SMHI
Oceanographic Unit
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AlgAware
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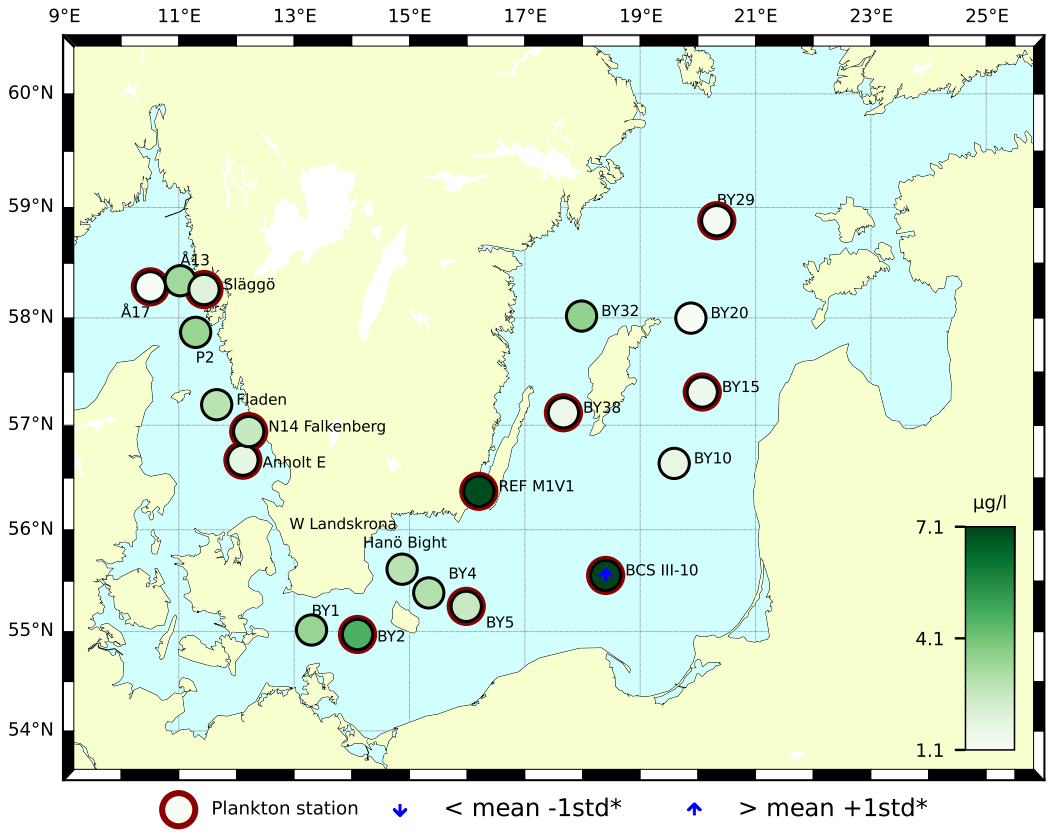
ALGAL SITUATION IN
MARINE WATERS SURROUNDING SWEDEN

Sammanfattning

I Skagerrak var de totala cellantalen höga, så även biodiversiteten. Olika arter av kiselalger dominerade det kustnära växtplanktonsamhället, framförallt kiselalgen *Skeletonema marinoi*, som är vanlig under vårblomningen. Dock var coccolithoforiden *Emiliania huxleyi* väldigt vanligt förekommande i yttre Skagerrak. I Kattegatt var både totala cellantal och biodiversiteten hög och hade en stor andel kiselalger, där *S. marinoi* fanns i högst cellantal. De integrerade klorofyllvärdena var generellt sett i de lägre områdena av vad som är normalt.

Bland Östersjöstationerna hade vårblomningen kommit igång på de södra stationerna, framförallt på BY2, REFM1V1 och BCSIII-10, vilket speglades i höga klorofyllvärden och hög andel *S. marinoi* och andra typiska vårblomningsarter. Vid de övriga stationerna visade både klorofyllvärdena och artsammansättningen och cellantalen på att vårblomningen ännu inte startat.



Abstract

Both stations in the Skagerrak had high total cell abundances and high biodiversity. Different species of diatoms dominated the coastal phytoplankton community, of which the common chain forming diatom *Skeletonema marinoi* was the most abundant. The off-shore station was, however, dominated by the coccolithophorid *Emiliania huxleyi*. The two stations in Kattegat had high total cell abundances and high biodiversity, and mainly consisted of diatom species, of which *S. marinoi* was the most abundant species. The integrated chlorophyll concentrations were, generally speaking, in the lower range of what is normal for this month.

Among the Baltic stations the spring bloom had started at the southern stations, especially at BY2, REFM1V1 and BCSIII-10, which was reflected in high chlorophyll concentrations and high amounts of *S. marinoi* and other typical spring bloom species. At the other stations both the chlorophyll concentrations and species composition indicated that the spring bloom had not started yet.

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

The Skagerrak

Å17 (open Skagerrak) **22nd of March**
The total biomass was low compared to the other west coast stations, yet the species diversity was quite high. There were less diatoms present compared to the other stations, and the coccolithophorid *Emiliania huxleyi* was very abundant. The integrated chlorophyll concentrations were within the lower range of what is normal for this month.

Släggö (Skagerrak coast) 22nd of March
The species diversity and total cell numbers were high, especially for diatoms. The chain forming diatom *Skeletonema marinoi* dominated the sample and several species of the diatom genus *Thalassiosira* were also common. The integrated chlorophyll concentrations were within the lower range of what is normal for this month.

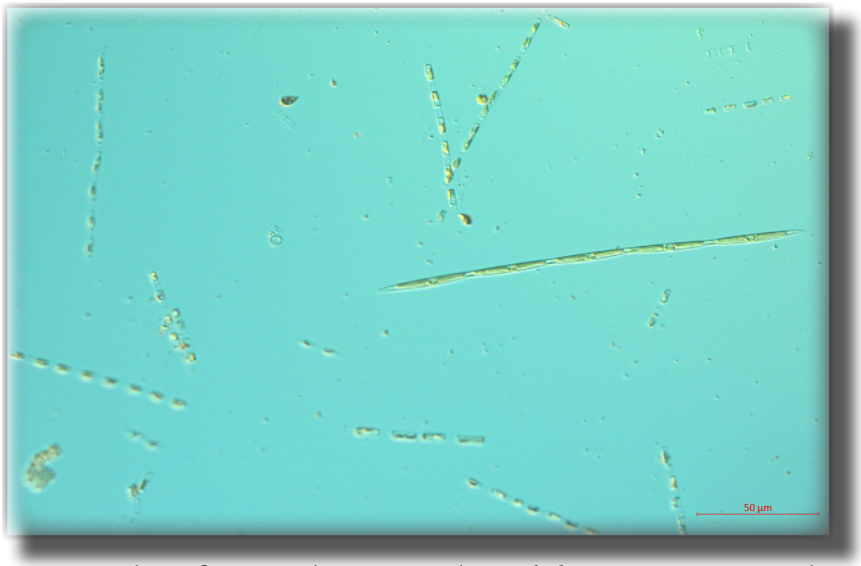


Fig. 1. Chain forming diatoms, such as *Skeletonema marinoi* and *Pseudo-nitzschia* spp. were common along the Swedish west coast. Photo: A. Torstensson.

The Kattegat

Anholt E 21st of March
The species diversity and total cell numbers were high, especially for diatoms. The chain forming diatom *S. marinoi* dominated the sample and several species of the diatom genera *Thalassiosira* and *Chaetoceros* were present, of which *Thalassiosira nordenskioeldii* was the most abundant species. The integrated chlorophyll concentrations were within the lower range of what is normal for this month.

N14 Falkenberg 21st of March
The phytoplankton situation at N14 was very similar to the ones at Anholt E and Släggö. However, both species diversity and total cell numbers were somewhat higher compared to the other stations. *S. marinoi* dominated the phytoplankton community, and several species of *Chaetoceros* were quite numerous. The integrated chlorophyll concentrations were within the normal range for this month.

The Baltic

REFM1V1 17th of March
Phytoplankton diversity was a bit low but the abundance was high with a clear dominance of *Skeletonema marinoi*, with *Thalassiosira* cf. *levanderi* as a runner up. The rest of the community consisted of *Chaetoceros wighamii*, *Thalassiosira* sp., various choanoflagellates, *Ebria tripartita* and *Mesodinium rubrum*. *Karlodinium veneficum** was present. The integrated (0-20 m) and (0-10 m) chlorophyll concentrations were high but within normal for this month. An obvious spring bloom in regards of chlorophyll concentration and phytoplankton cell numbers!

BY38 17th of March
Both phytoplankton diversity and abundance were low. The community mainly consisted of Gymnodiniales, *Eutreptiella* sp. and *M. rubrum*. The integrated (0-20 m) and (0-10 m) chlorophyll concentrations were within normal for this month.

BCSIII-10 19th of March
Both phytoplankton diversity and abundance were high. *S. marinoi* dominated the sample but *C. wighamii*, *Melosira arctica*, *Heterocapsa rotundata* and various choanoflagellates were in high numbers. Other species from both *Chaetoceros* and *Thalassiosira* were common, as well as the typical spring species *Peridiniella catenata*. The integrated (0-20 m) and (0-10 m) chlorophyll concentrations were higher than normal for this month. An obvious spring bloom in regards of chlorophyll concentration and phytoplankton cell numbers and diversity!

BY15 19th of March
Both phytoplankton diversity and abundance were low. The phytoplankton community mainly consisted of *P. catenata*, *Eutreptiella* sp., ciliates and *M. rubrum*. The filamentous cyanobacterium *Aphanizomenon flosaquae* were present in quite high numbers. The integrated (0-20 m) and (0-10 m) chlorophyll concentrations were within normal for this month.

BY5 20th of March
Phytoplankton diversity was quite high while abundance was low. The phytoplankton community mainly consisted of *Chaetoceros subtilis*, *S. marinoi*, *T.* cf. *levanderi*, *H. rotundata*, *P. catenata*, Cryptomonadales, *Eutreptiella* sp., choanoflagellates, ciliates and *M. rubrum*. The toxin producing species *Dinophysis acuminata** was present. Both the integrated (0-20 m) and (0-10 m) chlorophyll concentrations were within normal for this month.

BY2 20th of March
Both phytoplankton diversity and abundance were moderate. *S. marinoi* were present in quite high numbers, while the rest of the community consisted of *T.* cf. *levanderi*, *Gymnodiniales*, *H. rotundata*, *Cryptomonadales*, choanoflagellates, ciliates, *M. rubrum* and flagellates, as well as the colony-forming cyanobacterium *Snowella* sp. Both the integrated (0-20 m) and (0-10 m) chlorophyll concentrations were high but within normal for this month.

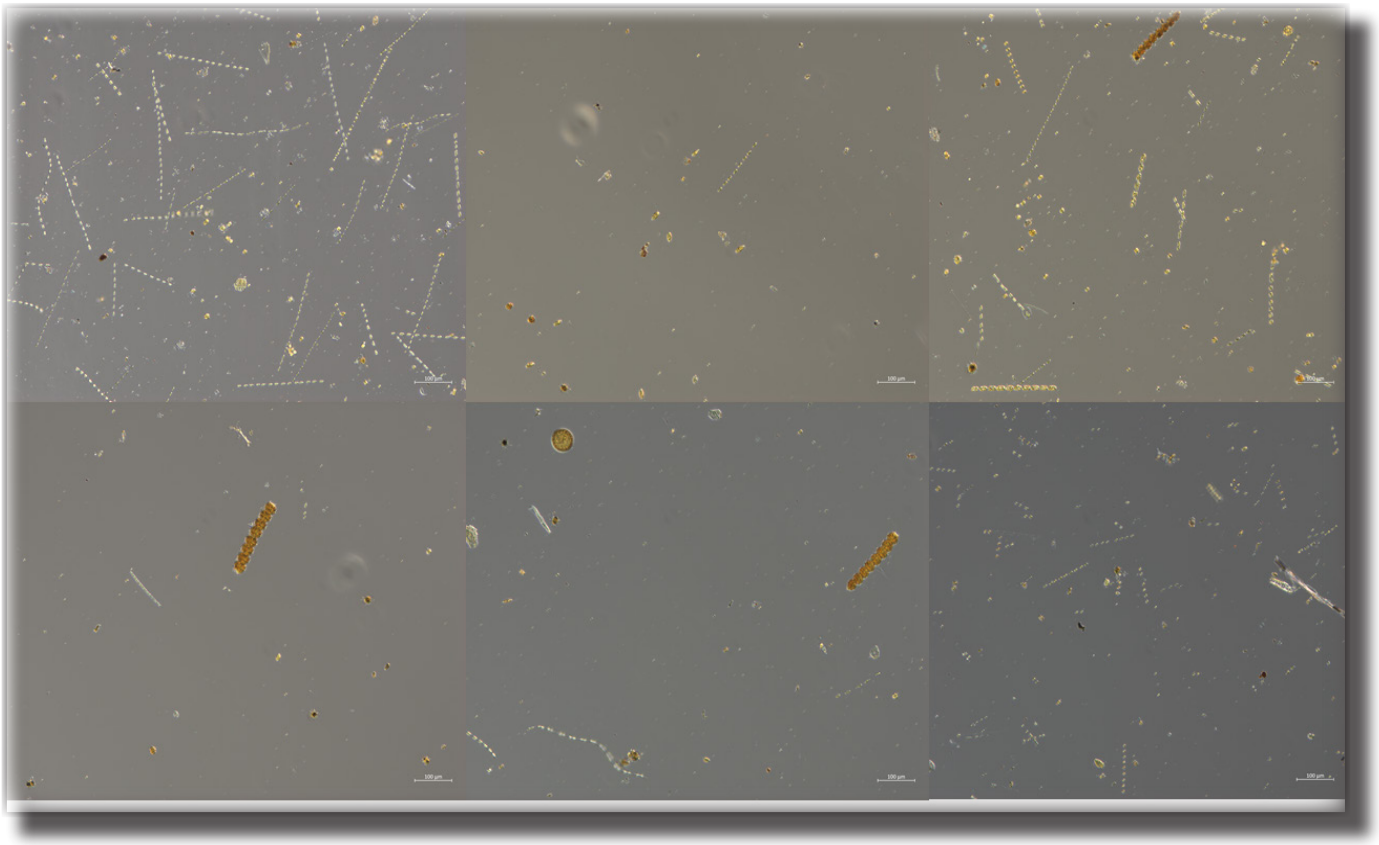
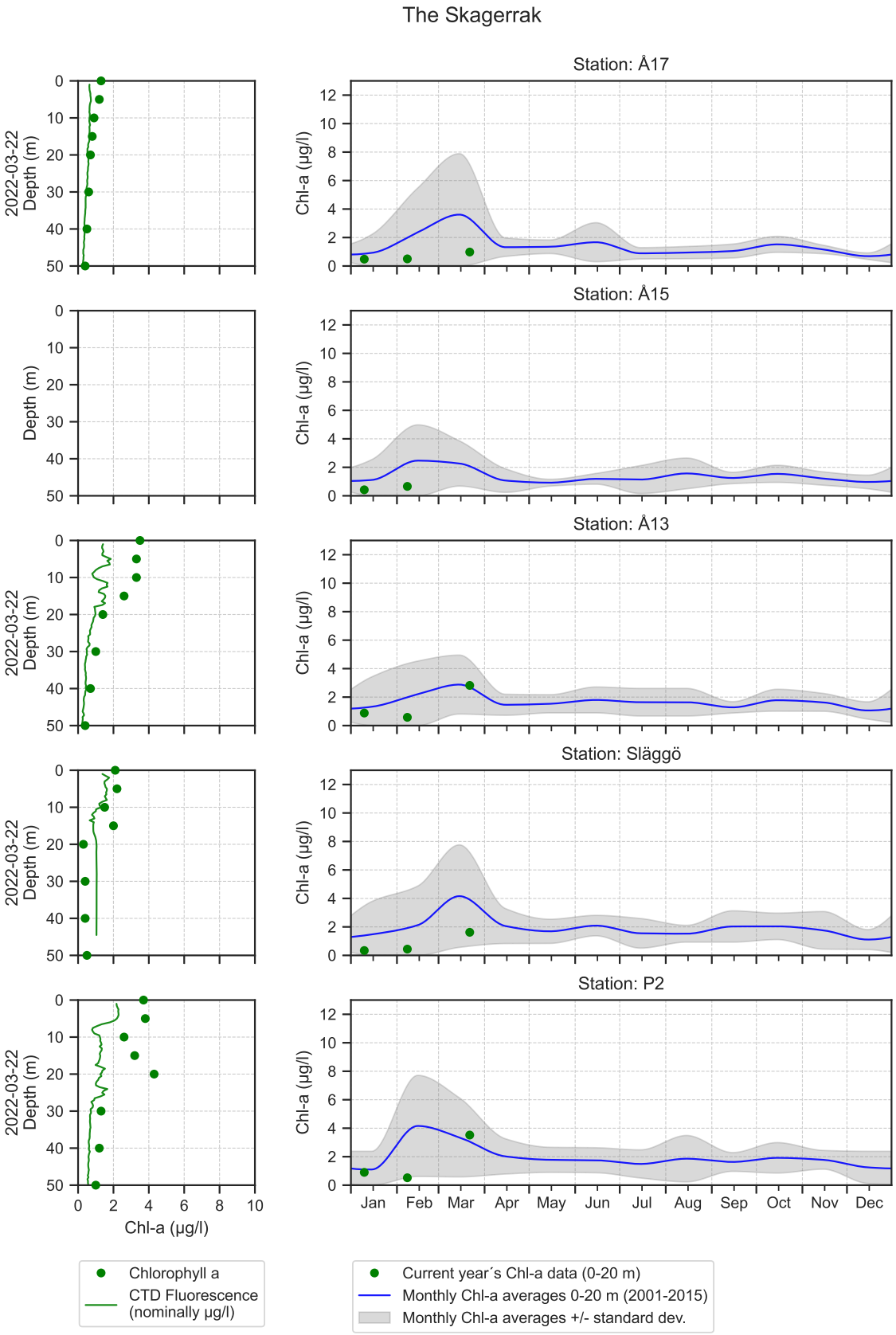


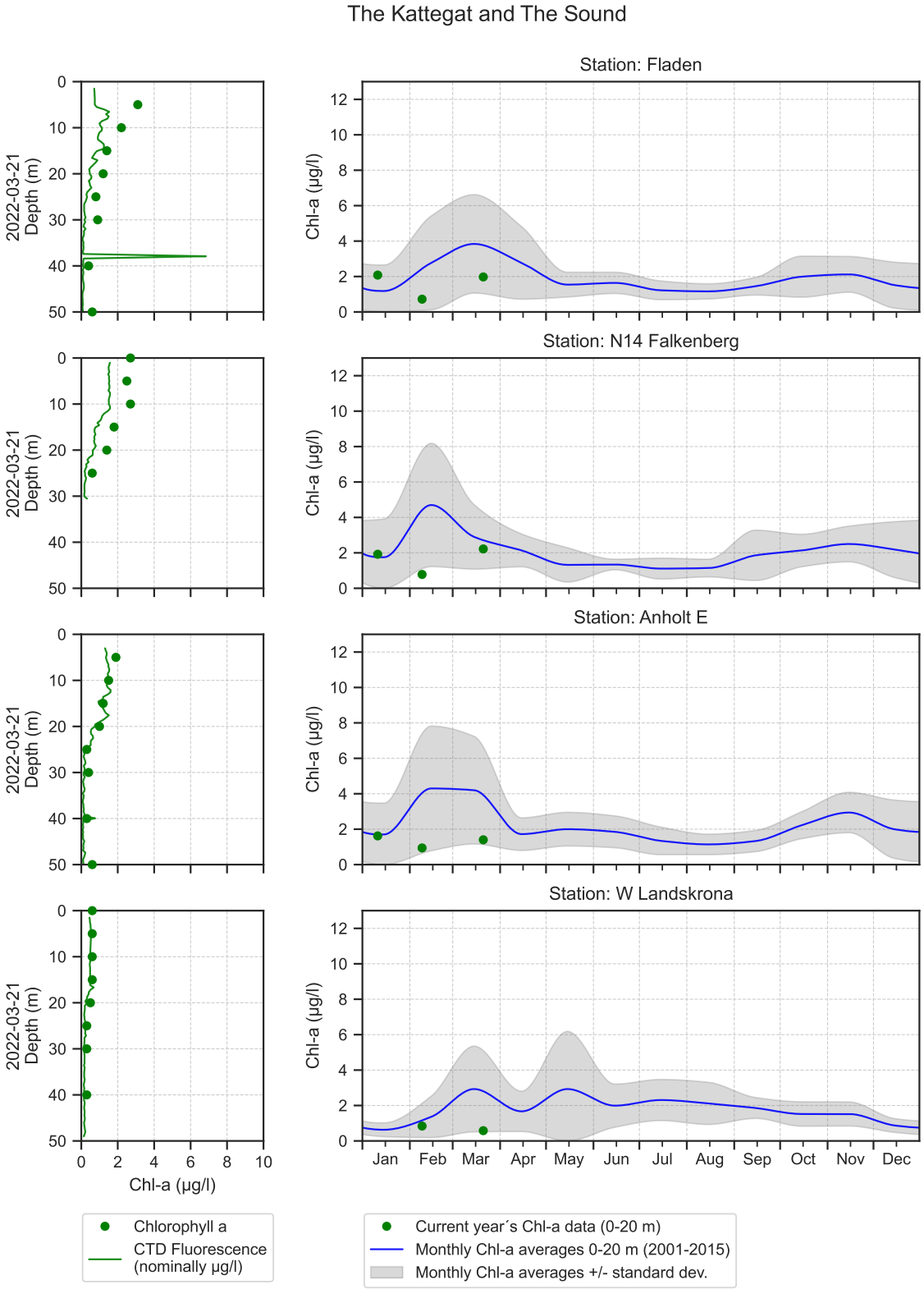
Fig. 2. All six Baltic stations photographed in 100x. From upper left to right; REFM1V1 with *Skeletonema marinoi* dominance, BY38 with some Gymnodiniales and *Eutreptiella* sp., and BCSIII-10 with high diversity of *S. marinoi*, *Melosira arctica*, *Peridiniella catenata* and many more species. From lower left to right; BY15 with *P. catenata* and filaments of *Aphanizomenon flosaquae*, BY5 with low abundance but the small *Chaetoceros subtilis* were quite numerous, and BY2 with moderate abundance of *S. marinoi* and *Thalassiosira* cf. *levanderi* among other species. Photo: M. Karlberg.

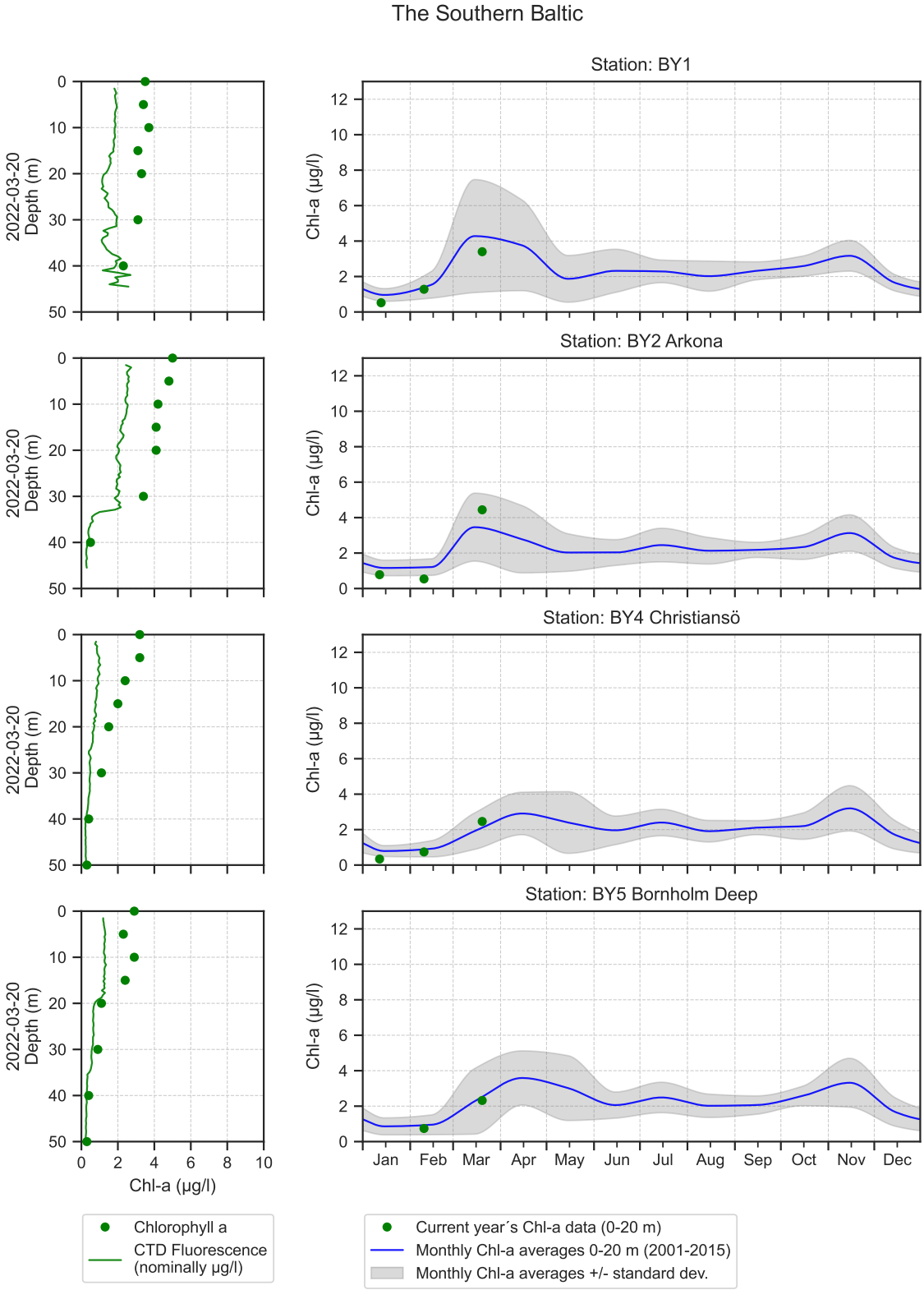
Phytoplankton analysis and text:
Maria Karlberg and Anders Torstensson.

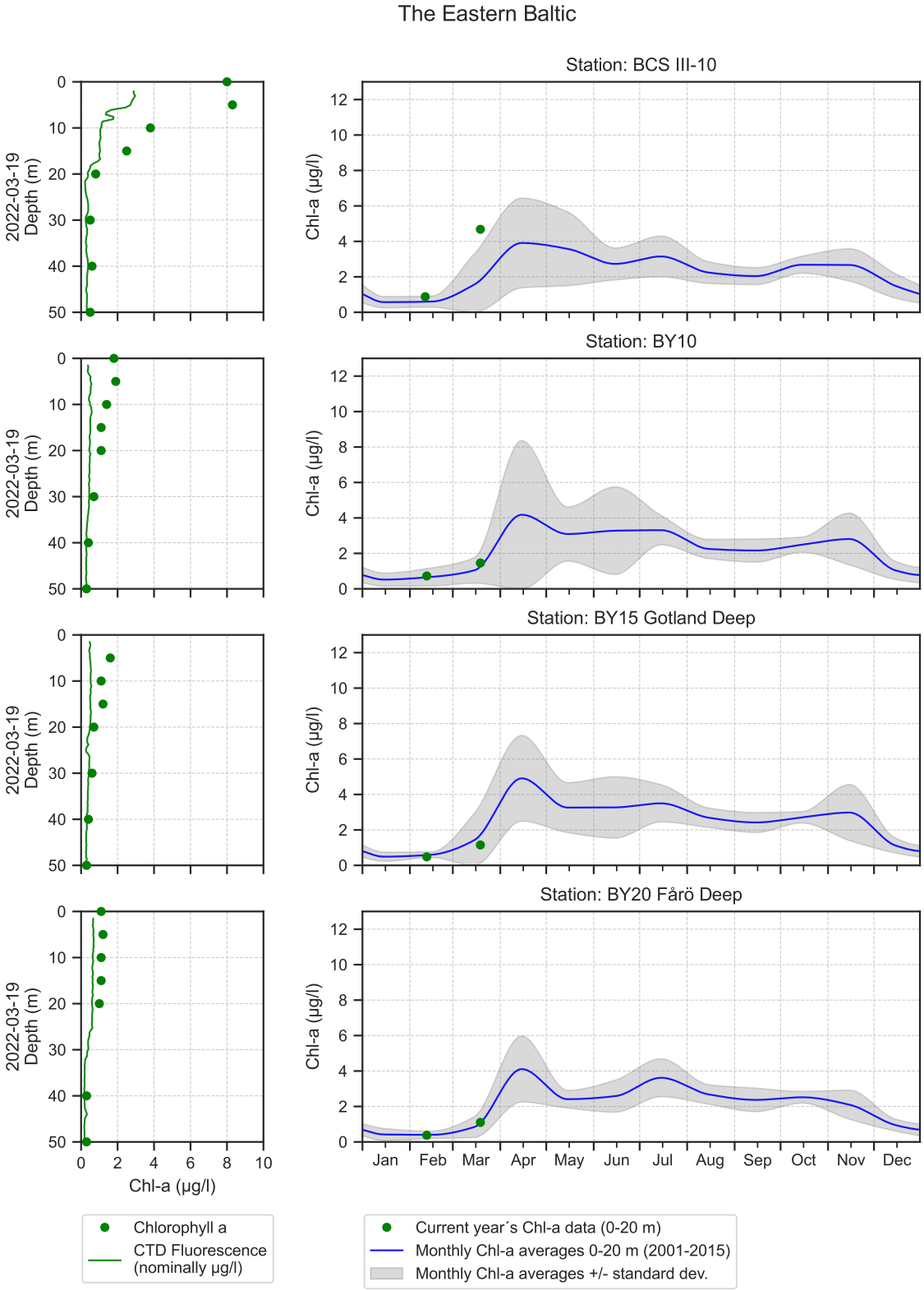
Selection of observed species	Anholt E	N14	Släggö	Å17
Red=potentially toxic species	21/3	21/3	22/3	22/3
Hose 0-10 m	presence	presence	presence	presence
Centrales	present	present	present	present
Chaetoceros	present	present		
Chaetoceros			present	present
Chaetoceros danicus	present	common	present	
Chaetoceros debilis	present	common	common	present
Chaetoceros similis			present	
Chaetoceros subtilis		present	present	
Coscinodiscus radiatus			present	
Dactyliosolen fragilissimus	present	present	present	
Guinardia delicatula	common	common	common	
Leptocylindrus minimus			present	
Nitzschia longissima				present
Pennales			present	
Proboscia alata	present			
Pseudo-nitzschia	common	present	present	common
Rhizosolenia hebetata	present		present	present
Rhizosolenia setigera			present	
Skeletonema marinoi	very common	very common	very common	common
Thalassiosira			present	
Thalassiosira anguste-lineata				present
Thalassiosira gravida		present		present
Thalassiosira nordenskioeldii	common	present	common	
Thalassiosira punctigera	present			
Cryptomonadales	present	common	present	common
Octactis speculum		present	present	present
Dinophysis acuminata	present	present	present	
Dinophysis norvegica	present	present	present	
Gymnodiniales	present	present	present	common
Gyrodinium spirale		present		present
Heterocapsa rotundata	present	present	present	
Katodinium glaucum	present	present		present
Oxytoxum gracile				present
Peridiniales	present			present
Peridiniella danica	present			present
Protoperidinium	present			
Protoperidinium			present	
Tripos longipes	present			present
Tripos muelleri	present			
Ebria tripartita	present	present	present	
Mesodinium rubrum	present			present
Emiliania huxleyi				very common
Heterosigma akashiwo		present	present	present
Unicell	common	common	common	common
Ciliophora	present	common	present	common
Flagellates	present	present	present	common

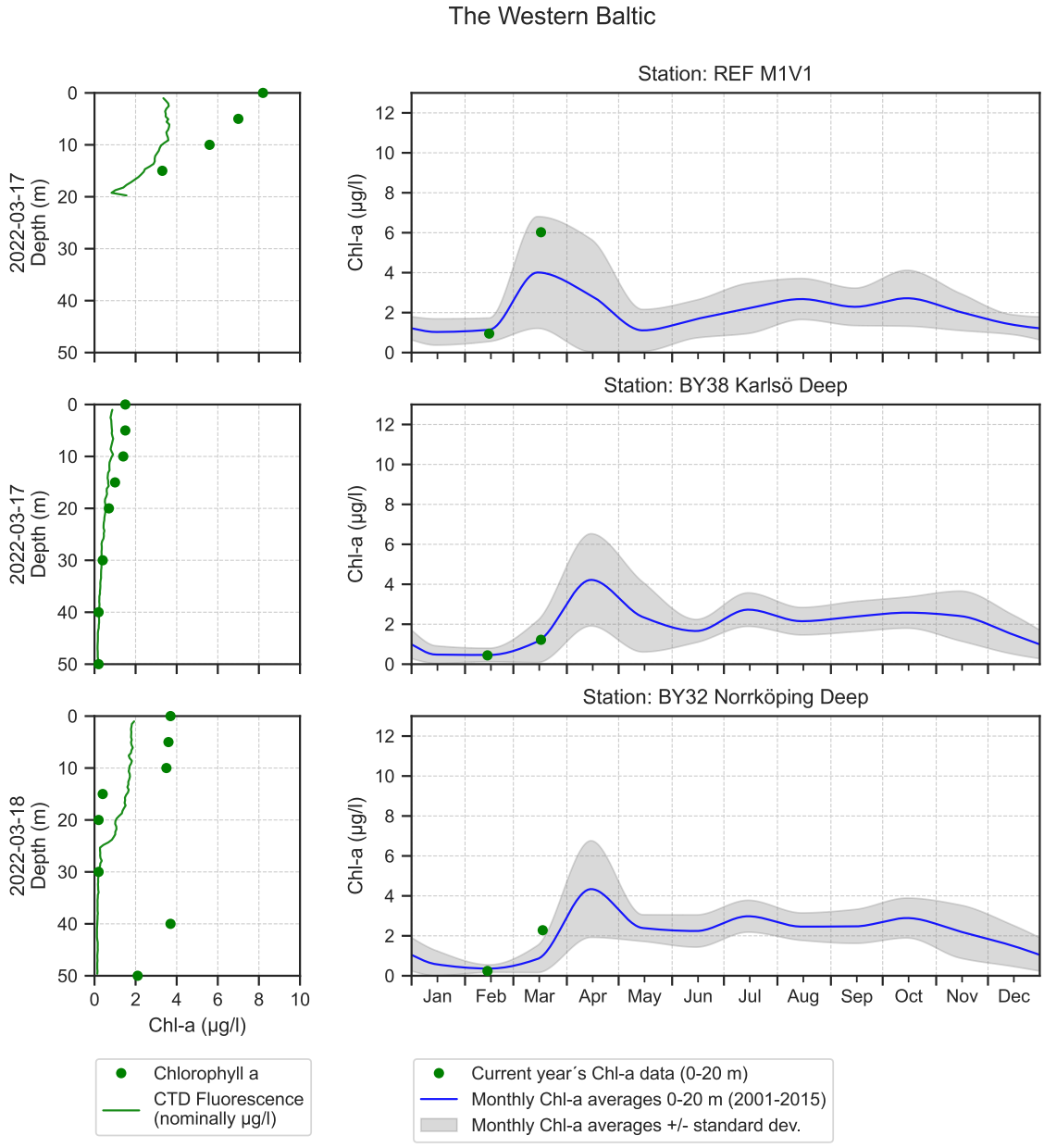
Selection of observed species	REFM1V1	BY38	BCSIII-10	BY15	BY5	BY2
Red=potentially toxic species	17/3	17/3	19/3	19/3	20/3	20/3
Hose 0-10 m	presence	presence	presence	presence	presence	presence
Asterionella formosa			present			
Aulacoseira			present			
Centrales				present	present	
Chaetoceros		present	common		present	
Chaetoceros decipiens			common			present
Chaetoceros similis	present	present	common		present	present
Chaetoceros socialis	present					
Chaetoceros subtilis		present	present		common	present
Chaetoceros wighamii	common		very common			present
Cylindrotheca closterium	present					
Melosira arctica			very common			
Navicula					present	present
Skeletonema marinoi	dominant	present	dominant	present	common	very common
Thalassiosira	common		common		present	present
Thalassiosira cf. levanderi	very common	present	common	present	common	common
Amphidinium crassum		present		present		
Amphidinium sphenoides				present		
Amylax triacantha			present			
Dinophysis acuminata					present	
Gymnodiniales	present	common	common	present	present	common
Gyrodinium spirale		present	present	present	present	
Heterocapsa rotundata	present	present	very common	present	common	common
Karlodinium veneficum	present					
Katodinium glaucum		present	present			present
Peridiniales			present	present	present	
Peridiniella catenata	present	present	common	common	common	
Protoperidinium bipes		present				
Protoperidinium cf. granii					present	
Oocystis		present		present		present
Binuclearia lauterbornii		present		present	present	present
Cryptomonadales	present	present	common	present	common	common
Eutreptiella	present	common	present	common	common	
Aphanizomenon flosaquae				common		
Merismopedia			present			
Snowella		present	common	present	present	common
Choanoflagellatea	common	present	very common		common	common
Ebria tripartita	common		common	present	present	present
Ciliophora	present	present	common	common	common	common
Mesodinium rubrum	common	common	common	common	common	common
Flagellates	present	present	present	present	present	common


The Skagerrak
Station: Å17
Station: Å15
Station: Å13
Station: Släggö
Station: P2
2022-03-22
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 (2001-2015)
Monthly Chl-a averages +/- standard dev.


The Kattegat and The Sound
Station: Fladen
Station: N14 Falkenberg
Station: Anholt E
Station: W Landskrona
2022-03-21
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 (2001-2015)
Monthly Chl-a averages +/- standard dev.


The Southern Baltic
Station: BY1
Station: BY2 Arkona
Station: BY4 Christiansö
Station: BY5 Bornholm Deep
2022-03-20
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 (2001-2015)
Monthly Chl-a averages +/- standard dev.


The Eastern Baltic
Station: BCS III-10
Station: BY10
Station: BY15 Gotland Deep
Station: BY20 Fårö Deep
2022-03-19
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 (2001-2015)
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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