Data Article

Dataset of the *Emiliania huxleyi* abundance and phytoplankton composition in the Barents Sea in summer 2014–2018

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**ABSTRACT**

This data article contains data on the *Emiliania huxleyi* abundance, phytoplankton composition, in the Barents Sea in summer 2014–2018, and physical and hydrochemical parameters in summer 2017. The data are based on the samples collected on stations, where *E. huxleyi* blooms were recorded. The physical data included the water temperature, salinity, oxygen concentrations at the surface, and various depths. Data of nutrients concentrations included followed parameters: silicates, phosphates, nitrates, nitrites, ammonium, and dissolved inorganic nitrogen. The nutrients ratios are also given. Data of phytoplankton composition consists of the abundance of diatoms, dinoflagellates, coccolithophores, and small flagellates.

The data presented in this article are associated with the research article entitled “Interannual variability of Emiliania huxlei blooms in the Barents Sea: In Situ data 2014–2018” [1]. The related research article examines the influence of abiotic factors such as temperature, salinity, nutrients concentrations, and biotic factors (phytoplankton composition) on *E. huxleyi* abundance.

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Specifications Table

| Subject                        | Oceanology                        |
|-------------------------------|-----------------------------------|
| Specific subject area         | Biooceanology                     |
| Type of data                  | Table                             |
| How data were acquired        | SEM (VEGA-3sem TESCAN, Czech Republic) and Light Microscope (Ergoval, Karl Zeiss, Jena); CTD (SBE-19 Plus; Sea Bird Equipment); TechNicon II autoanalyzer raw data | |
| Data format                   | All data were obtained in the Barents Sea during cruise 127 of the RV Professor Shotkman, which took place from July 26 to August 5, 2014; cruises 62, 65, 68 and 71 of the RV Akademik Mstislav Keldysh, which took place from July 22 to August 18, 2015, from June 29 to July 9, 2016, from July 23 to August 18 2017, and August 12–13 2018 respectively (Fig. 1 and Table S1, Supplementary material, original research article). | |
| Parameters for data collection| Sampling was carried out from different depths, which was selected by CTD (SBE-19 Plus; Sea Bird Equipment) probing. The samples were collected using a rosette probe sampler with a 5–10-L Niskin bottles. The seawater was neutralized using 40% formalin buffered with borax, with a final concentration in the sample of 0.8–1.0%. Phytoplankton was concentrated by sedimentation. | |
| Description of data collection| The Barents Sea; 40 stations between 21° 51.70–44° 20.94 E and 68° 01.1–75° 09.48 N | |
| Data source location          | Relevant data reported in this article related research article “Interannual variability of Emiliania huxleyi blooms in the Barents Sea: In Situ data 2014–2018” [1]. | |
| Data accessibility            | Relevant data reported in this article related research article “Interannual variability of Emiliania huxleyi blooms in the Barents Sea: In Situ data 2014–2018” [1]. | |

Value of the Data

- Coccolithophores blooms in the Barents Sea usually study by remote sensing. However, this method cannot use for a precise estimate of the coccolithophores' abundance. Therefore satellite observations should be supported by in situ measurements that are rarely in the Barents Sea. This dataset provides precise information about the abundance of the coccolithophores and will be useful for the validation of satellite data.
- Coccolithophorids are responsible for the functioning of the carbonate pump in the ocean. These data provide complete information about abiotic and biotic factors, making it possible to determine the mechanisms of regulation of the carbonate pump. The primary beneficiaries of the data may be researchers working on the problem of the biological carbon pump in the ocean.
- Climate change in the Barents Sea is usually associated with increased intrusion of Atlantic waters. Their biological indicator is Emiliania huxleyi. This dataset provides accurate data on the northward movement of this species. Therefore, the data presented can be useful for researchers working on climate change in the Arctic region.

1. Data Description

The data presented in this article hosts 2 tables and 1 figure (6 images). Table 1 hosts raw data about temperature, salinity, oxygen concentrations, nutrients concentrations (silicates, phosphates, nitrates, nitrites, ammonium, dissolved inorganic nitrogen), and their ratios and Emiliania huxleyi abundance in summer 2017 in the Barents Sea. This table shows only data at stations and at the depth where Emiliania huxleyi blooms were registered i.e. where the abundance exceeded 10^6 cells per liter. Data of phytoplankton composition in the Barents Sea in 2014–2018 were presented in Table 2 where followed parameters were included: the abundance of diatoms, dinoflagellates, coccolithophores, and small flagellates. The Fig. 1 contains images (a)–(f) show SEM microphotographs of E. huxleyi received on the data of cruise 67 of the RV Akademik Mstislav Pautova et al. (2016) [2].
Fig. 1. SEM photomicrographs of the *Emiliania huxleyi* in the southern part of the Barents Sea in July 2016: (a) station 6526, layer 0 m; (b) and (c) station 6534, layer 0 m; (d) station 6534, layer 10 m; (e) and (f) station 6534, layer 25 m. Station locations are shown in the Fig. 1 and Table S1, Supplementary material, original research article.
Table 1  
Temperature, salinity, dissolved oxygen, nutrients concentrations and their ratios and *Emilia huxleyi* abundance in the Barents Sea in August 2017.

| Station | Depth T | S | O₂ | O₃ | Si | P−PO₄³⁻ | N−NO₃⁻ | N−NO₂⁻ | N−NH₄⁺ | DIN | DIN:P | Si:DIN | Si:P | E. huxleyi | 10⁶ cells/L |
|---------|---------|---|----|----|----|---------|---------|---------|---------|-----|------|-------|------|-----------|------------|
| 5544    | 5       | 7.32| 35.02| 7.19| 108| 0.24| 0.03| 0.02| 0.06| 0.48| 0.56| 19.81| 0.42| 8.29| 1.82 |
| 5548    | 5       | 7.56| 34.98| 7.41| 111| 0.28| 0.08| 0.01| 0.13| 0.64| 0.78| 10.34| 0.36| 3.73| 1.15 |
| 5550    | 5       | 7.15| 35.00| 7.35| 109| 0.24| 0.07| 0.02| 0.15| 0.75| 0.92| 13.86| 0.26| 3.55| 1.15 |
| 5548A   | 5       | 7.44| 34.94| 7.08| 106| 0.42| 0.07| 0.02| 0.12| 0.64| 0.78| 11.82| 0.54| 6.39| 0.98 |
| 5548A   | 20      | 7.44| 34.97| 7.09| 106| 0.42| 0.07| 0.02| 0.21| 0.59| 0.82| 12.31| 0.52| 6.39| 1.56 |
| 5574    | 5       | 8.26| 34.93| 6.79| 103| 0.85| 0.13| 0.06| 0.71| 0.91| 1.68| 12.66| 0.50| 6.39| 1.44 |
| 5576    | 5       | 9.38| 34.50| 6.63| 103| 0.71| 0.12| 0.03| 0.15| 0.64| 0.81| 6.80| 0.87| 5.74| 6.62 |
| 5577    | 5       | 9.31| 34.64| 6.71| 90| 0.42| 0.04| 0.02| 0.18| 1.02| 1.22| 32.05| 0.35| 11.91| 4.10 |
| 5578    | 5       | 10.09| 34.18| 6.65| 87| 0.19| 0.05| 0.02| 0.26| 1.07| 1.35| 28.58| 0.14| 3.98| 3.17 |
| 5579    | 5       | 10.72| 33.91| 6.59| 102| 0.05| 0.04| 0.01| 0.19| 0.64| 0.84| 22.19| 0.06| 1.24| 3.26 |
| 5579    | 17      | 10.06| 34.11| 6.73| 105| 0.28| 0.09| 0.04| 0.63| 0.64| 1.31| 13.80| 0.22| 2.98| 2.64 |
| 5580    | 10      | 9.79| 34.45| 6.67| 105| 0.28| 0.09| 0.02| 0.10| 0.53| 0.65| 7.60| 0.44| 3.31| 5.28 |
| 5580    | 22      | 9.21| 34.45| 6.73| 104| 0.28| 0.08| 0.03| 0.29| 0.75| 1.07| 14.07| 0.26| 3.73| 3.65 |
| 5581    | 5       | 8.64| 34.66| 6.95| 106| 0.47| 0.05| 0.02| 0.18| 0.80| 1.00| 21.13| 0.47| 9.94| 1.62 |
| 5581    | 15      | 8.66| 34.66| 6.74| 103| 0.42| 0.09| 0.02| 0.15| 0.69| 0.87| 10.15| 0.49| 4.97| 1.94 |
| 5581    | 22      | 7.32| 34.65| 7.01| 104| 0.90| 0.13| 0.03| 0.23| 1.02| 1.28| 9.62| 0.70| 6.75| 2.42 |

Keldysh in summer 2016. These images demonstrate the variability of cells and coccoliths size during *E. huxleyi* bloom.

2. Experimental design, materials and methods

2.1. Sampling

All data were obtained in the Barents Sea during cruise 127 of the R/V Professor Shokman, which took place from July 26 to August 5, 2014, cruises 62, 65, 68 and 71 of the R/V Akademik Mstislav Keldysh, which took place from July 22 to August 18, 2015, from June 29 to July 9, 2016, from July 23 to August 18 2017, and August 12–13 2018 respectively. Coordinates of 40 sampling stations were situated between 21° 51.70–44° 20.94 E and 68° 01.1–75° 09.48 N (Table S1, Supplementary material, original research article). In 2014, water samples were taken from the water surface and at a depth of 4 m. In 2015, 2016, 2017 and 2018, sampling was carried out from different depths. Temperature and salinity were measured by using CTD device (SBE-19 Plus; Sea Bird Equipment). The water samples were collected using a rosette probe sampler with a 5–10-L Niskin bottles. The seawater was fixed using neutralized 40% formalin buffered with borax, with a final concentration in the sample of 0.8–1.0%. Phytoplankton was concentrated by sedimentation.

2.2. Species identification and phytoplankton cells counting

Species identification was based on morphology, according to [2,3] and the World Register of Marine Species (http://www.marinespecies.org). The identification and counting of cells were conducted using a light microscope Ergoval (Karl Zeiss, Jena), with 16 × 10 and 16 × 40 magnifications. Cells with linear dimensions below 20 µm were counted using a Naujotte chamber (0.05 ml); the larger cells were counted using a Naumann chamber (1 ml). Unidentified species of the size group 4–10 µm were assigned to the group of small flagellates. Cells with linear dimensions smaller than 2 µm were not taken into account for the estimation of total phytoplankton biomass. Cell biovolume and biomass was estimated, according to [4,5]. Converting wet phytoplankton biomass to carbon units were carried out by using allometric equations [6].
Table 2
Phytoplankton abundance (cells/L) of different taxonomic and size groups in the Barents Sea in 2014–2018 at the stations where *Emiliania huxleyi* bloom was observed.

| Station | Depth, m | Diatoms | Dinoflagellates | E. huxleyi | Small flagellates |
|---------|----------|---------|-----------------|------------|------------------|
| 2014    |          |         |                 |            |                  |
| 33      | 0        | 0       | 235             | 1,391,200  | 689,000          |
| 33      | 4        | 0       | 400             | 1,548,000  | 828,000          |
| 34      | 0        | 51      | 15500           | 3,060,000  | 448,800          |
| 34      | 4        | 0       | 6900            | 1,800,000  | 288,000          |
| 35      | 0        | 0       | 23800           | 6,936,000  | 1,010,600        |
| 35      | 4        | 0       | 2100            | 8,347,200  | 689,000          |
| 36      | 0        | 0       | 3670            | 2,448,000  | 244,800          |
| 36      | 4        | 0       | 14500           | 3,196,000  | 300,800          |
| 2015    |          |         |                 |            |                  |
| 5192    | 0        | 0       | 1860            | 2,889,600  | 598,600          |
| 5193    | 23       | 0       | 970             | 2,476,800  | 591,700          |
| 5195    | 0        | 0       | 1980            | 1,428,000  | 319,600          |
| 5195    | 10       | 0       | 5670            | 3,264,000  | 877,200          |
| 5195    | 21       | 0       | 5700            | 1,224,000  | 584,800          |
| 2016    |          |         |                 |            |                  |
| 25      | 0        | 0       | 7330            | 4,071,000  | 50,900           |
| 26      | 0        | 0       | 740             | 5,391,500  | 610,900          |
| 30      | 0        | 0       | 300             | 7,505,555  | 40,200           |
| 31      | 0        | 9       | 1900            | 12,000,000 | 44,700           |
| 32      | 0        | 9       | 230             | 4,145,000  | 24,000           |
| 33      | 0        | 0       | 855             | 5,091,000  | 39,800           |
| 33      | 5        | 18      | 2055            | 8,000,000  | 50,900           |
| 33      | 19       | 9       | 170             | 7,854,500  | 47,800           |
| 34      | 0        | 0       | 760             | 9,309,100  | 38,200           |
| 34      | 10       | 0       | 1445            | 9,454,500  | 102,000          |
| 34      | 25       | 0       | 380             | 3,636,000  | 30,000           |
| 35      | 0        | 0       | 245             | 1,818,200  | 80,000           |
| 2017    |          |         |                 |            |                  |
| 5544    | 5        | 29      | 62800           | 1,746,000  | 11,100           |
| 5548    | 5        | 0       | 6360            | 1,097,000  | 315,000          |
| 5550    | 5        | 0       | 54600           | 1,097,000  | 185,000          |
| 5548-A  | 20       | 6       | 117400          | 1,490,000  | 22,900           |
| 5574    | 5        | 96      | 1630            | 1,371,000  | 45,700           |
| 5576    | 5        | 217     | 2100            | 6,308,600  | 59,000           |
| 5577    | 5        | 0       | 1500            | 4,114,000  | 27,000           |
| 5578    | 5        | 21600   | 11700           | 3,017,000  | 12,800           |
| 5579    | 5        | 28800   | 1570            | 3,108,571  | 11,000           |
| 5579    | 17       | 11440   | 1680            | 2,514,000  | 12,000           |
| 5580    | 10       | 0       | 2040            | 5,029,000  | 22,900           |
| 5580    | 22       | 0       | 4360            | 3,474,000  | 6000             |
| 5581    | 5        | 69      | 1080            | 1,555,000  | 197,000          |
| 5581    | 15       | 69      | 1150            | 1,85,200   | 93,600           |
| 5581    | 22       | 801     | 1030            | 2,309,000  | 119,000          |
| 2018    |          |         |                 |            |                  |
| 5940    | 0        | 0       | 930             | 1,440,000  | 144,000          |
| 5940    | 2        | 9       | 1770            | 1,426,000  | 67,000           |
| 5940    | 5        | 9       | 1330            | 1,385,000  | 41,000           |
| 5940    | 10       | 0       | 1800            | 1,645,700  | 11,200           |
| 5940    | 23       | 26      | 690             | 1,728,000  | 68,600           |
| 7104    | 0        | 44      | 2860            | 1,101,000  | 967,600          |
| 7106    | 0        | 77      | 740             | 1,097,000  | 75,000           |
| 7107    | 0        | 86      | 620             | 1,406,000  | 54,900           |
| 7108    | 0        | 0       | 420             | 2,112,000  | 29,5000          |
2.3. SEM microphotographs of Emiliania huxleyi

Microphotographs of *E. huxleyi* was received by using VEGA-3sem TESCAN (Czech Republic) scanning electron microscopy (SEM) (Fig. 1).

Water samples were filtered through membrane filters (0.45 μm pore size) using a vacuum pump (under a vacuum ≤ 400 mbar) immediately after sampling in July 2016. Then samples were dried at $T = 50 \, ^\circ C$ and transported to the lab and examined using SEM. For observation in secondary electron (SE) mode, the samples were coated with a 3- to 5-nm-thick gold layer.

2.4. Chemical analyses

Analyses of nutrients (phosphate, silicate, nitrate, nitrite, and ammonia) were carried out in 2016–2017 with a segmented continuous-flow TechNicon II autoanalyzer or with colorimetric methods [7,8] (Table 1). Dissolved inorganic nitrogen (DIN) was as the sum of nitrate, nitrite, and ammonia. Dissolved oxygen was analyzed by the Winkler method.

2.5. Determination of phytoplankton composition

Using a light microscope, cells abundance of various species was calculated. All species were divided into three taxonomic groups (diatoms, dinoflagellates, and coccolithophores) and one size group (small flagellates) (Table 2). This group included non-identified cells with linear sizes from 4 to 10 microns.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

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