |
| BAC Pyramimonas sp. | 103 35 |
| BAC Pyramimonas sp. | 25 116 |
| BAC Pyramimonas sp. | 116 116 |
| BAC Pyramimonas sp. | 0.34 0.07 |
Table 2
Mean volume (\(V, \mu m^3\)) and standard deviation (SD) of Uthermöhl fraction of phytoplankton and picophytoplankton taxa observed in Santa Giusta Lagoon during the study period (– = the taxon has been observed once). BAC, Bacillariophyceae; CHL, Chlorophyceae; CHR, Chrysophyceae; CRY, Cryptophyceae; CYA, Cyanophyceae; DIC, Dictyochophyceae; DIN, Dinophyceae; EUG, Euglenophyceae; PRA, Prasinophyceae; RAP, Raphidophyceae; FLA, Flagellates; NAN, Nanoplankton; PICO, picophytoplankton.

|                | Summer | Autumn | Winter | Spring |
|----------------|--------|--------|--------|--------|
|                | \(V\)  | \(SD\) | \(V\)  | \(SD\) | \(V\)  | \(SD\) | \(V\)  | \(SD\) |
| **BAC**        |        |        |        |        |
| *Biddulphia cf. antediluviana* (Ehrenberg) Van Heurck | 246,274 | – |        |        |
| *Cerataulina* sp. | 34,127 | – |        |        |
| *Chaetoceros curvisetus* Cleve | 62 | – |        |        |
| *Chaetoceros* spp. | 139 | 134 |        |        |
| *Cyclotella* sp. | 17 | 7 | 46 | 44 | 44 | 44 |        |        |
| *Cylindrotheca closterium* (Ehrenberg) Reimann & J. C. Lewin | 107 | 46 | 42 | – | 212 | 0 | 36 | 18 |
| *Gainardia striata* (Stoltherfoth) Hasle | 8831 | – |        |        |
| *Leptocylindrus* sp. | 654 | 0 |        |        |
| *Licmophora* sp. |        |        |        |        |
| *Nitzschia* sp. | 2072 | – | 7293 | 683 | 7720 | – |        |        |
| *Pleurosigma* / *Gyrosigma* sp. | 12,953 | – | 66,382 | 75,560 | 250,501 | – |        |        |
| *Pseudo-nitzschia* sp. | 170 | – | 170 | – | 260 | 269 |        |        |
| *Rhizosolenia* sp. | 13,620 | – | 147 | – | 71 | – |        |        |
| *Skeletonema* sp. |        |        |        |        |
| *Striatella* sp. | 44,438 | – | 101,750 | 99,349 | 172,000 | – | 7546 | – |
| *Tabellaria* sp. | 44,438 | – | 101,750 | 99,349 | 172,000 | – | 7546 | – |
| *Tenuicilindrus belgicus* (Meunier) D. Nanjappa & A. Zingone | 147 | – |        |        |
| *Thalassionema* sp. | 745 | – |        |        |
| *Thalassiosira* sp. | 956 | – |        |        |
| *Pennales* undetermined 1 | 2012 | 553 | 5273 | 5896 | 23,617 | – | 46 | 61 |
| *Pennales* undetermined 2 | 49 | 34 | 21 | 10 | 38 | 22 |        |        |
| *Carteria* sp. | 28 | – |        |        |
| *Crucigenia* tetrapedia (Kirchner) Kuntze | 8 | – |        |        |
| *Monoraphydium* sp. 1 | 12 | – |        |        |
| *Monoraphydium* sp. 2 | 20 | – | 12 | 4 | 20 | – | 18 | – |
| *Monoraphydium* sp. 3 | 17 | – |        |        |
| *Oocystis* sp. | 15 | 1 | 13 | – | 15 | 9 |        |        |
| *Pediastrum duplex* Meyen | 8 | – |        |        |
| *Chlorophyceae* undetermined | 481 | 153 | 66 | – | 300 | 274 |        |        |
| *Cryptophyceae* undetermined | 51 | 15 | 55 | 6 | 49 | 6 | 89 | 44 |
| *Aphanizomenon* sp. | 48 | 51 |        |        |
| *Nostocales* undetermined | 38 | 40 | 41 | – |        |        |
| *Oscillatoriales* undetermined | 14 | – | 201 | – |        |        |
| Component | Species/Genus | Count | Count | Count | Count | Count | Count |
|-----------|--------------|-------|-------|-------|-------|-------|-------|
| DIC       | *Apedinella* sp. | 66    | –     | 53    | –     | 101   | 5     |
| DIN       | Akashiwo sanguinea (K. Hirasaka) G. Hansen & Moestrup | 8341  | 3419  | 14,364| –     | 12,291| 8378  |
| DIN       | *Alexandrium* sp. 1 | 6455  | 657   | –     | –     | –     | –     |
| DIN       | *Alexandrium* sp. 2 | 16,689| –     | –     | –     | –     | –     |
| DIN       | *Dinophysis* cf. acuminata Claparède & Lachmann | 6449  | –     | –     | –     | 6264  | 320   |
| DIN       | *Gonyaulax* sp. | 7533  | –     | 11,484| –     | –     | –     |
| DIN       | *Gyrodinium impudicum* S. Fraga & I. Bravo | 2665  | 535   | –     | –     | –     | –     |
| DIN       | *Heterocapsa* cf. rotundata (Lohmann) G. Hansen | 136   | 60    | 112   | 78    | 102   | 46    |
| DIN       | *Levanderina fissa* (Levander) Moestrup, Hakanen, G. Hansen, N. Daugbjerg & M. Ellegaard | 4495  | 0     | –     | –     | 11,083| –     |
| DIN       | *Peridinium quinquecorne* Abé | 243   | 64    | 338   | 0     | 154   | 57    |
| DIN       | *Prorocentrum* arcuatum Issel | –     | –     | –     | –     | 6632  | –     |
| DIN       | *Prorocentrum cordatum* (= *Prorocentrum minimum*) (Ostenfeld) J.D. Dodge | 351   | –     | 1013  | –     | 1013  | 1792  |
| DIN       | *Prorocentrum micans* Ehrenberg | –     | –     | 3919  | 0     | 4407  | 1539  |
| DIN       | *Prorocentrum triestinum* J. Schiller | 243   | 64    | 338   | 0     | 154   | 57    |
| DIN       | *Prorocentrum* spp. | –     | –     | –     | –     | 2747  | –     |
| DIN       | *Pyrophacus* sp. | 16,245| 0     | –     | –     | –     | –     |
| DIN       | *Scrippsilla* spp. | 5076  | 2128  | 3640  | 1736  | 12,592| –     |
| DIN       | *Dinophyceae undetermined* 1 | 3623  | 5925  | 324   | 69    | 1631  | –     |
| DIN       | *Tripos fusus* (= *Ceratium fusus*) (Ehrenberg) F.Gómez | 6514  | –     | –     | –     | –     | –     |
| DIN       | *Tripos* sp. | –     | –     | –     | –     | 20,991| –     |
| DIN       | *Dinophyceae undetermined* 2 | 3479  | –     | 4178  | –     | 2914  | 944   |
| EUG       | *Eutreptiella* sp. | 2538  | 0     | 950   | –     | 950   | –     |
| PRA       | *Prasinophyceae undetermined* | 43    | 32    | 108   | 32    | 73    | –     |
| RAP       | *Chattonella subsalsa* B. Biecheler | 1900  | –     | –     | –     | –     | –     |
| FLA       | Flagellates | 79    | 19    | 110   | 72    | 79    | 11    |
| NAN       | Nanoplancton | 13    | 1     | 20    | –     | 38    | –     |
| PICO      | *Pico* | 0.83  | 0.35  | 0.62  | 0.11  | 0.57  | 0.10  |
| PICO      | *Pico* | 1.62  | 1.34  | 1.59  | 0.21  | 1.89  | 0.30  |
Table 3
Mean volume ($V$, $\mu$m$^3$) and standard deviation (SD) of Uthermöhl fraction of phytoplankton and picophytoplankton taxa observed in Corru S’ittiri Lagoon during the study period (– = the taxon has been observed once). BAC, Bacillariophyceae; CHL, Chlorophyceae; CHR, Chrysophyceae; CRY, Cryptophyceae; CYA, Cyanophyceae; DIC, Dictyochophyceae; DIN, Dinophyceae; EUG, Euglenophyceae; PRA, Prasinophyceae; RAP, Raphidophyceae; FLA, Flagellates; PICO, picophytoplankton.

| Taxon | Summer | Autumn | Winter | Spring |
|-------|--------|--------|--------|--------|
|       | $V$    | SD     | $V$    | SD     | $V$    | SD     | $V$    | SD     |
| BAC Amphiprora spp. | 11,038 | 3740 | 4329 | 255 | 6857 | – | 231 | – |
| BAC Amphora sp. | 132 | 139 | 2723 | 0 | 145 | 121 | 231 | – |
| BAC Chaetoceros minimus (Levander) D. Marino et al. | 57 | 0 | 57 | – | – | 57 | – |
| BAC Chaetoceros spp. | 230 | 249 | 793 | 548 | 415 | 243 | 555 | – |
| BAC Cylindrotheca closterium (Ehrenberg) Reimann & J.C. Lewin | 349 | 0 | 585 | 334 | 1316 | 1577 | 349 | – |
| BAC Cocconeis sp. | 833 | 0 | 833 | – | 9139 | 6776 | 2244 | – |
| BAC Diploneis sp. | 492 | 0 | 492 | – | 492 | – | 492 | – |
| BAC Grammatophora sp. | 2007 | 0 | 2007 | – | 2007 | – | 2007 | – |
| BAC Licmophora sp. | 4348 | – | 9139 | 6776 | – | – | – | – |
| BAC Navicula spp. | 345 | 92 | 395 | 12 | 708 | – | 498 | 128 |
| BAC Nitzschia cf. sigma (Kützing) W. Smith | 417 | – | 417 | – | 417 | – | 417 | – |
| BAC Nitzschia longissima (Brébisson) Ralfs | 822 | 0 | 822 | – | 822 | – | 822 | – |
| BAC Nitzschia spp. | 349 | 0 | 585 | 334 | 1316 | 1577 | 349 | – |
| BAC Pleurosigma/ Gyrosigma sp. | 38,244 | 27,533 | 47,286 | – | 38,244 | 27,533 | 47,286 | – |
| BAC Pseudo-nitzschia sp. | 140 | 51 | 296 | 137 | 156 | – | 110 | – |
| BAC Rhizosolenia setigera Brightwell | 2146 | 1374 | 998 | 766 | 324 | – | 2728 | 1420 |
| BAC Skeletonema sp. | 8233 | 9080 | 2828 | – | 99 | – | 7194 | – |
| BAC Synedra sp. | 363 | – | 1332 | 113 | 542 | 252 | 363 | – |
| BAC Thalassiosira sp. | 73 | 74 | 158 | 69 | 69 | 69 | 69 | 69 |
| BAC Carteria sp. | 113 | – | 113 | – | 113 | – | 113 | – |
| BAC Chlorella sp. | 135 | 0 | 19 | – | 17 | – | 17 | – |
| BAC Dictyospherium pulchellum H. C. Wood | 15 | 0 | 19 | – | 17 | – | 17 | – |
| BAC Kirchneriella sp. | 77 | – | 77 | – | 77 | – | 77 | – |
| BAC Monoraphidium minutum (Nägeli) Komárková-Legnerová | 20 | 1 | 20 | 1 | 20 | 1 | 20 | 1 |
| BAC Monoraphidium arcuatum (Komshikov) Hindák | 77 | – | 77 | – | 77 | – | 77 | – |
| BAC Pediastrum boryanum (Turpin) Meneghini | 207 | 0 | 158 | 69 | 69 | – | 361 | – |
| BAC Pediastrum tetras (Ehrenberg) Ralfs | 36 | – | 40 | – | 32 | – | 32 | – |
| BAC Chrysophyceae undetermined | 56 | 34 | 37 | – | 2477 | – | 2477 | – |
| CRY | Cryptomonas sp. | 526 | 275 | 721 | – |
| CRY | Plagioselmis sp. | 37 | 8 | 44 | – | 44 | – |
| CRY | Cryptophyceae undetermined | 35 | 8 | 139 | 138 | 140 | 58 | 47 | 3 |
| CYA | Anabaena sp. | 87 | 0 | – | 76 | 16 |
| CYA | Anabaenopsis sp. | 58 | 0 | 58 | – |
| CYA | Chroococcus sp. | 31 | 13 | 24 | – |
| CYA | Pseudanabaena sp. | 10 | 7 | 11 | 5 | 4 | – |
| CYA | Oscillatoriales undetermined | 37 | 0 | 37 | – | 37 | – |
| DIC | Apedinella sp. | – | – | – | – |
| DIN | Akashiwo sanguinea (K. Hirasaka) G. Hansen & Moestroup | 8537 | 0 | 12,291 | 8378 | 8537 | – | 8341 | 3419 |
| DIN | Alexandrium minutum Halim | 6141 | 0 | – | – |
| DIN | Alexandrium sp. | 5672 | 0 | – | – |
| DIN | Bysmatrum sp. | 2449 | – | – |
| DIN | Dinophys cf. acuminata Claparède & Lachmann | 3956 | 1040 | 6726 | 2295 | 8348 | 921 | 7523 | – |
| DIN | Gonyaulax spinifera (Claparède & Lachmann) Diesing | 13,582 | 0 | – | – | 13,582 | – | – |
| DIN | Gymnodinium litoralis A. Reñé | 1474 | 192 | 1593 | – | 2174 | 562 | – | – |
| DIN | Gymnodinium sp. | 980 | 351 | – | – | 1165 | – | – |
| DIN | Heterocapsa sp. | 371 | 57 | 319 | 21 | 164 | 50 | 813 | – |
| DIN | Peridinium quinquecorne Abé | 3543 | 963 | 5605 | 1345 | 4850 | – | 4719 | 798 |
| DIN | Prorocentrum cordatum (= Prorocentrum minimum) (Ostenfeld) J.D. Dodge | 569 | 0 | – | – |
| DIN | Prorocentrum micans Ehrenberg | 3881 | 464 | – | – | 6367 | – | – |
| DIN | Prorocentrum triestinum J. Schiller | 821 | 119 | 334 | 143 | 1072 | 22 | – |
| DIN | Prorocentrum sp. | 6214 | – | – | – | 6214 | – | – |
| DIN | Scrippsiella spp. | 3393 | 202 | 4331 | 998 | 3908 | – | 5044 | – |
| DIN | Dinophyceae undetermined | 4629 | 311 | 4954 | – | 4601 | – | 332 | – |
| EUG | Eutreptiella marina da Cunha | 668 | 306 | – | – | – | 999 | – | – |
| EUG | Euglenophyceae undetermined | 1076 | 647 | 1421 | – | – | 1965 | – | – |
| PRA | Tetraselmis sp. | 3185 | 0 | – | – | – | 2820 | – | – |
| PRA | Prasinophyceae undetermined | 62 | 22 | 38 | – | 78 | – | – |
| PICO | Picocyanobacteria | 1.06 | 0.40 | 0.99 | 0.57 | 0.79 | 0.55 | 0.52 | 0.21 |
| PICO | Picoeukariotes | 0.71 | 0.16 | 1.52 | 0.11 | 0.77 | 0.22 | – | – |
each sample, about 200 randomly selected cells of each group (autotrophic picocyanobacteria and autotrophic picoeukaryotes) were measured with a manual micrometer. Mean volume was calculated assuming the shape of cell spherical or cylindrical with hemispheric ends, using the formulas described in [6].

Transparency document. Supplementary material

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.08.001.

References

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