Dnr: S/Gbg-2023-105

SMHI

AlgAware

Oceanographic Unit
No 8, August 2023

ALGAL SITUATION IN MARINE WATERS SURROUNDING SWEDEN

Sammanfattning

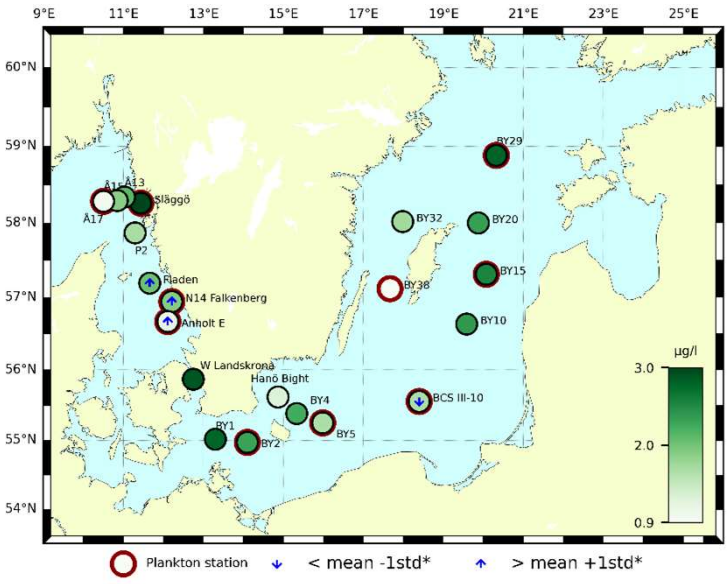
Diversiteten och totala cellantalen var generellt sett relativt höga vid samtliga stationer i västerhavet. Undantaget var Å17 där få celler och låg artdiversitet återfanns. Dinoflagellater var vanligast förekommande i Skagerrak, medan kiselalger var vanligast förekommande i Kattegatt. De integrerade klorofyllhalten (0–10 m) var över normalt i Kattegatt medans de djupare integrerade värdena samt (0–20 m) var generellt normala för månaden vid samtliga stationer.

Diversiteten och cellantalen av växtplankton var normala vid alla stationer i Egentliga Östersjön, dock som högst i de södra delarna. Av de sommarblommande filamentösa cyanobakterierna var *Aphanizomenon flosaquae* vanlig, främst i de södra och norra delarna av Östersjön, men återfanns i samtliga prover. Även mindre mängder av *Nodularia spumigena** fanns på vissa stationer, främst i södra Östersjön. Kiselalgerna dominerades av *Dactyliosolen fragilissimus* i södra Östersjön, och *Chaetoceros castracanei* var vanlig på övriga stationer. Enstaka celler av de toxinbildande dinoflagellaten *Dinophysis norvegica** observerades i proverna. De integrerade klorofyllhalterna (0–10 m och 0–20 m) var generellt normala för månaden vid de flesta station, även om de djupare integrerade värden (0–20 m) var något lägre än de normala i västra Östersjön.

Abstract

The diversity and total cell numbers were generally high at most stations along the Swedish west coast. The only exception being Å17 where both biodiversity and total cell numbers were low. Dinoflagellates were most commonly found in Skagerrak and diatoms in Kattegat. The integrated chlorophyll concentration (0-10 m) were above normal in Kattegat. The deeper integrated chlorophyll (0-20 m) were generally within normal range for this month at all stations.

The diversity and cell numbers of phytoplankton were normal at all stations in the Baltic Proper, with the highest abundances observed in the southern parts of the Baltic. Of the summer-blooming filamentous cyanobacteria *Aphanizomenon flosaquae* was common, mainly in the southern and northern parts of the Baltic Sea, but was observed in all samples. Also, smaller amounts of *Nodularia spumigena** were present at some stations, primarily in the southern parts of the Baltic Proper. The diatom community was mainly dominated by *Dactyliosolen fragilissimus* in the southern parts of the basin, while *Chaetoceros castracanei* was common at the other stations. A few cells of the toxin producing dinoflagellate *Dinophysis norvegica** were observed in the samples. The integrated chlorophyll concentrations (0-10 and 0-20 m) were generally within the normal range for this month at most stations, although the deeper integrated samples (0–20 m) were somewhat below the normal range for the Western Baltic.



The Skagerrak

Å17 (open Skagerrak) 10th of August
The phytoplankton diversity and total cell numbers was relatively low. The larger cells were dominated by dinoflagellates and the dinoflagellate genus *Tripos* was most common. The naked dinoflagellate genus *Karenia* was also found in higher cell numbers. Among the diatoms only *Proboscia alata* was common. The smaller cells were represented by *Emiliania huxleyi* and small naked dinoflagellates of different sorts. The integrated chlorophyll concentrations (0-10 and 0-20 m) were normal for this month.

Släggö (Skagerrak coast) 10th of August
The number of species and total cell numbers were both high. The diatom *Leptocylindrus danicus* was found in high cell numbers. Quite a few cells of different dinoflagellates were also found an among these *Prorocentrum micans*, the genus *Tripos* and *Karenia* were common. Among the small cells different cryptomonadales, small naked dinoflagellates and *E. huxleyi* was found. The integrated chlorophyll concentrations (0-10 m) were a bit higher than normal for the month whereas the integrated (0-20 m) was normal for this month.

The Kattegat

Anholt E 11th and 17th of August
The number of species was quite high but total cell numbers was moderate on both occasions. Small cells dominated the sample on the first occasion. On the second occasion larger cells were seen in higher abundance. Among the larger cells the diatom *Skeletonema marinoi* and different species of *Pseudo-nitzschia* and *Chaetoceros* was found in higher cell numbers. The genus *Tripos* was more common on the second occasion. Among the small cells different cryptomonadales and *Chaetoceros socialis* was mainly found. The integrated chlorophyll concentrations (0-10 m) were above normal whereas the deeper integrated chlorophyll concentrations (0-20 m) were within normal on both occasion this month.

N14 Falkenberg 11th of August
The number of species were relatively high but total cell number was moderate. Among the dinoflagellates the genus *Tripos* was most common. The diatoms were represented by *S. marinoi* and different species of *Pseudo-nitzschia*. Among the small cells the diatom *Chaetoceros tenuissimus* was common and some cells of *E. huxleyi* were found. The integrated chlorophyll concentrations (0-10 m) were above normal whereas the deeper integrated chlorophyll concentrations (0-20 m) were within normal on the both occasion this month.

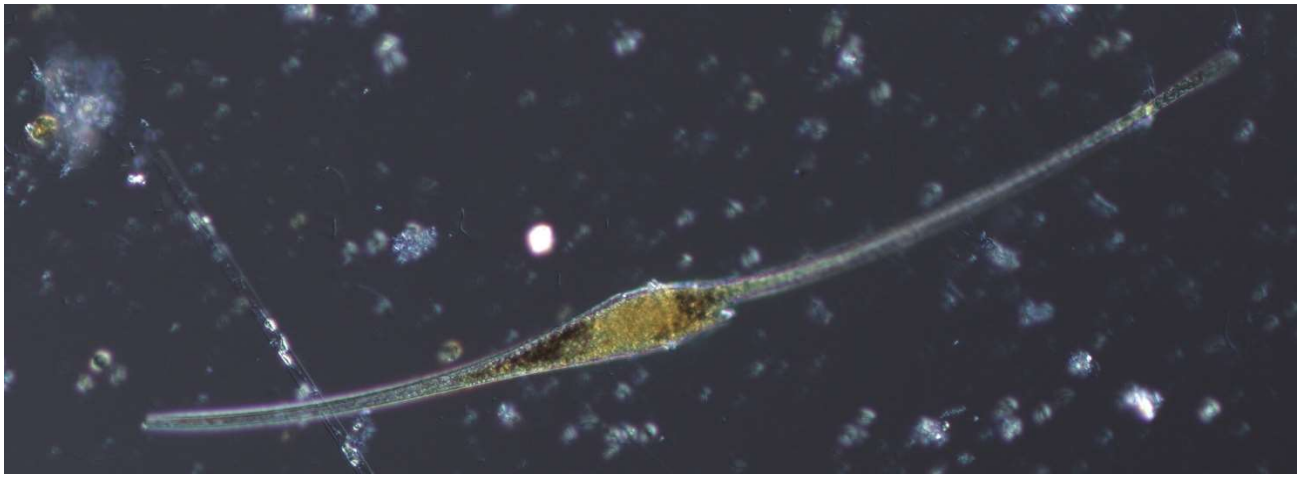


Fig. 1. The dinoflagellate *Tripos fusus* was common in the Skagerrak area and also at N14 Falkenberg this month. Photo: M. Johansen

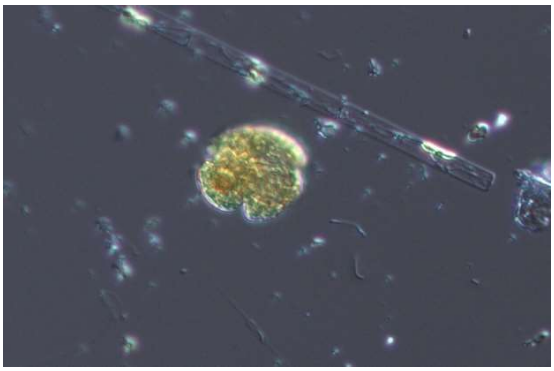


Fig 2. the dinoflagellate genus Karenia was relatively common in the Skagerrak area this month. Photo: M. Johansen

The Baltic

BY2 Arkona 12th of August

The phytoplankton diversity and abundances were high. The diatoms were mainly represented by *Dactyliosolen fragilissimus* and some small cells belonging to *Chaetoceros throndsenii* and *Chaetoceros subtilis*. There were some *Aphanizomenon flosaquae* while both *Dolichospermum* sp. and *Nodularia spumigena** were observed in low amounts. There were various taxa of other smaller phytoplankton present. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

BY5 Bornholm deep 12th of August
The phytoplankton diversity and abundances were high. Similar to BY2, the diatoms were mainly dominated by *D. fragilissimus*. Among the dinoflagellates, *Heterocapsa rotundata* was common. The amount of *A. flosaquae* was moderate and there were also a few filaments of *N. spumigena**. There were various taxa of other smaller phytoplankton present, such as the green algae *Cymbomonas tetramitiformis* and members of the Prymnesiales order. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

BY15 Gotland deep 13th of August
The phytoplankton diversity and abundances were moderate. The diatoms were mainly represented by *Chaetoceros castracanei*. Among the dinoflagellates Gymnodiniales was common and there were some *Dinophysis norvegica** present. *A. flosaquae* was abundant and there were several filaments of *Pseudanabaena* sp. Smaller ciliates, flagellates and smaller phytoplankton were present. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

BCSIII-10 13th of August
The phytoplankton diversity and abundances were low. The diatoms were represented by a few cells of *C. castracanei*, and single-celled centric diatoms. There were few dinoflagellates present, and mainly represented by members of the order Gymnodiniales. *A. flosaquae* was present together with *Pseudanabaena* sp. Smaller ciliates, Cryptomonadales, flagellates and other phytoplankton were present. The integrated (0-10 m) chlorophyll concentrations were below the normal range for this month, while the concentration at 0-20 m was within the normal range.

BY31 14th of August
The phytoplankton diversity and abundances were moderate. There were some chains present of the diatom *C. castracanei*. Among the dinoflagellates Gymnodiniales was mainly observed. *A. flosaquae* was abundant and there were just a few filaments of *N. spumigena**. Smaller ciliates, flagellates, the green algae *Binuclearia lauterbornii* were present.

BY29 14th of August
The phytoplankton diversity and abundances were low. Unlike the other stations in the Baltic Sea, the diatoms were mainly represented by a few cells of *C. danicus*. There were few dinoflagellates present, although *D. norvegica** was observed. *A. flosaquae* was present. Smaller ciliates, Cryptomonadales, flagellates and other phytoplankton were present. The integrated (0-10 m) chlorophyll concentrations was within the normal range for this month.

BY38 15th of August
The phytoplankton diversity and abundances were low. There were some chains present of the diatom *C. castracanei*, and some single-celled centric diatoms. Among the dinoflagellates Gymnodiniales was present in low numbers. The amount of *A. flosaquae* was moderate. The integrated (0-10 m) chlorophyll concentrations was within the normal range for this month, while the concentration at 0-20 m was below normal.

BY39 15th of August
The phytoplankton diversity was high, although the abundances were moderate. The diatoms were mainly represented by *C. castracanei* and smaller pennate diatoms. Among the dinoflagellates Gymnodiniales and *H. rotundata* were present and both *D. acuminata** and *D. norvegica** were observed in low amounts. The amount of *A. flosaquae* and *Dolichospermum* sp. were low, whereas small, colony forming cyanobacteria taxa were common, such as *Lemmermanniella* sp. and *Snowella* sp. There were various taxa of other smaller phytoplankton present.

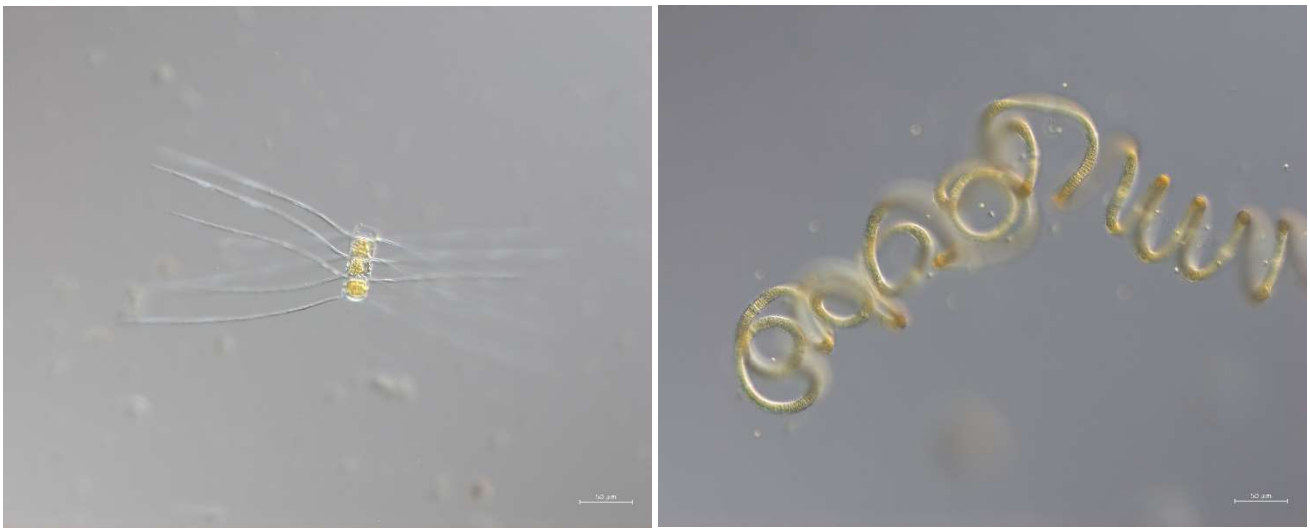
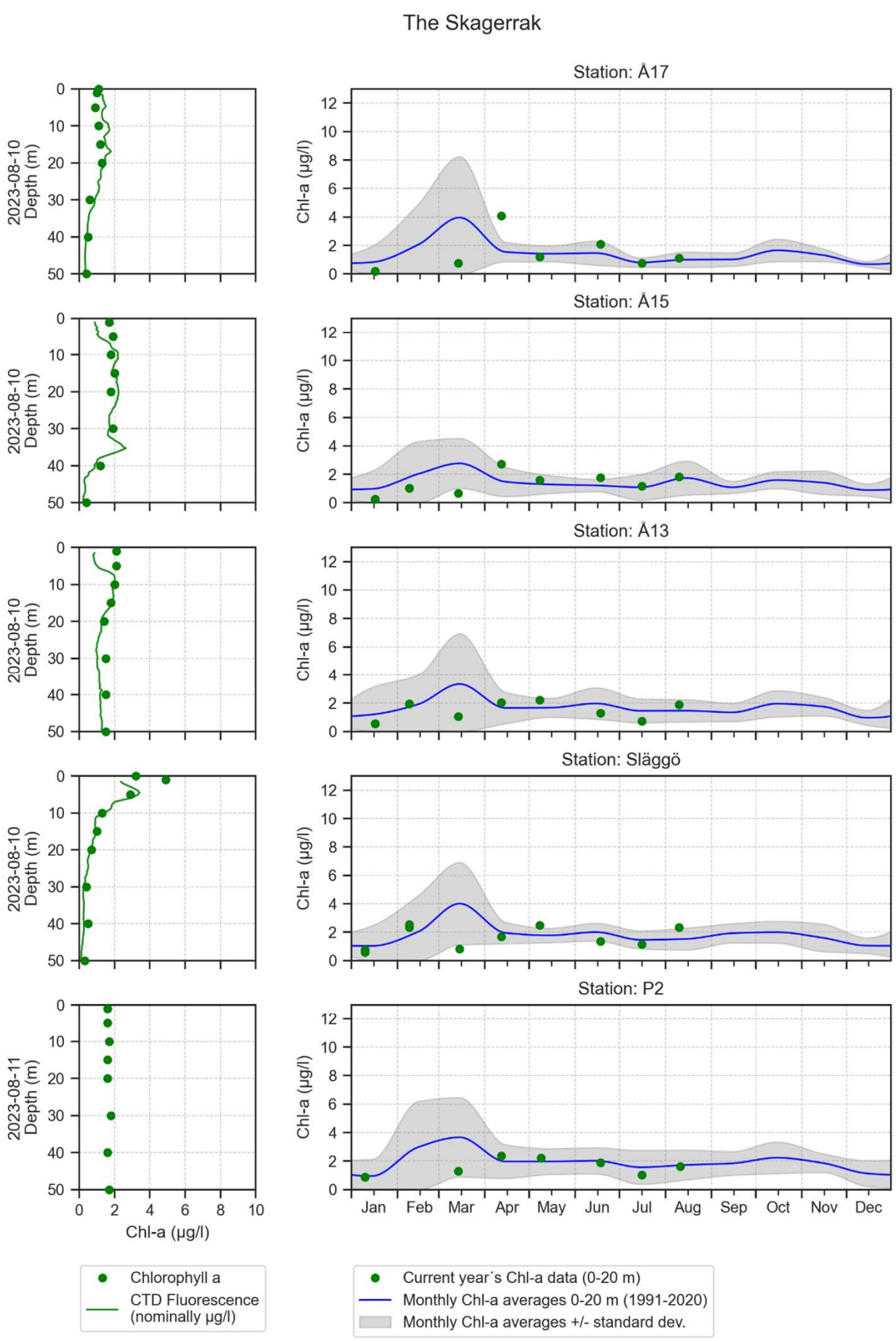


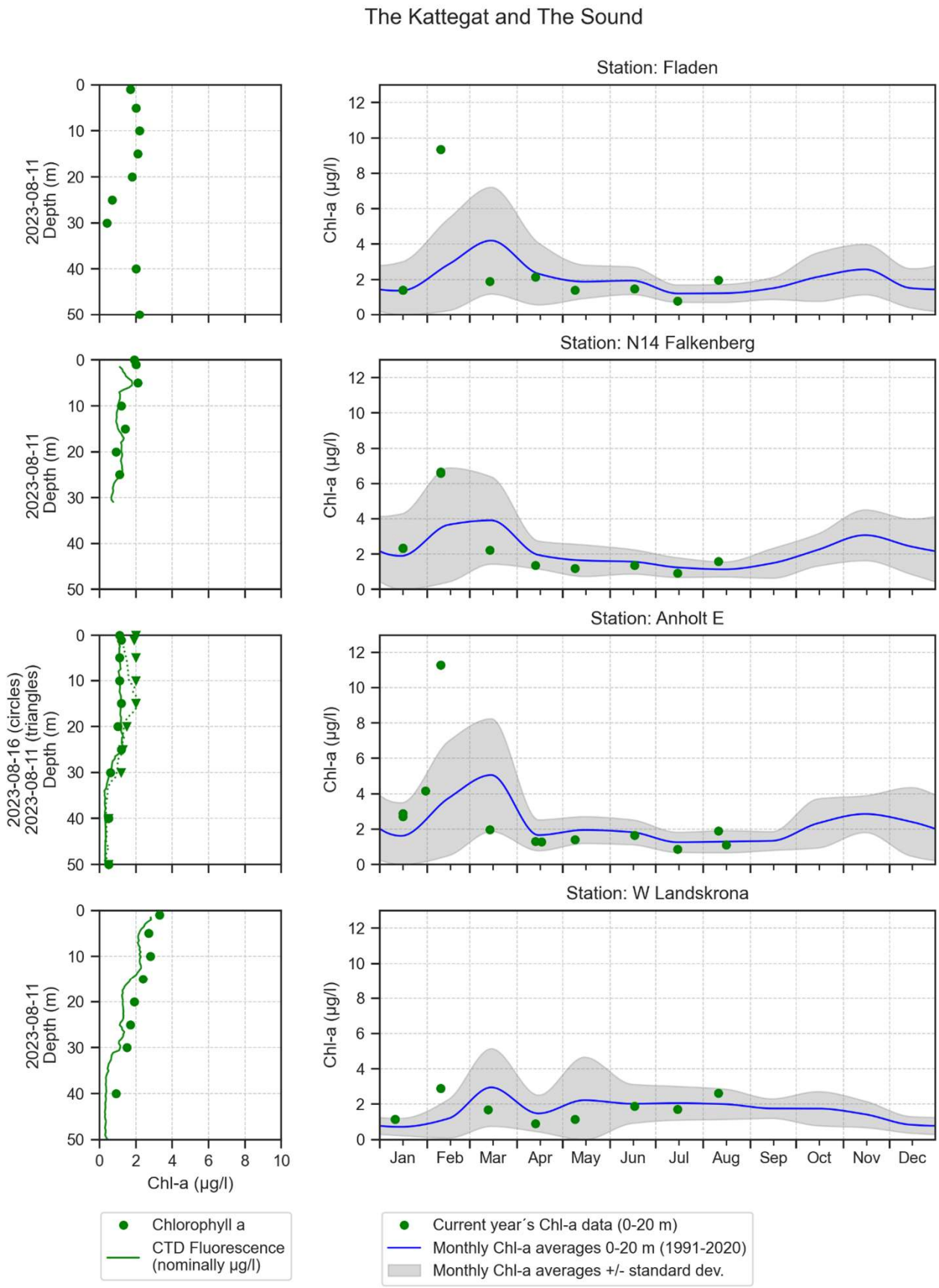
Fig. 3. The diatom community was mainly comprising of *Chaetoceros castracanei* (left) at most sampling stations. Some filaments of the potentially toxin-producing cyanobacterium *Nodularia spumigena** (right) were observed at some stations. Photos: A. Torstensson

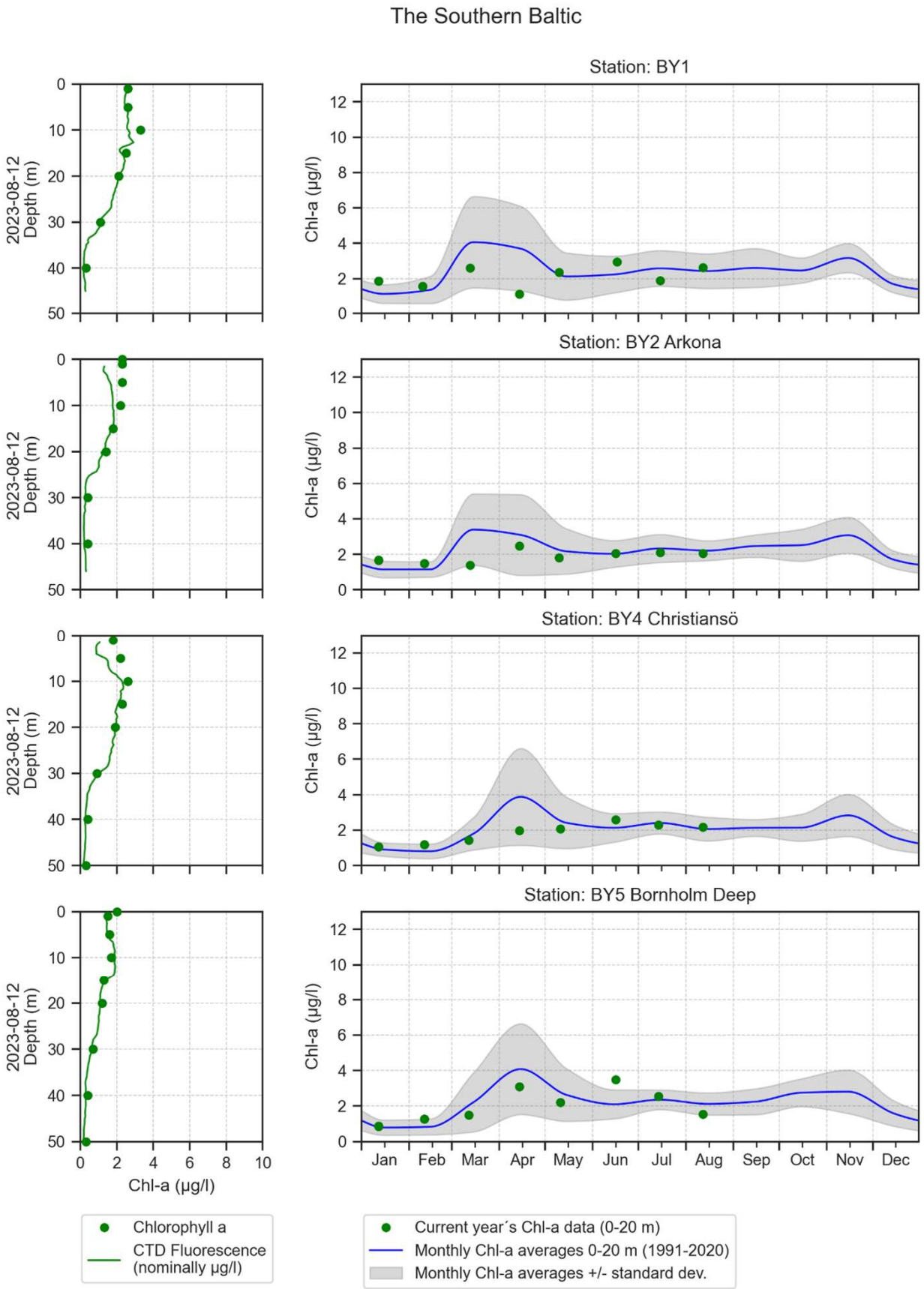
Phytoplankton analysis and text:
Marie Johansen and Anders Torstensson

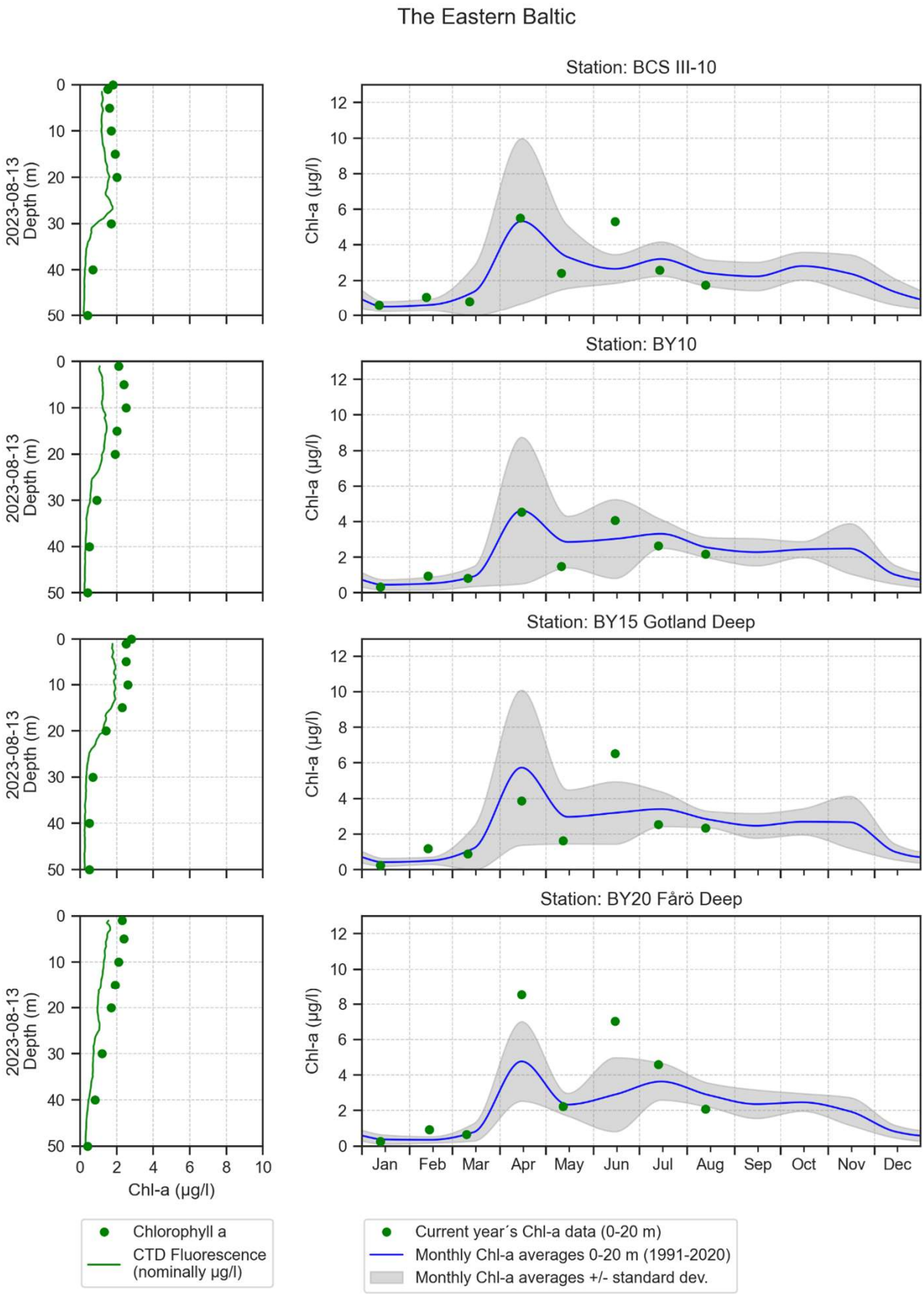
Selection of observed species	Anholt E	N14	Släggö	Å17
Red=potentially toxic species	17/8	11/8	10/8	10/8
Hose 0-present0 m	presence	presence	presence	presence
Cerataulina pelagica	present	present		
Chaetoceros		present		
Chaetoceros curvisetus	present			
Chaetoceros didymus	present			
Chaetoceros cf. laciniosus	present			
Chaetoceros cf. lorenzianus	present	present		
Chaetoceros similis			present	
Chaetoceros socialis		present		present
Chaetoceros tenuissimus		common	present	
Coscinodiscus radiatus			present	
Cylindrotheca closterium		present	present	
Dactyliosolen fragilissimus		present		
Ditylum brightwellii	present			
Guinardia flaccida	present			
Leptocylindrus danicus			common	present
Leptocylindrus minimus			present	
Nitzschia longissima	present	present	present	
Pleurosigma		present		
Proboscia alata			present	common
Pseudo-nitzschia	common	common	present	
Pseudosolenia calcar-avis	present			
Skeletonema marinoi	common	very common	present	
Thalassionema nitzschioides	present	present	present	
Thalassiosira	present			
Thalassiosira gravida		present		
Thalassiosira pseudonana		present		
Alexandrium pseudogonyaulax	present			present
Amphidinium			present	
cf. Azadinium				present
Dinophysis acuminata				present
Dinophysis norvegica		present		
Ensiculifera carinata			present	
Gonyaulax		present		
Gymnodiniales	present	present	common	common
Gyrodinium flagellare		present	present	present
Gyrodinium spirale	present	common	present	
Heterocapsa rotundata	present	present		
Karenia				present
Karenia mikimotoi			present	
Peridiniales			present	
Phalacroma rotundatum	present	present	present	
Polykrikos schwartzii	present			
Prorocentrum micans	present	present	common	present
Protoperidinium			present	
Protoperidinium bipes	present		present	
Protoperidinium brevipes			present	
Protoperidinium depressum		present		
Scrippsiella GRP		present	present	
Torodinium robustum				present
Tripos furca	present			
Tripos fusus	present	common	common	common
Tripos lineatus	present	present	present	
Tripos longipes	common	common	present	present
Tripos macroceros		present	present	present
Tripos muelleri	present	present	present	
Emiliania huxleyi	common	present	present	common

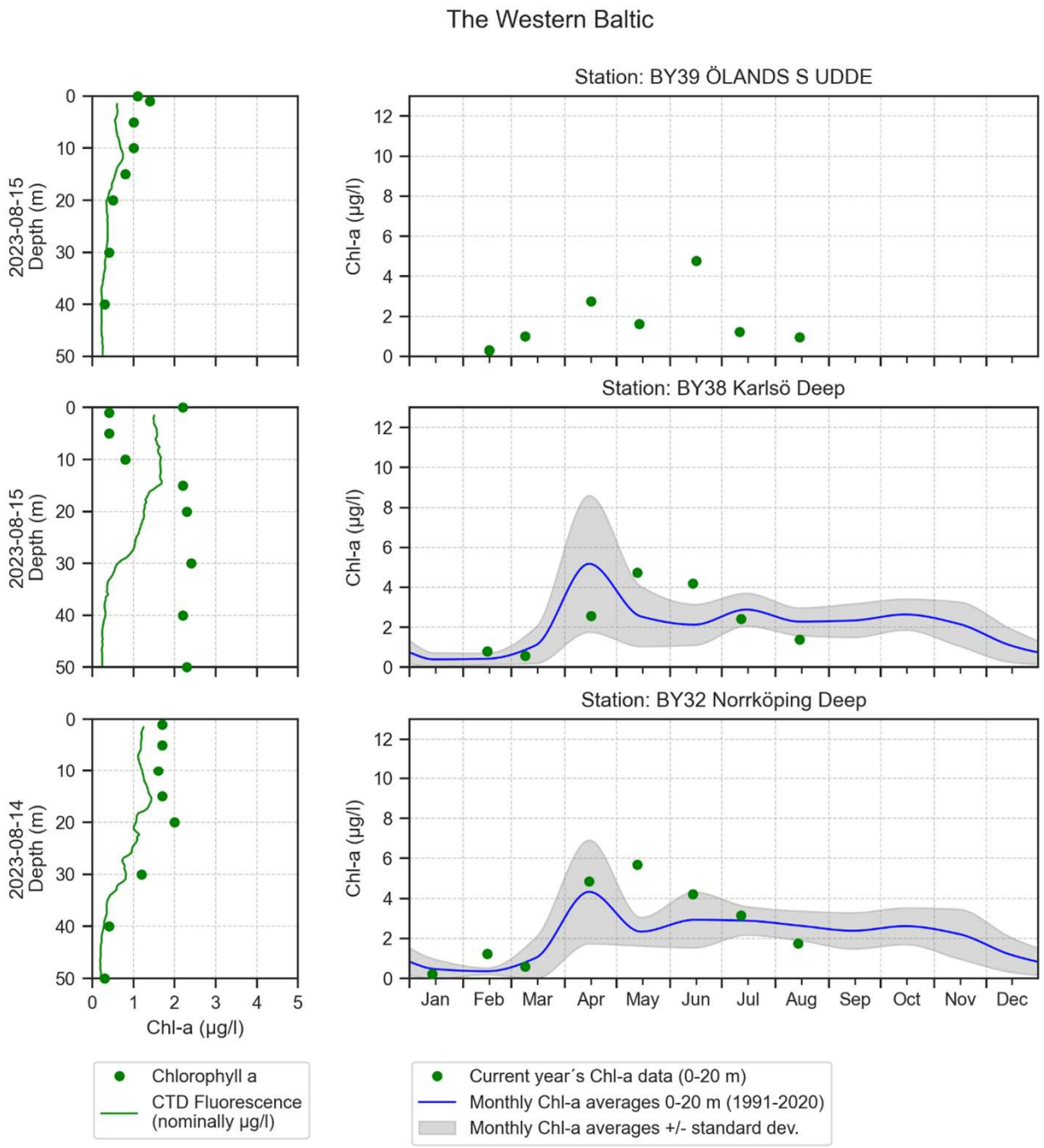
Selection of observed species	BY5	BY2	BCSIII-10	BY15	BY29	BY31	BY38	BY39
Red=potentially toxic species	12/8	12/8	13/8	13/8	14/8	14/8	15/8	15/8
Hose 0-10 m	presence	presence	presence	presence	presence	presence	presence	presence
Ciliophora		present	present	present	present	present	present	present
Centrales			present	present	present		present	
Cerataulina pelagica	present							
Chaetoceros castracanei			present	common		present	present	present
Chaetoceros danicus					present			
Chaetoceros subtilis	present	present						
Chaetoceros throndsenii	present	present						
Coscinodiscus				present				
Cylindrotheca closterium	present	present						present
Dactyliosolen fragilissimus	common	common						
Licmophora		present						
Pennales						present		present
Rhizosolenia hebetata f. semispina		present						
Skeletonema marinoi	present	present						
Thalassionema nitzschioides		present						
Dinobryon		present						
Dinobryon	present							
Cryptomonadales	present	present	present	common	present	present		present
Aphanizomenon flosaquae	common	common	present	common	common	common	common	present
Aphanocapsa		present						present
Dolichospermum		present						
Dolichospermum								present
Lemmermanniella								common
Nodularia spumigena	present	present				present		
Planktolyngbya								present
Pseudanabaena		present	present					
Pseudanabaena	present			present		present	present	
Snowella						present		present
Amphidinium crassum							present	
Dinophysis norvegica				present	present			present
Gymnodiniales	present		present	common		present	present	present
Gyrodinium flagellare	present	present						
Heterocapsa rotundata	common	present						present
Peridiniales				present				
Scrippsiella		present						
Tripos muelleri		present						
Ebria tripartita	present	present			present	present	present	present
Eutreptiella	present	present				present		present
Mesodinium rubrum	present		present	present	present	present	present	present
Helicostomella subulata			present	present	present	present	present	
Prymnesiales	present							present
Cymbomonas tetramitiformis	present	present						
Pyramimonas	present			present		present		present
Oocystis			present	present	present	present		
Binuclearia lauterbornii						present		present


The Skagerrak
Station: Å17
Station: Å15
Station: Å13
Station: Släggö
Station: P2
2023-08-10
2023-08-11
Depth (m)
Chl-a (µg/l)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Chlorophyll a
CTD Fluorescence (nominally µg/l)
Current year´s Chl-a data (0-20 m)
Monthly Chl-a averages 0-20 m (1991-2020)
Monthly Chl-a averages +/- standard dev.


The Kattegat and The Sound
Station: Fladen
Station: N14 Falkenberg
Station: Anholt E
Station: W Landskrona
2023-08-11
Depth (m)
2023-08-16 (circles)
2023-08-11 (triangles)
Depth (m)
Chl-a (µg/l)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Chlorophyll a
CTD Fluorescence
(nominally µg/l)
Current year´s Chl-a data (0-20 m)
Monthly Chl-a averages 0-20 m (1991-2020)
Monthly Chl-a averages +/- standard dev.


The Southern Baltic
Station: BY1
Station: BY2 Arkona
Station: BY4 Christiansö
Station: BY5 Bornholm Deep
2023-08-12
Depth (m)
Chl-a (µg/l)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Chlorophyll a
CTD Fluorescence (nominally µg/l)
Current year´s Chl-a data (0-20 m)
Monthly Chl-a averages 0-20 m (1991-2020)
Monthly Chl-a averages +/- standard dev.


The Eastern Baltic
Station: BCS III-10
Station: BY10
Station: BY15 Gotland Deep
Station: BY20 Fårö Deep
2023-08-13
Depth (m)
Chl-a (µg/l)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Chlorophyll a
CTD Fluorescence (nominally µg/l)
Current year´s Chl-a data (0-20 m)
Monthly Chl-a averages 0-20 m (1991-2020)
Monthly Chl-a averages +/- standard dev.



Om klorofylldiagrammen

Klorofyll *a* är ett mått på mängden växtplankton. Prover tas från ett antal djup. Data presenteras både från de fasta djupen och som medelvärden 0–20 m. Utöver resultaten från laboratorieanalyserna av vattenprover mäts klorofyll *a* som fluorescens från ett automatiskt instrument som sänks ned från fartyget. På så sätt kan djupt liggande, ibland tunna lager av växtplankton observeras.

About the chlorophyll graphs

Chlorophyll *a* is sampled from several depths. Data are presented both from the discrete depths and as an average 0-20 m. In addition to the laboratory analysis from the water samples chlorophyll *a* fluorescence is measured in continuous depth profiles from the ship. This is a way to observe thin layers of phytoplankton occurring below the surface.

Om AlgAware

SMHI genomför månatliga expeditioner i Östersjön och Västerhavet. Resultat, baserade på semikvantitativ mikroskopanalys av planktonprover samt klorofyllmätningar, presenteras kortfattat i denna rapport. Information från SMHIs satellitövervakning av cyanobakterieblomningar finns under perioden juni–augusti på smhi.se/vader/observationer/algsituationen/algae. Resultat från provtagningarna kan hämtas från SMHIs databas på sharkweb.smhi.se/hamta-data/. Hydrografiska data läggs ut varje månad, växtplanktondata läggs ut en gång per år.

About AlgAware

SMHI carries out monthly cruises in the Baltic Sea, the Kattegat and the Skagerrak. Results from semi-quantitative microscopic analysis of phytoplankton samples as well as chlorophyll measurements are presented in brief in this report. Information from SMHIs satellite monitoring of cyanobacterial blooms are found at smhi.se/en/weather/observations/the-algae-situation/algae during the period June-August. Results from the expeditions are found in the SMHI database at sharkweb.smhi.se/hamta-data/. Hydrographic data are published monthly, phytoplankton data are published once a year.

Översikt över några potentiellt skadliga alger och det aktuella giftets effekt.
Overview of potentially harmful algae and effects of toxins.
2003, UNESCO Publishing, Manual on harmful marine microalgae

Art/Species	Gift/Toxin	Eventuella symptom	Clinical symptoms
Alexandrium spp.	Paralytic shellfish poisoning (PSP)	**Milda symptom:** Inom 30 min: Stickningar eller en känsla av bedövning runt läpparna, som sprids gradvis till ansiktet och nacken; stickningar i fingertoppar och tår; Huvudvärk; yrsel, illamående, kräkningar, diarré **Extrema symptom:** Muskelförlamning; andningssvårigheter; känsla av att kvävas; Man kan vara död inom 2-24 timmar efter att ha fått i sig giftet, på grund av att andningsmuskulaturen förlamas.	**Mild case:** Within 30 min: Tingling sensation or numbness around lips, gradually spreading to face and neck; prickly sensation in fingertips and toes; headache, dizziness, nausea, vomiting, diarrhoea. **Extreme case** Muscular paralysis; pronounced respiratory difficulty; choking sensation; death trough respiratory paralysis may occur within 2-24 hours after ingestion.
Dinophysis spp.	Diarrhetic shellfish poisoning (DSP)	**Milda symptom:** Efter cirka 30 minuter till några timmar: yrsel, illamående, kräkningar, diarré, magont **Extrema symptom:** Upprepad exponering kan orsaka cancer	**Mild case:** Within 30 min-a few hours: Dizziness, nausea, vomiting, diarrhoea, abdominal pain. **Extreme case:** Repeated exposure may cause cancer.
Pseudo- nitzschia spp.	Amnesic shellfish poisoning (ASP)	**Milda symptom:** Efter 3-5 timmar: yrsel, illamående, kräkningar, diarré, magkramper **Extrema symptom:** Yrsel, hallucinationer, förvirring, förlust av korttidsminnet, kramper	**Mild case:** Within 3-5 hours: dizziness, nausea, vomiting, diarrhoea, abdominal cramps. **Extreme case:** Dizziness, hallucinations, confusion, loss of memory, cramps.
Chaetoceros concavicornis/ C. convolutus	Mechanical damage through hooks on setae	**Låg celltäthet:** Ingen påverkan. **Hög celltäthet:** Fiskens gälar skadas, fisken dör.	**Low cell numbers:** No effect on fish. **High cell numbers:** Fish death due to gill damage.
Pseudochattonella spp.	Fish toxin	**Låg celltäthet:** Ingen påverkan. **Hög celltäthet:** Fiskens gälar skadas, fisken dör.	**Low cell numbers:** No effect on fish. **High cell numbers:** Fish death due to gill damage.

Kartan på framsidan visar viktat medelvärde för klorofyll *a*, µg/l (0–10 m) vid de olika stationerna. Pil upp eller ned indikerar om resultatet är över eller under en standardavvikelse från medel. Medel är beräknat utifrån aktuell månad under perioden 1991–2020. Förekomst av skadliga alger vid stationer där arter analyseras markeras med symbol.

The map on the front page shows weighted mean of chlorophyll *a*, µg/l (0-10 m) at sampling stations. The arrow up or down indicate whether the result is above or below one standard deviation from mean. The mean value is calculated using results from the current month during the period 1991-2020. Presence of harmful algae at stations where species analysis is performed is shown with a symbol.

SMHI

Havs och Vatten myndigheten