

SMHI

Oceanographic Unit
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AlgAware

ALGAL SITUATION IN
MARINE WATERS SURROUNDING SWEDEN



Sampling route of the expedition in July 2020

Sammanfattning

Analyserna utfördes ombord på fartyget Svea under expeditionens gång. Vatten från integrerat djup alternativt diskreta djup har filtrerats ner på 5µm filter och analyserats med ett rättvänt mikroskop. Metoden innebär att framförallt större celler kan identifieras medan små celler är svårbestämda eller förbises i större utsträckning

Västerhavet

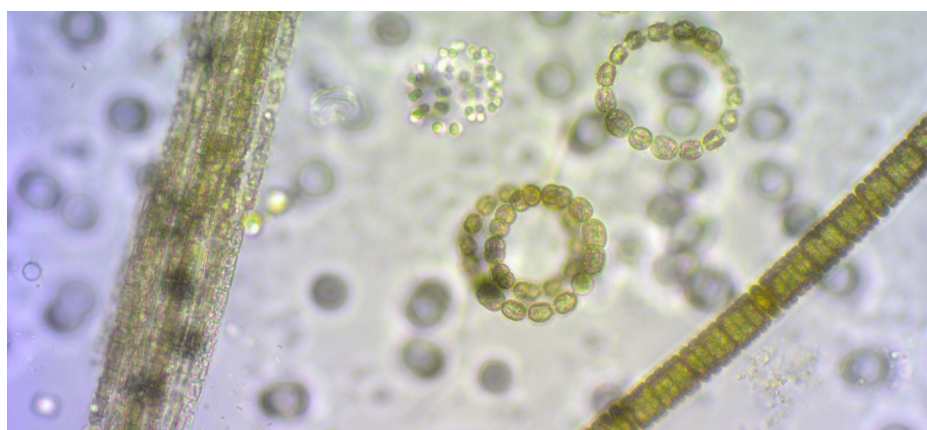
Vid alla stationer i Västerhavet var artdiversiteten och totala cellantal relativt låga. Vid samtliga stationer förekom kiselalgen *Proboscia alata* i höga cellantal. Bland Dinoflagellater var släktet *Tripes* vanligast. Framförallt i de fluorescensstoppar som återfanns var flera olika arter av släktet *Tripes* dominerande.

Östersjön

Inga heltäckande ytansamlingar återfanns utefter den södra delen av Östersjön. Vinden och därmed vågorna höll filamenten omblandade ner i vattenpelaren. De riskornslänkande aggregeringar som återfanns vid samtliga stationer innehöll framförallt *Aphanizomenon flosaquae* men även en del *Nodularia spumigena**. I den östra delen av Östersjön med start i sydöst om Gotland och upp till mitten av Gotland så tilltog ytansamlingarna i form av större stråk och små sjok av aggregeringar. Den giftiga sorten, *Nodularia spumigena* återfanns här i högre tätheter. Mellan Gotland och Öland hade vinden tilltagit lite och inge ytansamlingar syntes men riskorn i vattnet noterades. Vid provtagning vid Karlsödjupet skapade fartyget lä närmast båten och små ytansamlingar bildades från kornen inom 20-30 minuter. Kring södra Öland i Kalmar sund samt Hanöbukten så var vinden tillräckligt stark för att blanda vattnet och få eller inga tydliga riskorn syntes. Ytprover från detta område påvisade bara enstaka cyanobakteriafilament och då framför allt *Aphanizomenon*.

För att se satellittolkningar av ytansamlingar av cyanobakterier:

<https://www.smhi.se/vadret/hav-och-kust/algsituationen>



The three genera of filamentous cyanobacteria normally found in the Baltic Sea

Abstract

The analyses were made on board the ship Svea during the cruise. Water from Integrated samples or discrete depths were filtrated down to filters with 5µm pore size. The method is most suitable for identifying larger and more robust cells whereas smaller cells and fragile cells are difficult to determine taxonomically or missed to a higher degree.

West coast

All stations along the west coast had low to moderate cell numbers and biodiversity. At most stations diatoms dominated where *Proboscia alata* was most abundant. The dinoflagellates were represented by different species belonging to the genus *Tripes*. This genus was especially common in the fluorescence peaks found at about 20m at a couple of stations.

Baltic Sea

No large surface accumulations were noted in the south of the Baltic. The wind and waves kept the filaments dispersed in the watercolumn. The small grains of aggregations that were seen at all stations mainly contained *Aphanizomenon* but also some filaments of the toxic one *Nodularia spumigena**. In the eastern part of the Baltic outside the east coast of Gotland larger areas of surface accumulations were noted in form of streaks. The toxic sort *N. spumigena** was more common here. The wind increased on the way between Öland and Gotland and the aggregates were seen as grains in the watercolumn. At Karlsö deep the ship stopped the wind close to the ship and the grains quickly accumulated as small streaks at the surface. South of Öland, in Kalmar sound and Hanö bight the wind stress were high enough to keep the filaments dispersed in the watercolumn. The total concentration of filaments were overall lower in these areas and mainly *Aphanizomenon flosaquae* was found.

Please follow the link below to see interpretations of blooms from satellite images in the Baltic:

<https://www.smhi.se/vadret/hav-och-kust/algsituationen>

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

The Skagerrak

Å17 (open Skagerrak) 7th of July

Both the species diversity and total cell numbers were moderate. The dinoflagellate genus *Tripos* dominated in numbers and especially *T. fusus* and *T. macroceros* were common. The diatoms were dominated by *Proboscia alata*. A fluorescence peak was found at about 20 meters which mainly contained different species of the genus *Tripos*.

Släggö (Skagerrak coast) 7th of July

Both the species diversity and total cell numbers were moderate. Diatoms dominated in numbers and *Proboscia alata* was found in highest numbers. The dinoflagellates were mainly represented by the genus *Tripos* but some cells of the potentially toxic species *Dinophysis norvegica** were also present.



The genus *Tripos* (former *Ceratium*) was common along the Swedish west coast, especially in the fluorescence peaks found. On the second sampling occasion at Anholt E. *T. macroceros* dominated in the fluorescence peak at 20m.

The Kattegat

Anholt E 8th and 13th of July

The species diversity and total cell numbers were moderate on both occasions. The integrated sample taken by hose (0-10 m) contained the diatom *Proboscia alata* in highest cell numbers and also the dinoflagellate genus *Tripos* was noted in relative high cell numbers. A fluorescence maxima was detected on both visits at about 20 meters depth. The sample contained a dominance of different species of the dinoflagellate genus *Tripos* with a clear dominance of *T. macroceros* on the second sampling occasion.

N14 Falkenberg 8th of July

The species diversity and total cell numbers were moderate. The integrated sample (0-10 m) was dominated by diatoms where *P. alata* and *Cerataulina pelagica* were most common. The dinoflagellates were less in numbers and the most common were different species of the genus *Tripos*.

The Baltic Sea

BY2 Arkona Basin 9th of July

Only small grains of cyanobacteria were visible. The integrated sample contained quite a few filamentous cyanobacteria where *Aphanizomenon flosaquae* was most common. Besides the cyanobacteria significant concentrations of the dinoflagellate *Heterocapsa triquetra** and the diatom *Dactyliosolen fragilissimus* were also recorded in the hose sample from 0-10 meters.

BY4 Christiansö 9th of July

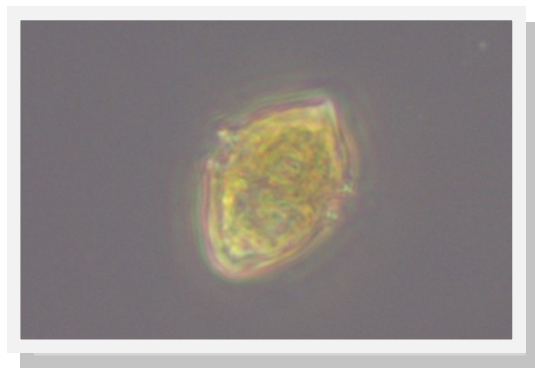
This station was sampled when the windstress was relatively low for the first time during the cruise. Some small grains of cyanobacteria were visible even creating some thin surface streaks. The potential of surface accumulation is high if the wind stress reduces. The surface sample revealed that all three filamentous cyanobacteria were present. Both *Aphanizomenon flosaquae* and *Nodularia spumigena** were common.

BY5 Bornholm Basin 9th of July

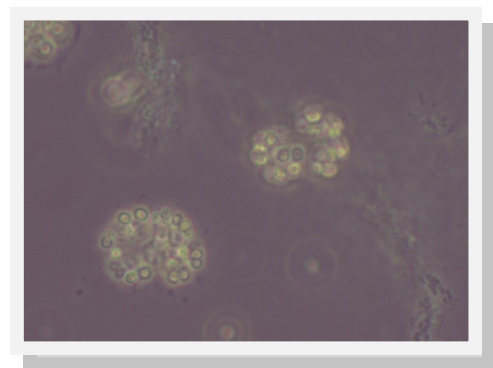
Some grains could be distinguished but the rain and the cloudy sky made it difficult to estimate the amount of aggregates. Among the filamentous cyanobacteria *Aphanizomenon flosaquae* was most abundant. The integrated sample (0-10 m) consisted of a quite diverse plankton community mainly consisting of different diatoms and filamentous/colonyforming cyanobacteria. The diatoms were mainly represented by the genus *Chaetoceros* and the dinoflagellates were represented by *Heterocapsa triquetra*

BCS III-10 10th of July

The station was sampled at night so surface accumulations could not be verified. The collected surface sample contained only moderately amounts of filaments indicating that no surface accumulations were present. The biodiversity in the integrated hose sample was relatively high with the diatom *Chaetoceros danicus*, the dinoflagellate *Dinophysis norvegica** and many different colonyforming pico-cyanobacteria. The integrated sample also contained quite a few filaments of *Nodularia spumigena** and *Aphanizomenon* whereas the genus *Dolichospermum* was less abundant.



The dinoflagellate *Heterocapsa triquetra* was abundant in the southern part of the Baltic Sea



Various pico cyanobacteria colonies were abundant at most of the Baltic stations.

BY10 10th of July

Small grains were clearly visible from the boat. The concentration of filaments in the collected surface water were relatively high with equal amounts of filaments of *Nodularia spumigena** and *Aphanizomenon* but less filaments of *Dolichospermum*.

BY15 10th of July

Surface accumulations of streaks were clearly visible from the ship. The surface sample contained a clear dominance of *Nodularia spumigena** but *Dolichospermum* was also present in relatively high concentrations. The integrated sample (0-10m) contained equal amounts of the three different groups of filamentous cyanobacteria indicating that *N. spumigena* was more confined to the surface. Among the smaller cells lots of different pico-cyanobacteria were common. Quite a few cells of *Dinophysis norvegica** was also present in the sample.

BY20 10th of July and BY32 Norrköping deep 11th of July

These station was sampled at night so any presence of surface accumulations could not be verified. The analyses of surface and integrated samples indicated that the filaments most likely were dispersed into the watercolumn. The collected surface samples contained only moderate amounts of filaments. *Aphanizomenon flosaquae* dominated in the samples where as *Nodularia spumigena** was found in less amounts of filaments.

BY38 Karlsö deep 11th of July

This station was sampled when the windstress was relatively light. Some small grains of cyanobacteria were visible even creating some thin streaks as the wind stress reduced. The potential of surface accumulation is high if the wind stress diminish for a longer period. The surface sample revealed that all three filamentous cyanobacteria were present. Both *Aphanizomenon flosaquae* and *Nodularia spumigena** were common. The integrated sample contained, besides filamentous cyanobacteria, the dinoflagellate *Heterocapsa triquetra* and a lot of colony forming picocyanobacteria of different sorts.

Ref M1V1 11th of July

Both a surface sample and a integrated sample was collected. Only a few filaments of *Aphanizomenon flosaquae* was noted. The integrated sample (0-10m) however contained a relatively high biodiversity mainly of smaller cells. Among the diatoms *Skeletonema marinoi* was common and something resembling *Cyclotella choctawhatcheeana*. Among the dinoflagellates *Heterocapsa triquetra* was most abundant. Several colonies of the genus *Dinobryon* were also noted.

Hanö Bight 12th of July

The windstress were keeping the water column mixed and almost no aggregates in forms of grains could be seen. The surface sample collected mainly contained moderate amounts of filaments of *Aphanizomenon flosaquae* and almost no other filamentous cyanobacteria.

Surface samples, bucket	The following filamentous cyanobacteria were observed:		
	<i>Aphanizomenon flosaquae</i>	<i>Nodularia spumigena</i> *	<i>Dolichospermum spp.</i>
Station:			
BY2 9/7	common	present	present
BY4 9/7	common	common	present
BY5 9/7	common	present	present
BCSIII-10 9/7	common	common	present
BY10 10/7	common	very common	present
BY15 10/7	common	very common	common
BY20 10/7	common	present	present
BY32 11/7	common	present	present
Knolls grund 11/7	common	common	present
BY38 11/7	common	common	present
BY39 Ölands södra 11/7	common	common	present
Ref M1W1 11/7	present	present	present
Hanöbukten 12/7	common	present	present

Selection of observed species	Anholt E	Anholt E	N14 Falkenberg	Släggö	Å17
Red=potentially toxic species	8/7	13/7	8/7	7/7	7/7
Hose 0-10 m	presence	presence	presence	presence	presence
Cerataulina pelagica	present		common	present	
Chaetoceros			present		present
Dactyliosolen fragilissimus	present	common	present		present
Guinardia flaccida	present	present	present		
Proboscia alata	very common	very common	very common	very common	common
Pseudo-nitzschia				present	present
Rhizosolenia hebetata f. semispina	present	present	present		
Skeletonema marinoi				present	
Thalassionema nitzschioides		present	present	common	
Dinophysis norvegica	present	present	present	common	present
Prorocentrum micans			present	present	
Protoperidinium				present	
Protoperidinium oblongum		present		present	
Protoperidinium pellucidum		present			
Tripes fusus	present	present	present	present	common
Tripes lineatus				present	present
Tripes longipes			present		present
Tripes macroceros		present	present	present	common
Tripes muelleri	present	present	common	present	common
Dolichospermum	present		present		
Nodularia spumigena		present			

Selection of observed species	BY2	BY5	Ref M1V1	BY15	BCSIII-10	BY38
Red=potentially toxic species	9/7	9/7	11/7	10/7	10/7	11/7
Hose 0-10 m	presence	presence	presence	presence	presence	presence
Chaetoceros	present					
Chaetoceros castracanei	common	present				
Chaetoceros danicus	present	present			common	present
Chaetoceros similis	present	present			present	
Chaetoceros subtilis			present			
Chaetoceros thronsenii		present				
Cyclotella cf choctawhatcheeana			common			
Cylindrotheca closterium	common		present	present		
Dactyliosolen fragilissimus	very common	present				
Skeletonema marinoi	common	present	common			
Dinophysis norvegica	present	present	present	common	common	present
Gymnodiniales		present				
Heterocapsa triquetra	present	common	common			common
Phalacroma rotundatum			present		present	
Dinobryon			present			
Dinobryon faculiferum			present			
Binuclearia lauterbornii		present		present	present	
Oocystis				present	present	
Apedinella radians			present			
Aphanizomenon flosaquae	present	common	present	common	present	common
Aphanocapsa		present		common	present	present
Aphanothece		present	present	present	present	present
Aphanothece paralleliformis			present	common	common	present
Dolichospermum	present	present		common	present	present
Lemmermanniella			present			present
Nodularia spumigena	present	present	present	common	present	common
Snowella	present	present	present	present	present	common
Ebria tripartita		present	present		present	present

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 algbloomingar 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
<i>Alexandrium</i> 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 through respiratory paralysis may occur within 2-24 hours after ingestion.
<i>Dinophysis</i> 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.
<i>Pseudo-nitzschia</i> spp.	Amnesic shellfish poisoning (ASP)	Milda symptom: Efter 3-5 timmar: yrsel, illamående, kräkningar, diarré, magkramp Extrema symptom: Yrsel, hallucinationer, förvirring, förlust av korttidsminnet, kramp	Mild case: Within 3-5 hours: dizziness, nausea, vomiting, diarrhoea, abdominal cramps. Extreme case: dizziness, hallucinations, confusion, loss of memory, cramps.
<i>Chaetoceros concavicornis</i> / <i>C. convolutus</i>	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.
<i>Pseudochattonella</i> 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

