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Oceanographic Unit
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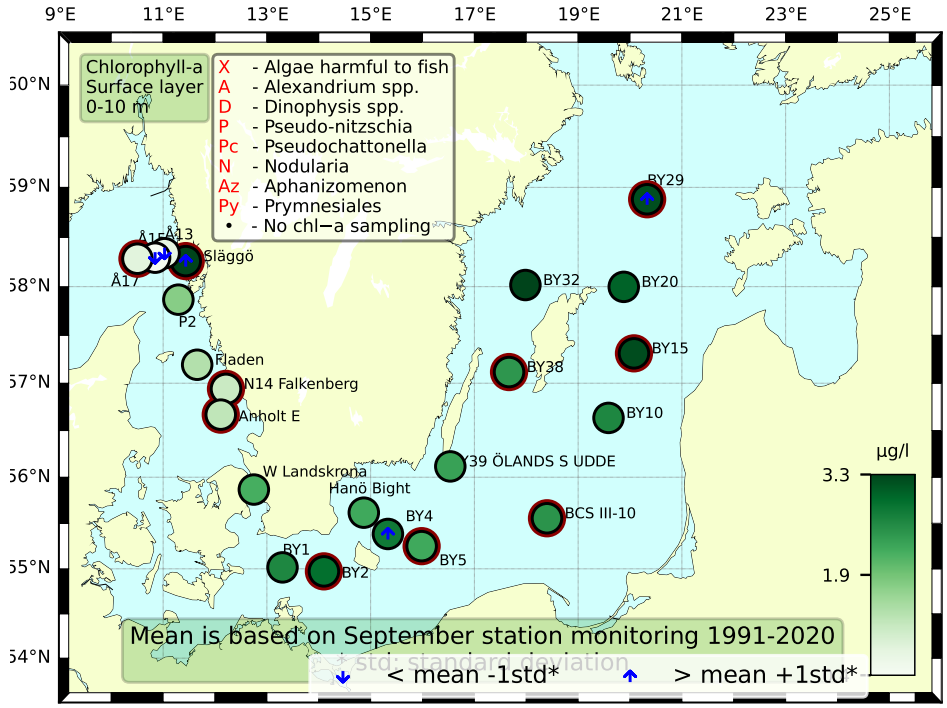
AlgAware
ALGAL SITUATION IN
MARINE WATERS SURROUNDING SWEDEN

Dnr: S/Gbg-2023-115

Sammanfattning
Septemberexpeditionens högsta antal arter noterades vid Släggö och dinoflagellaterna *Scrippsiella*-gruppen och *Ensiculifera carinata* var talrika. De totala cellantalen var dock generellt sett låga vid alla västkuststationer. Det fanns flera arter av dinoflagellater än av kiselalger i proverna och ett fåtal potentiellt giftiga arter förekom i låga cellantal. Relativt höga cellantal av kiselalgen *Pseudosolenia calcar-avis* fanns vid alla stationer förutom Å17. Klorofyll uppmätt vid de enskilda djupen var förhöjt ned till tio meter vid Släggö, men de integrerade värdena var inom det normala för månaden vid alla stationer i Västerhavet.

Diversiteten och cellantalen av växtplankton var normala vid alla stationer i Egentliga Östersjön. Mängden av de tre sommarblommande filamentösa cyanobakterierna var fortfarande ganska höga i de södra delarna medan enbart *Aphanizomenon flosaquae* återfanns vid de övriga delarna av Östersjön. Diversitet och abundans av kiselalger var generellt låg vid samtliga stationer och av dinoflagellater noterades mest gymnodiniales och *Heterocapsa rotundata*, även om enstaka potentiellt toxinbildande arter fanns. Bland övriga plankton var cryptomonadales, *Pyramimonas* spp. och ciliater mycket vanliga. De integrerade klorofyllhalterna (0–10 m och 0–20 m) var generellt normala för månaden vid de flesta stationerna i Egentliga Östersjön.



Abstract
The highest number of species during the September cruise was found at Släggö and the dinoflagellates *Scrippsiella*-group and *Ensiculifera carinata* were numerous. The total cell numbers were however low at all of the west coast stations. There were more dinoflagellate species than diatoms in the samples and a few species that are potentially toxic were found in low cell numbers. Relatively high cell numbers of the diatom *Pseudosolenia calcar-avis* were found at all stations except at Å17. Chlorophyll measured at distinct depths was rather high from zero to ten meters at Släggö, but all integrated concentrations were within normal for this month at all of the west coast stations.

The diversity and cell numbers of phytoplankton were normal at all stations in the Baltic Proper. The amount of the three bloom forming filamentous cyanobacteria were still quite high in the southern parts, while *Aphanizomenon flosaquae* was found at all stations. Diversity and abundance of diatoms were generally low at all stations and of dinoflagellates there were mostly gymnodiniales and *Heterocapsa rotundata*, even if some toxin producing species were found in low cell numbers. Among other plankton groups, cryptomonadales, *Pyramimonas* spp. and ciliates were very common. The integrated chlorophyll concentrations (0-10 and 0-20 m) were generally within the normal range for this month at most stations in the Baltic Proper.

Below follows a more detailed information on species composition and abundance. Species marked with * are

The Skagerrak

Å17 (open Skagerrak) 16th of September
The total cell numbers were low although the number of species was not so low. There were more dinoflagellates than diatom species, but the only group with high cell numbers were small cryptomonads. The integrated chlorophyll concentrations (0-10 and 10-20 m) were within normal for this month.

Släggö (Skagerrak coast) 15th of September
The phytoplankton diversity was high and this was the most species rich station sampled during the cruise. There were many diatom species, but an obvious bias towards dinoflagellates and among these the *Scrippsiella*-group and *Ensiculifera carinata* were numerous. The small diatoms *Chaetoceros minimus* and *Nitzschia longissima* and the large diatom *Pseudosolenia calcar-avis* were found in rather high cell numbers. Concerning toxic species, several *Dinophysis* species were present as well as the naked form of *Octactis speculum* and *Dictyocha fibula*, identified as dictyochales in the monitoring programs. The chlorophyll concentrations were somewhat elevated from the distinct depths between 0-10 meters, the integrated chlorophyll concentrations were however within normal for this month.

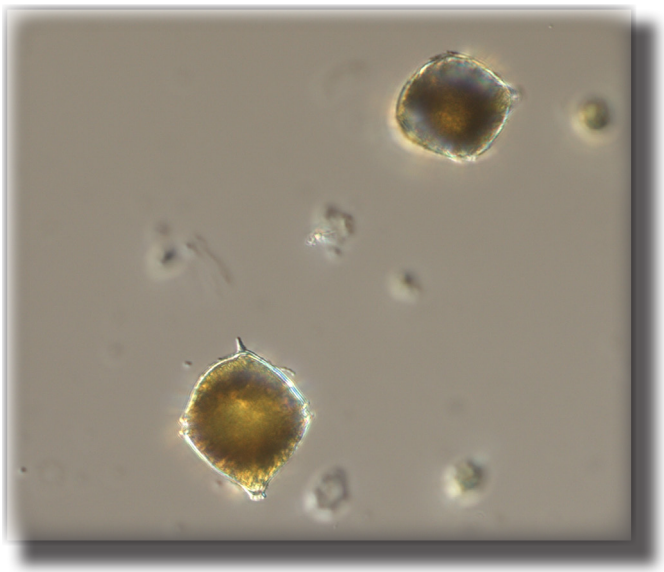


Fig 1. The dinoflagellate *Ensiculifera carinata* was numerous especially in the Skagerrak samples. Photo: A-T. Skjevik.

Fig 2. Potentially toxic species were found in very low cell numbers, the dinoflagellate *Dinophysis tripos* was one of them. Photo: A-T. Skjevik.

The Kattegat

Anholt E 16th of September
In the Kattegat samples, there was also a bias towards dinoflagellates when considering species numbers. The total cell numbers were low, even though high cell numbers were found among small taxa like ciliates, cryptomonads and the flagellate *Emiliania huxleyi*. The large diatom *Pseudosolenia calcar-avis* was however rather numerous. The integrated chlorophyll concentrations (0-10 and 10-20 m) were within normal for this month.

N14 Falkenberg 16th of September
The phytoplankton situation was more or less the same as at Anholt E with somewhat more species present. The integrated chlorophyll concentrations (0-10 and 10-20 m) were within normal for this month.

The Baltic

BY2 Arkona 17th of September

The phytoplankton diversity and abundances were high. The diatoms were not that abundant but there were some *Dactyliosolen fragilissimus*, *Nitzschia longissima* and *Pseudosolenia calcar-avis*. The dinoflagellates were more abundant with gymnodiniales, *Heterocapsa rotundata* and *Tripos muelleri* and some cells of *Dinophysis acuminata**. All of the three filamentous cyanobacteria species were still quite abundant. Among the other taxa ciliates and cryptomonadales were observed in high amounts. The integrated (0-10 m) chlorophyll concentration was above normal for this month, while the 0-20 m concentration was within normal.

BY5 Bornholm deep 18th of September

The phytoplankton diversity and abundances were moderate. Contrary to BY2, the diatoms at BY5 were mainly dominated by *D. fragilissimus* and *N. longissima* and *Chaetoceros castracanei* were present. Among the dinoflagellates, gymnodiniales and *H. rotundata* were common, but also the potentially toxin producing species *Prorocentrum cordatum**. There were less of the three filamentous cyanobacteria than at BY2, but they were all present. Among the other taxa ciliates and cryptomonadales were observed in quite high amounts. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

BCSIII-10 18th of September

The phytoplankton diversity and abundances were moderate. The diatoms were represented by some *D. fragilissimus*, and a few cells of *C. castracanei* and single celled centric diatoms; centrales. There were few dinoflagellates present, mainly gymnodiniales and *H. rotundata*. Among the filamentous cyanobacteria *A. flosaquae* was present in quite high numbers together with *Pseudanabaena* sp. Ciliates, cryptomonadales, *Pyramimonas* spp., *Ebria tripartita* and *Helicostomella subulata* were observed in high cell numbers. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

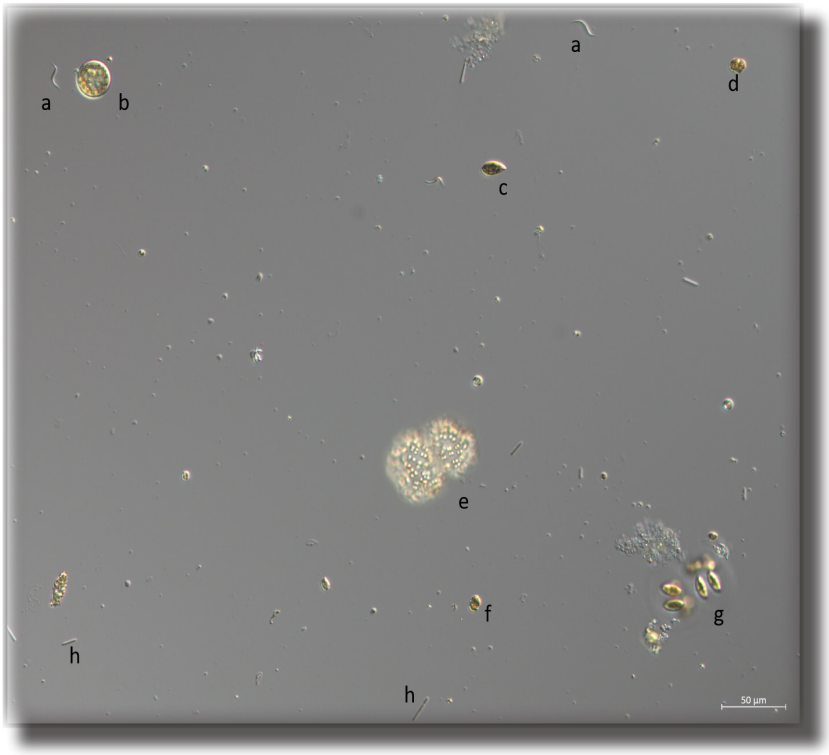


Fig 3. Overview of the plankton community at BY29 with *Monoraphidium* sp. (a), Centrales (b), Cryptomonadales (c), Gymnodiniales (d), *Snowella* sp. (e), *Heterocapsa rotundata* (f), *Oocystis* sp. (g) and *Pseudanabaena* sp. (h). Photo: M. Karlberg.

BY39 18th of September
The phytoplankton diversity and abundances were moderate. The diatoms were mainly represented by *C. castracanei*, centrales, *Chaetoceros throndsenii* and *N. longissima*. Among the dinoflagellates gymnodiniales and *H. rotundata* were present. *A. flosaquae* was present in quite high numbers together with *Pseudanabaena* sp. and some *Nodularia spumigena** filaments. There were various other taxa present, similar to the ones at BCSIII-10.

BY15 Gotland deep 19th of September
The phytoplankton diversity and abundances were high. The diatoms were few and mainly represented by *C. castracanei*, *Actinocyclus octonarius* and centrales. Gymnodiniales and *H. rotundata* were common among the dinoflagellates and there were some *Dissodinium pseudolunula* present. Among the cyanobacteria *A. flosaquae* was abundant together with filaments of *Pseudanabaena* sp. and colonies of *Snowella* sp. Among groups of relatively small plankton there was a great variety resulting in high diversity over all for this station. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

BY29 19th of September
The phytoplankton diversity and abundances were moderate. The diatoms were few and mainly represented by *A. octonarius*, centrales and *Coscinodiscus granii*. Among the dinoflagellates there were only gymnodiniales and *H. rotundata* present, but they were quite numerous. Among the cyanobacteria *A. flosaquae* was present together with filaments of *Pseudanabaena* sp. and colonies of *Snowella* sp. and *Merismopedia* sp. Various other phytoplankton were present, such as *Monoraphidium* sp. and cryptomonadales in high numbers. The integrated (0-10 m) chlorophyll concentrations was within the normal range for this month.

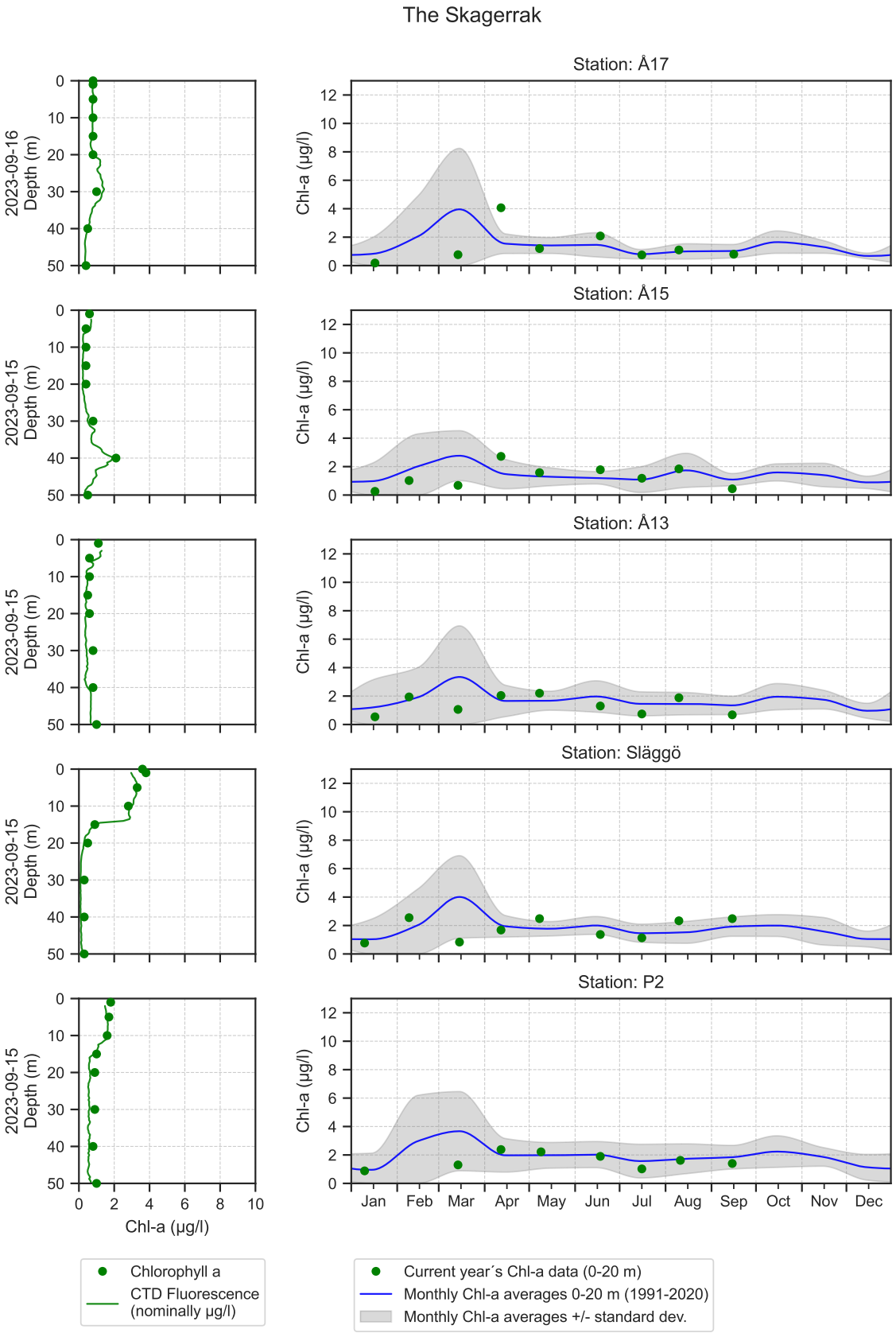
BY31 20th of September
The phytoplankton diversity was high while abundances was low. The diatoms were few and only represented by centrales and *C. castracanei*. Among the dinoflagellates there were only gymnodiniales and *H. rotundata* present, but they were quite numerous. *A. flosaquae* were very abundant and there were some *Pseudanabaena* sp. and *Snowella* sp. Among the other smaller plankton there was a great variety resulting in high diversity over all for this station.

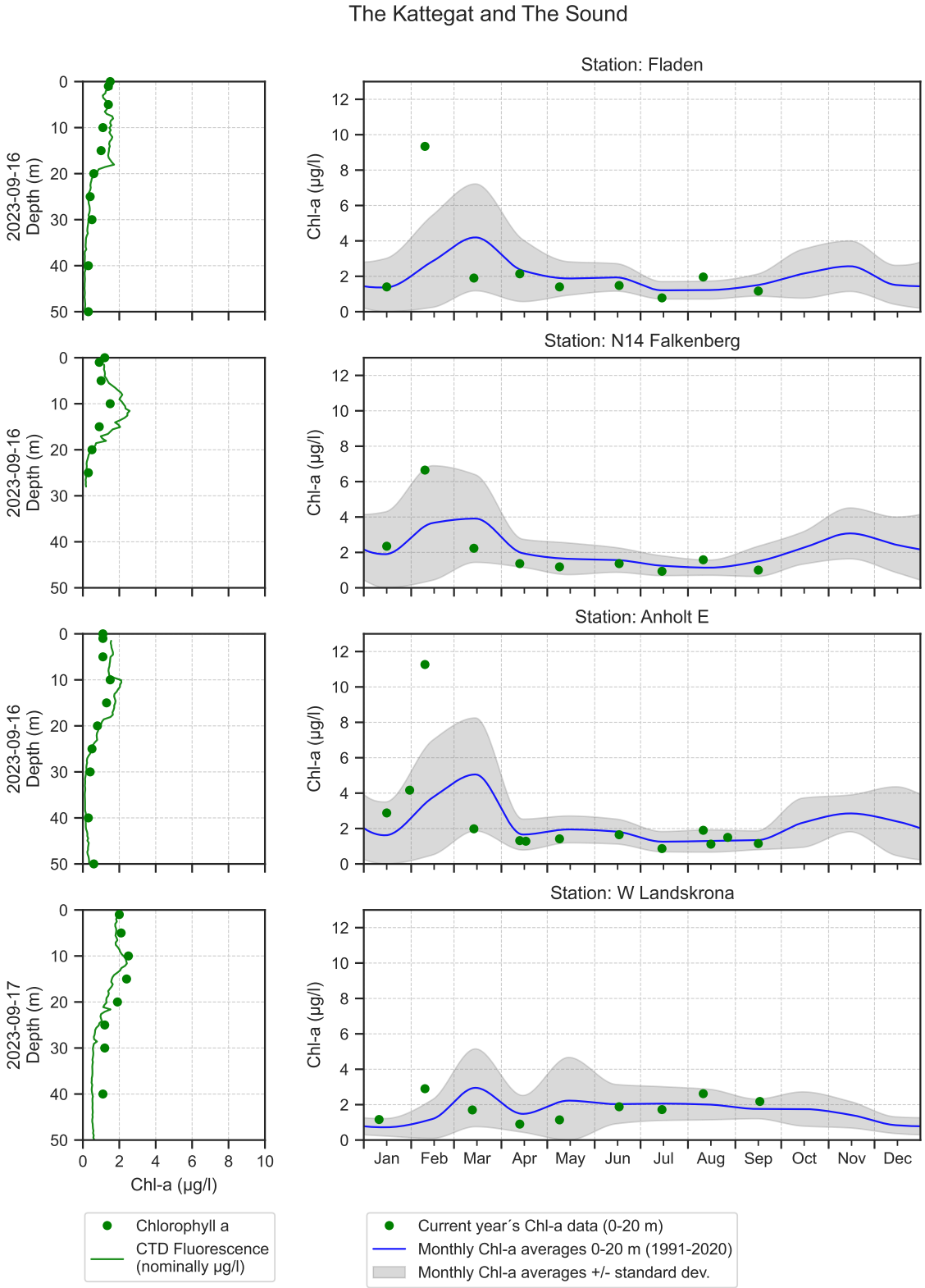
BY38 20th of September
The phytoplankton diversity and abundances were high. The diatoms were few and only represented by centrales and *C. castracanei*. Among the dinoflagellates there were only gymnodiniales and *H. rotundata* present, but they were quite numerous. Cyanobacteria were represented by a few filaments of *Aphanizomenon* sp., but *Pseudanabaena* sp. and *Lemmermanniella* sp. were quite numerous. Various other plankton were numerous, such as ciliates and cryptomonadales. The integrated (0-20 m and 0-10 m) chlorophyll concentrations were within the normal range for this month.

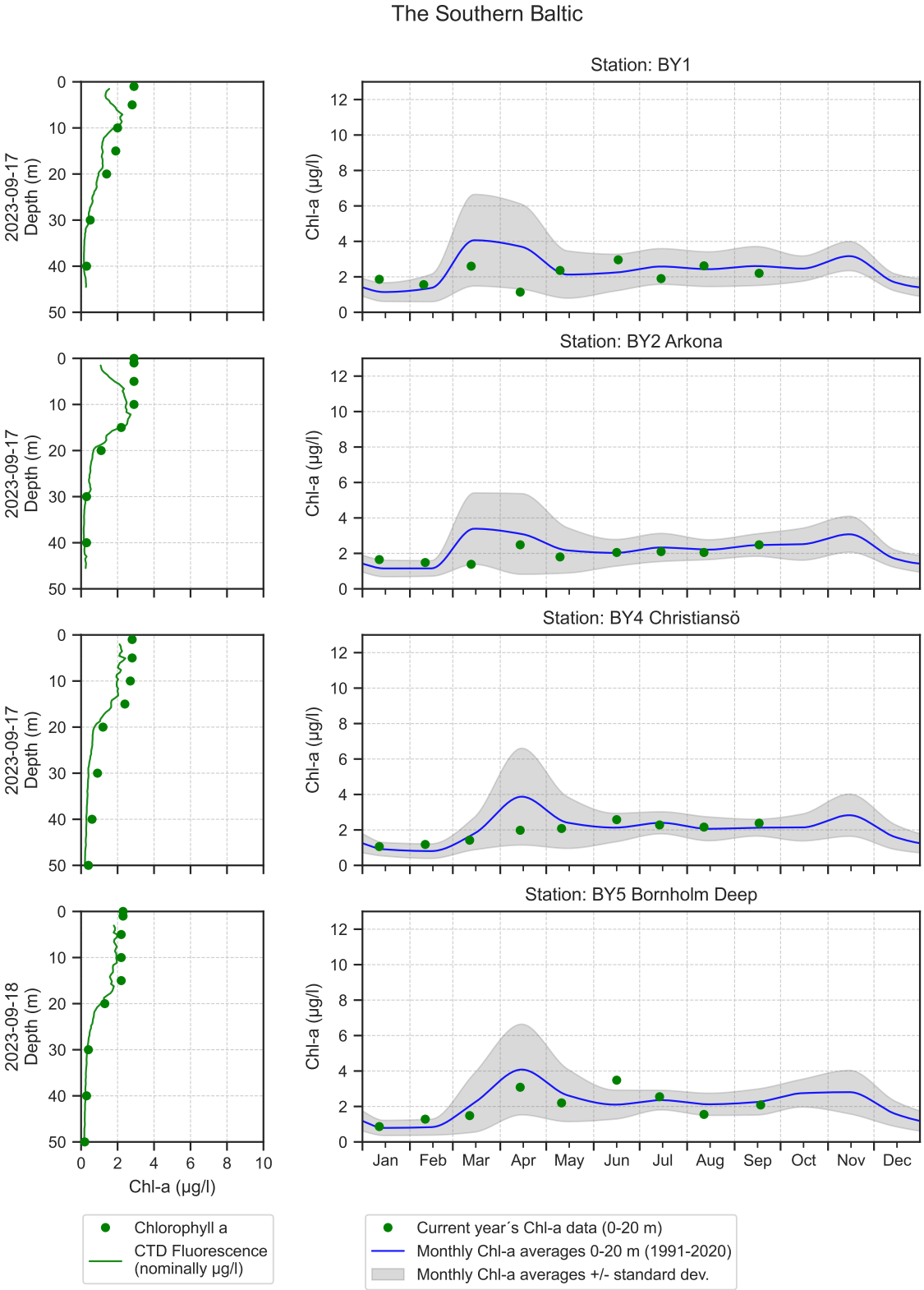
Phytoplankton analysis and text:
Ann-Turi Skjevik and Maria Karlberg.

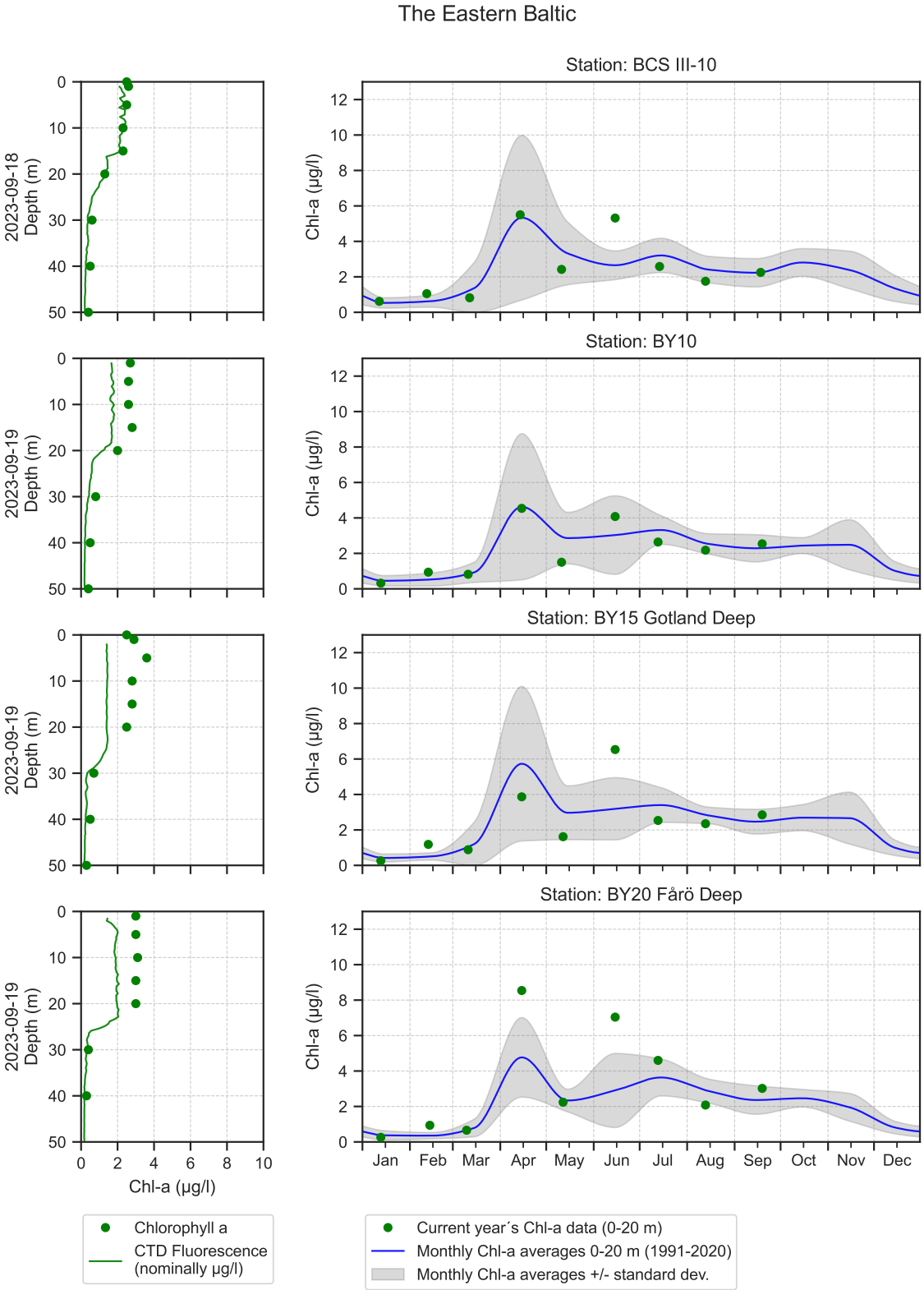
Selection of observed species	Anholt E	N14	Släggö	Å17
Red=potentially toxic species	16/9	16/9	15/9	16/9
Hose 0-10 m	presence	presence	presence	presence
Cerataulina pelagica		present	present	present
Chaetoceros				present
Chaetoceros debilis			present	present
Chaetoceros didymus			present	
Chaetoceros minimus			common	
Chaetoceros similis			present	
Chaetoceros subtilis			present	
Chaetoceros throndsenii			present	
Cylindrotheca closterium		present	present	
Dactyliosolen fragilissimus	present	present	present	present
Ditylum brightwellii			present	
Guinardia flaccida	present			
Leptocylindrus danicus	present	present		present
Leptocylindrus minimus		present	present	present
Nitzschia longissima	present	present	common	present
Proboscia alata	present		present	
Pseudo-nitzschia	present	present	present	present
Pseudo-nitzschia seriata	present			
Pseudosolenia calcar-avis	common	common	common	present
Rhizosolenia hebetata f. semispina			present	
Skeletonema marinoi		present	present	present
Thalassionema nitzschioides			present	
Alexandrium	present			
Amphidinium sphenoides				present
Azadinium			present	
Dinophysis acuminata			present	
Dinophysis norvegica		present	present	
Dinophysis tripos			present	
Ensiculifera carinata			common	present
Gymnodiniales	present	present	common	present
Gymnodinium verruculosum	present	present		present
Gyrodinium flagellare			present	present
Gyrodinium spirale				present
Heterocapsa	present	present	present	
Heterocapsa rotundata	present		present	
Karenia				present
Karenia mikimotoi		present		
Karlodinium veneficum		present		
Katodinium glaucum		present	present	present
Lessardia elongata		present		present
Lingulodinium polyedra	present	present		
Noctiluca scintillans	present		present	
Oxytoxum gracile			present	
Peridiniales		present		present
Phalacroma rotundatum	present	present	present	
Polykrikos schwartzii	present	present	present	
Prorocentrum compressum		present		
Prorocentrum cordatum			present	
Prorocentrum micans	present	present	present	present
Prorocentrum triestinum			present	
Protodinium simplex	present			
Protoperidinium	present	present		present
Protoperidinium divergens	present	present		
Protoperidinium pallidum		present		
Protoperidinium pellucidum			present	
Protoperidinium pentagonum			present	
Protoperidinium steinii		present		
Scrippsiella	present	present	common	present
Spatulodinium pseudonoctiluca			present	
Tripos furca	present	present	present	
Tripos fusus	present	present	present	
Tripos lineatus	present	present	present	
Tripos longipes	present	present		
Tripos macroceros			present	present
Tripos muelleri	present	present	present	present
Cryptomonadales	common	common	common	common
Dinobryon balticum			present	
Dinobryon faculiferum	present		present	
Apedinella radians			present	
Dictyochales			present	
Emiliania huxleyi	common	common	present	present
Prymnesiales	present	present	present	
Pyramimonas		present		
Ebria tripartita				present
Leucocryptos marina				present
Solenicola setigera				present
Telonema subtile		present	present	
Ciliophora	common	present	present	present
Favella			present	
Laboea strobila		present		
Rhizodomas tagatzi			present	
Salpingella acuminata	present	present		

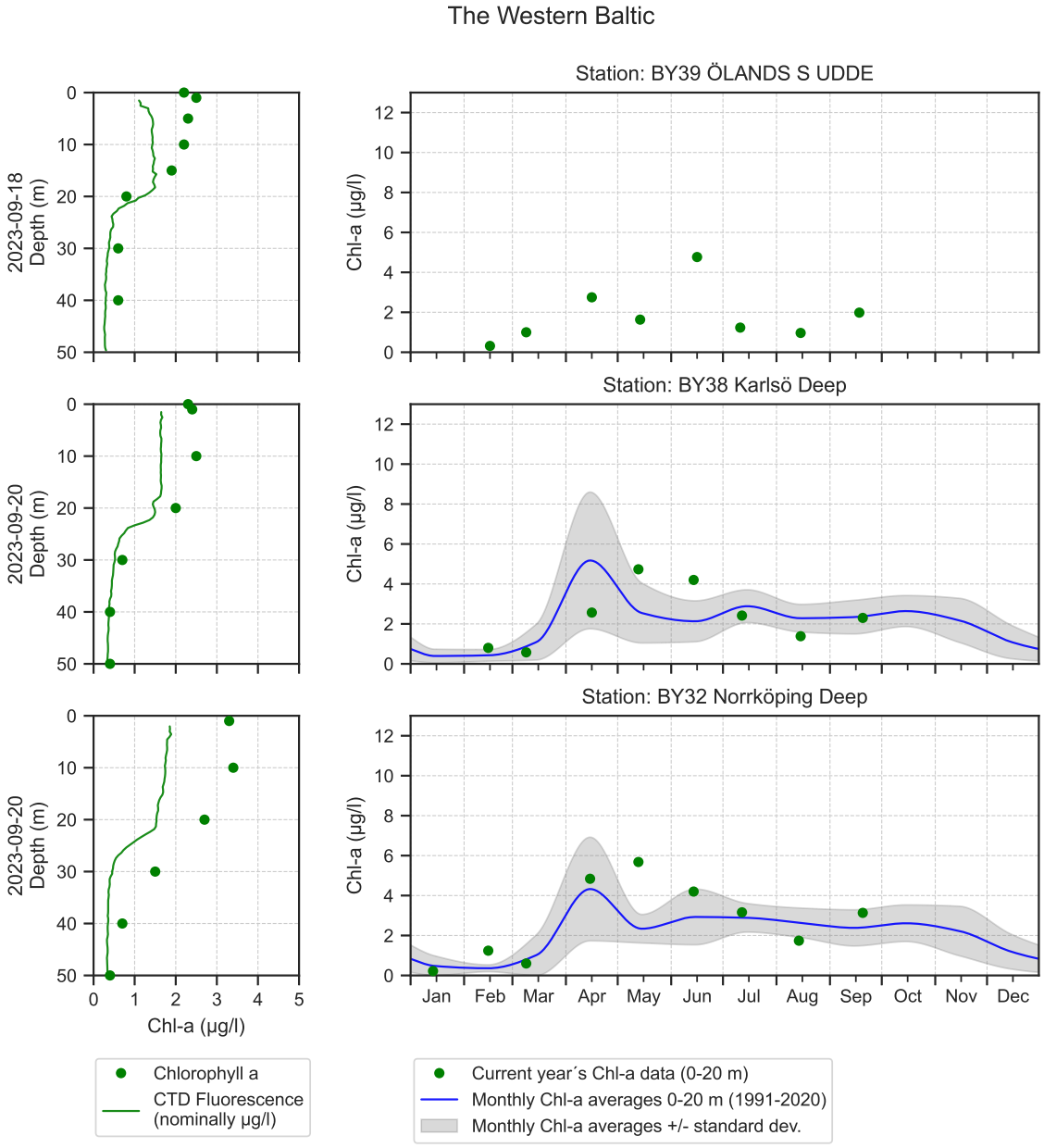
Selection of observed species	BY2	BY5	BCSIII-10	BY39	BY15	BY29	BY31	BY38
Red=potentially toxic species	17/9	18/9	18/9	18/9	19/9	19/9	20/9	20/9
Hose 0-10 m	presence	presence	presence	presence	presence	presence	presence	presence
Actinocyclus octonarius					present	present		
Centrales	present		present	present	present	common	present	present
Chaetoceros castracanei		present	present	present	present		present	common
Chaetoceros throndsenii				present				
Coscinodiscus granii						present		
Dactyliosolen fragilissimus	present	very common	common					
Nitzschia longissima	present	present		present				
Pseudosolenia calcar-avis	present							
Amphidinium crassum			present					
Dinophysis acuminata	present							
Dissodinium pseudolunula					present			
Gymnodiniales	common	common	common	common	common	common	common	common
Heterocapsa rotundata	common	common	common	present	common	common	common	present
Prorocentrum cordatum		common						
Prorocentrum micans	present							
Tripos muelleri	common	present	present					
Dinobryon faculiferum				present				
Prymnesiales							present	
Heterosigma akashiwo						present		
Monoraphidium					present	very common	present	
Oocystis				present	common	common	present	common
Pyramimonas	present	present	common	present	present	present	present	common
Cryptomonadales	very common	common	common	common	common	very common	common	very common
Telonema					present		present	
Pseudopedinella					common		present	
Eutreptiella			present	present			present	
Aphanizomenon	common	present	common	common	common	present	common	present
Aphanizomenon flosaquae	very common	common	present	common	common		very common	
Dolichospermum	very common	present						
Lemmermanniella								common
Merismopedia						present		
Nodularia spumigena	present	present	present	present				
Pseudanabaena	present	common	very common	common	common	very common	common	common
Snowella					common	common	present	
Ebria tripartita		present	present	present	common		present	
Paulinella ovalis							present	
Ciliophora	very common	common	common	common	common	common	common	very common
Mesodinium rubrum							present	present
Helicostomella subulata			present	present	present		present	present


The Skagerrak
Station: Å17
Station: Å15
Station: Å13
Station: Släggö
Station: P2
2023-09-16
2023-09-15
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
2023-09-16
2023-09-17
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
2023-09-17
2023-09-18
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
2023-09-18
2023-09-19
2023-09-19
2023-09-19
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 fluorescence is measured in continuous depth profiles from the ship. This is a way to observe thin layers of phytoplankton occuring 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 algblomningar finns under perioden juni-augusti på www.smhi.se. Resultat från provtagningarna kan hämtas från SMHI:s databas på sharkweb.smhi.se. Hydrografidata läggs ut varje månad, växtplanktondata läggs ut en gång per år.

About AlgAware

SMHI carries out monthly cruises in the Baltic and the Kattegat/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 algal blooms is found on www.smhi.se during the period June-August. Results from the expeditions are found in the SMHI database, sharkweb.smhi.se. Data are published monthly, phytoplankton data however, are published once a year.

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; headake, 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.	Diarrehetic 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- niztschia 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.

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

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 2001-2015. 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 actual month during the period 2001-2015. Presence of harmful algae at stations where species analysis is performed is shown with a symbol.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