SMHI
Oceanographic Unit
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AlgAware
ALGAL SITUATION IN MARINE WATERS SURROUNDING SWEDEN

Sammanfattning
Fluorescensmaxima i både Skagerrak och Kattegatt orsakades till stor del av dinoflagellatsläktet *Ceratium.* Ovanligt stora antal av *C. macroceros* observerades.

I Östersjön hade ytansamlingarna av cyanobakterier blandats ner i vattnet av vind och vågor. Det var dock gott om filamentösa (trådlika) cyanobakterier vid de flesta stationer i, både i ytprover och integrerade (0-10m) prover. Både *Nodularia spumigena** och *Aphanizomenon flos-aque* fanns i stora mängder vid de flesta stationerna. Cyanobakterierna hade aggregerat och syntes som flingor i vattnet i norra Egentliga Östersjön från öster om Gotska Sandön till BY19. På väg söderut återkom cyanobakterieflingorna i Bornholmsbassängen, men var borta igen vid BY1. Ytansamlingar observerades enbart utanför den svenska sydkusten på väg mot Hanöbukten, men med tanke på resans observationer kan det förutspås att lugnare väder kommer leda till flera ytansamlingar.

Växtplanktonanalyserna har genomförts ombord R/V Aranda med fokus på cyanobakterierna som dominerar i blomningarna i Östersjön. Analysmetoden är inte optimal för andra plankton, men de som observerats rapporteras här.

För att se satellittolkningar av ytansamlingar av cyanobakterier: http://www.smhi.se/vadret/hav-och-kust/algsituationen

Abstract
Fluorescence maxima in both Skagerrak and Kattegat areas were to a great deal caused by the dinoflagellate genus *Ceratium*. Unusually large numbers of *C. macroceros* was observed.

In the Baltic, the cyanobacteria surface accumulations had been muixed down in the water column by wind and waves. Filamentous (threadlike) cyanobacteria were abundant though at most stations, both surface samples and integrated (0-10m) samples. *Nodularia spumigena** and *Aphanizomenon flos-aque* were both very common at most of the stations. Aggregations of cyanobacteria were visible as grains in the water in the northern Baltic Proper from east of the Gotska Sandön to BY15 in the Eastern Gotland Basin. Going southwards, grains reappeared in the Bornholm Basin. No grains were seen at BY1, the most western station in the Arkona Basins. Surface accumulations were only seen outside the Swedish south coast heading towards the Hanö Bight, but considering the observations the prediction is that calmer weather will lead to more surface gatherings.

Phytoplankton analyses have been made on board the R/V Aranda with main focus on the cyanobacteria dominating in the Baltic bloom. The method used here is not the best for other plankton groups, but the organisms observed are reported.

To follow the surface accumulations of cyanobacteria in the Baltic Sea by satellite interpretations: http://www.smhi.se/en/weather/sweden-weather/1.11631

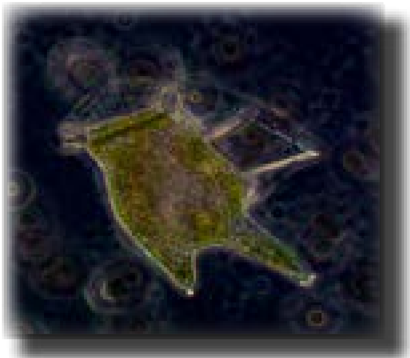
More detailed information on species composition and abundance

Results from the microscope analysis.
50 ml of water was filtered through 10 µm polycarbonate filters before being analysed using a light microscope. Potentially toxic species are marked with *. The observed species are listed on page 5-6.

Small species were not analysed on board. Results of chlorophyll *a*, which will be analysed later at SMHI, will not be included in this report.

The Skagerrak

Å17 24th of July
The integrated sample was rather low in diversity. The most common species were the diatom *Proboscia alata*, the dinoflagellate *Dinophysis norvegica** and several species from the dinoflagellate genus *Ceratium*.



Dinophysis tripos sometimes visits the Swedish west coast, this time Släggö.

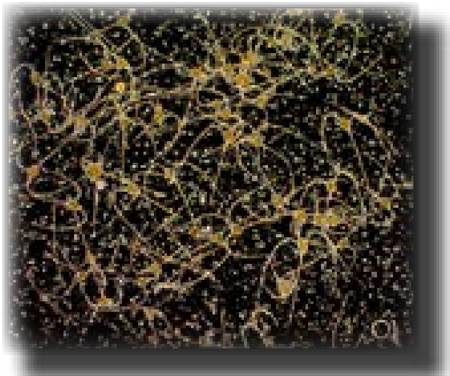
Å16 24th of July
A chlorophyll fluorescence maximum at 23 meters depth was dominated by the dinoflagellate *Ceratium macroceros*, which is an indicator of North Sea water.

Å14 and Å15 24th of July
The variation of species was larger than at Å16. The fluorescence maxima at 23 and 24 meters respectively were mainly caused by *Ceratium* species, but diatoms were more common here than at the previous station.

Släggö 24th of July, Skagerrak coast
The phytoplankton composition in the integrated sample was more diverse than in the open Skagerrak. The dinoflagellate genus *Ceratium* and *Dinophysis norvegica** were the most common. *Proboscia alata* and several other diatoms were present.

The Kattegat and the Sound

Anholt E 23rd and 25th of July
The species composition was more or less the same in the integrated samples from the two visits. The most common species were from the dinoflagellate genus *Ceratium* and *Dinophysis norvegica** and the diatoms *Proboscia alata*, *Dactyliosolen fragilissimus* and *Nitzschia longissima*. At the second visit, the fluorescence maximum had shifted from 19 to 23 meters and a variety of *Ceratium* species and some other dinoflagellates were replaced with an almost total dominance of the typically North Sea species *Ceratium macroceros*.



Ceratium macroceros caused the fluorescence maximum at Anholt E.

N14 Falkenberg 23rd of July
The integrated sample was dominated by several species from the dinoflagellate genus *Ceratium* and the diatom *Proboscia alata*.

Fladen 23rd of July
A fluorescence maximum at 25 meters depth was mainly caused by *Ceratium* spp and several diatom species.

W Landskrona 23rd of July
A fluorescence maximum at 13 meters depth was mainly caused by *Ceratium* spp. and several diatom species. Some cyanobacteria filaments was present of both *Nodularia spumigena** and *Aphanizomenon flos-aque*.

The Baltic

Short summary of the observed accumulations of cyanobacteria.

Due to the weather situation with wind and waves, surface accumulations had been mixed down in the water column at most stations. Accumulations were observed only outside the Swedish southcoast in the Estern Arkona Basin. Aggregations of cyanobacteria were however visible like grains in the water in the Northern Baltic Proper, east of The Gotska Sandön and southwards in the Eastern Gotland Basin. At BY15 the grains were not visible and they were spotted again at BY5 in the Bornholm Basin. The grains were sighted at BY2 but not at BY1 in the Arkona Basin.

LL7, LL12, LL15 and LL17 Gulf of Finland and just outside 20th and 21st of July

A few filaments of *Aphanizomenon flos-aque* and *Dolichospermum* sp. were present in the surface sample at LL7, a bloom of cf. *Heterocapsa triquetera* was observed. Going from LL12 towards the Baltic Proper, the dinoflagellate cf. *Heterocapsa triquetra* declined in numbers from station to station and the cyanobacteria *A. flos-aque* and *Nodularia spumigena** inclined.

The dinoflagellate cf. *Heterocapsa triquetra* bloomed in the Gulf of Finland.

BY19 and BY20 21st of July

The sun was shining and revealed the cyanobacteria grains in the water column as far as the eye could see and had been observed since daylight when the expedition was in the same height as the Gotska Sandön between BY29 and BY20. The amounts of the cyanobacteria *A. flos-aque* and *N. spumigena** were large and many of them had aggregated and were tangled into balls of cyanobacteria and other organisms ready to float up and accumulate in the surface if the weather becomes calmer. The dinoflagellate cf. *Heterocapsa triquetra* was numerous.

BY9, BY10, BY11, BY15 Eastern Gotland Basin and BCSIII-10 21st – 22nd of July

The integrated samples from BY15 and BCSIII-10 contained more *N. spumigena** than *A. flos-aque* although there were plenty of both species. The dinoflagellate *D. norvegica** was very numerous.

In the surface samples both *A. flos-aque* and *N. spumigena* were abundant, however less abundant than at BY19 and BY20. The dinoflagellate *D. norvegica** was very numerous even in the surface water.

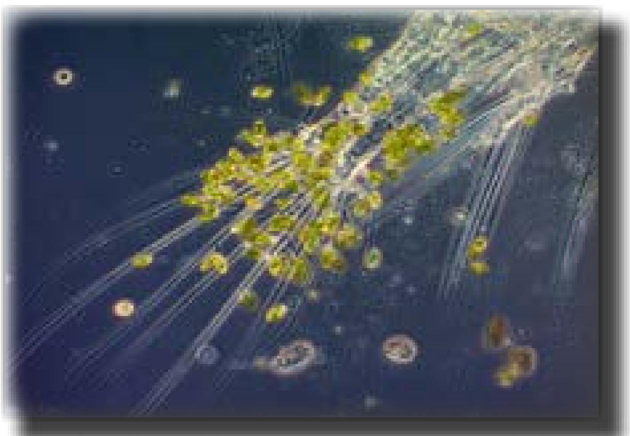
BY4 and BY5 Bornholm Basin 22nd of July

There was a lot of both *N. spumigena** and *A. flos-aque* in the integrated and in the surface samples, the latter was a bit more abundant though. The green algae *Planctonema lauterbornii* was numerous. The dinoflagellate *Dinophysis norvegica** and the diatoms *Chaetoceros impressus* and *Attheya septentrionales* were abundant as well as pico cyanobacteria colonies.

The cyanobacteria were visible in the water like very small grains.

BY1 and BY2 Arkona Basin 23rd of July

The cyanobacteria *Nodularia spumigena**, *Aphanizomenon flos-aque* were found in high amounts in the integrated sample from BY2, *Dolichospermum* sp. was present in low amounts. The flagellate *Ebria tripartita* and the green algae *Planctonema lauterbornii* were found in rather high cell numbers. Colonies of pico cyanobacteria were abundant.



Dinoflagellates klinging to a crustacean skeleton.

The cyanobacteria *N. spumigena**, *A. flos-aque* and *Dolichospermum* sp. were present in low amounts in the BY1 surface sample, at BY2 however, the highest amount of *N. spumigena** during this expedition was found and *A. flos-aque* was also abundant. *Dolichospermum* sp. was present in low amounts. Unidentified naked dinoflagellates were found in very high cell numbers as well as colonies of pico cyanobacteria.

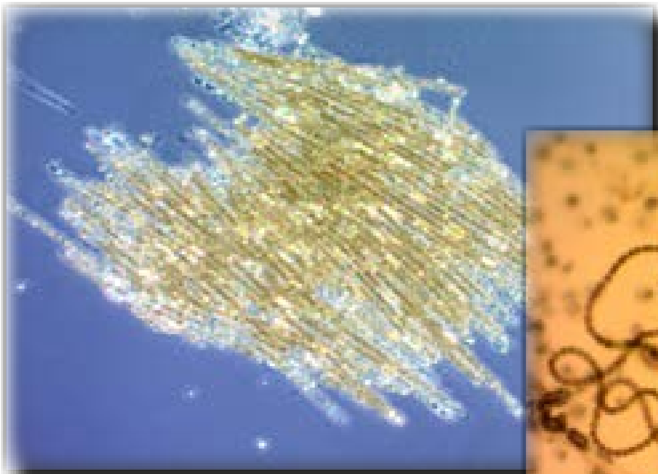
The Hanö Bight 25th of July
*N. spumigena** and *A. flos-aque* were both abundant in the surface sample. The dinoflagellate *Dinophysis norvegica** and the green algae *Planctonema lauterbornii* were numerous.

Ref M1V1 26th of July
Dolichospermum sp. was the filamentous cyanobacterium with the highest amount in the integrated sample, *A. flos-aque* was numerous and *N. spumigena* was present in low amounts. Several dinoflagellates and diatoms were found in low cell numbers, pico cyanobacteria colonies were abundant.

Approximately the same distribution of cyanobacteria was found in the surface sample as in the integrated sample.

BY32 and BY38 Western Gotland Basin 26th of July. BY29 27th of July
The amounts of cyanobacteria were higher in the integrated sample from BY38 compared to the surface sample, all three species were represented. *D. norvegica* was numerous.

There were moderate amounts of *A. flos-aque*, *N. spumigena** and *Dolichospermum* sp. at all stations in the surface samples. *D. norvegica** was abundant.



Aphanizomenon flos-aque

Dolichospermum sp.

*Nodularia spumigena**

Phytoplankton analysis and text by:
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Selection of observed species	Anholt E	Anholt E	N14 Falkenberg	Släggö	Å17
Red=potentially toxic species	23/7	25/7	23/7	24/7	24/7
Hose 0-10 m	presence	presence	presence	presence	presence
Chaetoceros laciniosus			present		
Chaetoceros spp		present			
Cylindrotheca closterium	present				
Dactyliosolen fragilissimus	common		present		
Leptocylindrus danicus				present	present
Nitzschia longissima	common	common	present	present	present
Proboscia alata	common	very common	common	present	common
Pseudo-nitzschia spp	present		present		
Pseudosolenia calcar-avis		present			
Rhizosolenia imbricata	present				
Rhizosolenia hebetata	present	common			
Rhizosolenia pungens	present				
Skeletonema costatum				present	
Thalassionema nitzschioides	present				
Alexandrium spp	present				
Ceratium fusus	common	common	common	common	common
Ceratium lineatum	common	present	present	present	
Ceratium longipes	present		present	common	common
Ceratium macroceros	present	present	present	common	common
Ceratium tripos	common	common	common	common	common
Dinophysis norvegica	common	present	present	common	common
Prorocentrum micans	present			present	
Protoperidinium depressum					present
Protoperidinium oblongum	present	present			present
Protoperidinium spp				common	
Dolichospermum sp	present	present			
Helicostomella subulata	present	common	common		
Favella sp.	present	present			

Selection of observed species	BY2	BY5	Ref M1V1	BY15	BCSIII-10	BY38
Red=potentially toxic species	23/7	22/7	26/7	21/7	22/7	26/7
Hose 0-10 m	presence	presence	presence	presence	presence	presence
Chaetoceros danicus		present	present		present	
Chaetoceros impressus	present	common	present	present	present	
Cyclotella choctawhatcheana			present			
Nitzschia longissima			present			
Skeletonema costatum			present			
Dinophysis norvegica	present	present	present	very common	present	common
Dinophysis rotundata						present
Gymnodiniales	very common					
Heterocapsa triquetra			present			
Dinobryon faculiferum			present			
Oocystis sp.	present	present				
Planctonema lauterbornii	common	common		present	present	
Ebria tripartita	present	present			present	
pico cyanobacteria colonies	common	common	common	common	common	common
Dolichospermum sp.	present	present	very common			common
Aphanizomenon flos-aquae	very common	very common	common	very common	very common	common
Nodularia spumigena	very common	very common	present	common	common	common

Surface samples, bucket	The following filamentous cyanobacteria were observed:		
Station:	Aggregations of Aphani-zomenon flos-aque	Nodularia spumigena*	Dolichospermum spp.
W Landskrona 23/7	present	present	present
BY1 23/7	common	common	
BY2 23/7	very common	very common	
Hanöbukten 25/7	common	common	
BY4 22/7	very common	very common	
BY5 22/7	very common	very common	
BCSIII-10 22/7	very common	very common	
REF M1V1 26/7	very common	common	very common
Ölands södra udde	very common	very common	very common
BY32 26/7	common	common	common
BY38 26/7	common	common	common
BY29 27/7	common	common	common
BY9 22/7	very common	very common	
BY10 21/7	very common	very common	
BY11 21/7	very common	very common	
BY15 21/7	very common	very common	
BY19 21/7	very common	very common	present
BY20 21/7	very common	very common	present
LL17 21/7	very common	very common	
LL15 21/7	very common	very common	
LL12 20/7	common	present	common
LL7 20/7	present		present

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