SMHI
Oceanographic Unit
No 7, 29 June – 4 July 2009

AlgAware
ALGAL SITUATION IN MARINE WATERS SURROUNDING SWEDEN

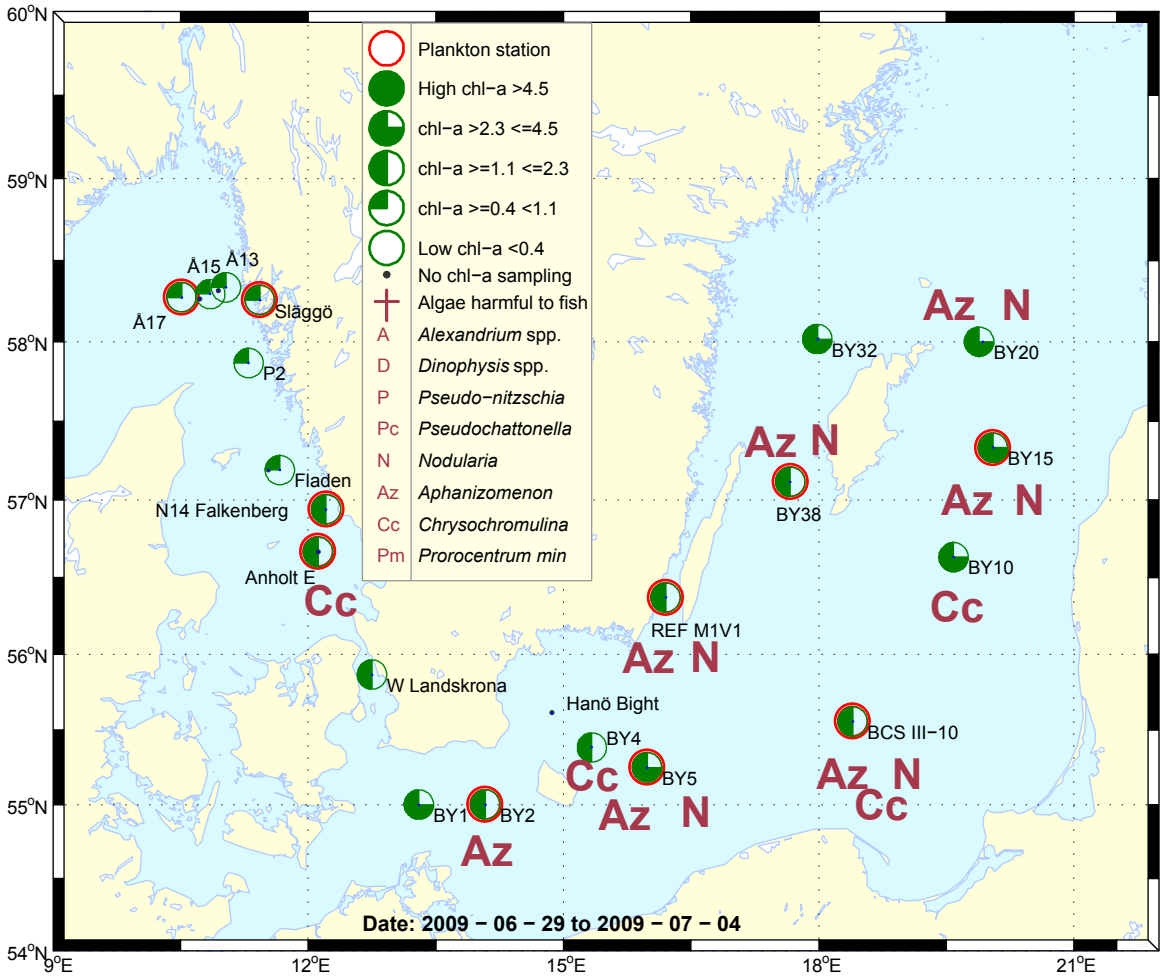
Abstract

The phytoplankton diversity was low in the Skagerrak area and the samples were dominated by the dinoflagellate genus *Ceratium*. A chlorophyll fluorescence maximum at the Skagerrak coast (P2) was also dominated by *Ceratium* spp.

At the Kattegat coast (N14), *Proboscia alata* was the most numerous species and the filamentous cyanobacterium *Anabaena* spp. was common in the whole area. Chlorophyll fluorescence maxima at N14 and Anholt E were dominated by the flagellate *Dictyocha speculum* and *Ceratium* spp.

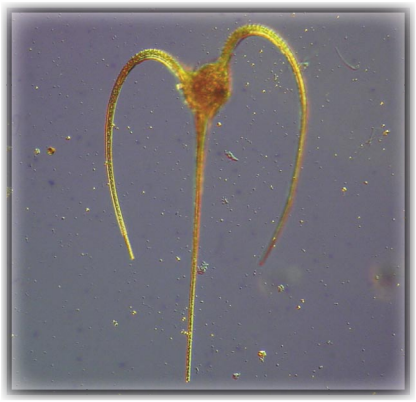
In the Baltic, surface accumulations of cyanobacteria were observed north and south of Drogden. Accumulations reappeared west of BY5 and were easily observed half of the distance towards BCS III-10. At BCS III-10 the accumulations increased and northwards passing Gotland there were dense patches of cyanobacteria. Dense accumulations were observed north of Öland and southwards in the sound of Kalmar. Thick patches of cyanobacteria accumulations were observed south of Hanö bight and further on along the south coast of Skåne. The filamentous cyanobacteria *Aphanizomenon* spp. and *Nodularia spumigena** were abundant at most of the Baltic stations.

To follow the surface accumulations of cyanobacteria in the Baltic Sea by satellite interpretations and high resolution images: http://www.smhi.se/cmp/jsp/polopoly.jsp?d=7826&l=en



The phytoplankton samples were filtered through 10 µm polycarbonate filters before being analysed using a light microscope. Potentially toxic species are marked with *. To observe which of the cyanobacteria species were dominating the surface accumulations, bucket sampling was performed at most of the Baltic stations, and are listed on page 5.

The Skagerrak



Ceratium macroceros

Å17 29th of June (open Skagerrak)
The phytoplankton diversity was low, the dinoflagellate genus *Ceratium* was observed. A chlorophyll fluorescence maximum at 30 meters depth was dominated by *Ceratium longipes.*

Släggö 29th of June (Skagerrak coast)
Dinoflagellates dominated, the genus *Ceratium* being the most abundant. The dinoflagellates *Dinophysis acuminata** and *D. rotundata** were present.

P2 29th of June (Skagerrak coast)
A chlorophyll fluorescence peak at 35 meters depth was dominated by *Ceratium* species, and *C. longipes* was found with the highest cell numbers. The diatom *Proboscia alata* was common.

Small species and fluorescence maxima
At Å16 and Å17 chlorophyll fluorescence maxima were observed at 28 and 30 meters respectively. At both stations, the coccolithophorid *Emiliania huxleyi* was the most numerous species in the plankton samples from these depths. At Å17, *E. huxleyi* was present in the integrated (0-10 m) sample as well, but in less amounts.

The Kattegat

Fladen 30th of June
A chlorophyll fluorescence peak was observed at 25 meters and the most common species were the dinoflagellates *Ceratium lineatum* and *Dinopysis acuminata** and the flagellate *Dictyocha speculum**.

N14 Falkenberg 30th of June
The filamentous cyanobacterium *Anabaena* spp. and the diatom *Proboscia alata* were very common in the integrated sample (0-10 m). A chlrophyll fluorescence peak was observed at 22 meters where the flagellate *Dictyocha speculum** was the most abundant species. The dinoflagellates *Ceratium lineatum, C. longipes* and *Dinophysis norvegica** were very common at this depth.

Anholt E 30th of June
The phytoplankton situation was very similar to the one at N14 both in the integrated and at the chlorophyll fluorescence peak found at 20 meters. The diatom *Proboscia alata* was less abundant in the integrated sample compared to N14 and there were a few more diatoms in low cell numbers in the peak sample.

W Landskrona 30th of June
A chlorophyll fluorescence peak was found at 15 meters and the dinoflagellate genus *Ceratium* and the flagellate *Dictyocha speculum** dominated the plankton sample. The dinoflagellate *Dinophysis norvegica** was very common.

Small species and fluorescence maxima
At the second visit at Anholt E (4th of july), the prymnesiophyte *Chrysochromulina* spp.* was the most abundant genus in the phytoplankton sample and the filamentous cyanobacterium *Anabaena* spp. was very common.

Selection of observed species	Å17	Släggö	N14	Anholt E	Anholt E
Red=potentially toxic species	2009-06-29	2009-06-29	2009-06-30	2009-06-30	2009-07-04
[1] quantified in m/l	cells/l	cells/l	cells/l	cells/l	cells/l
Dactyliosolen fragilissimus				present	common
Guinardia delicatula			present		
Guinardia flaccida		present		present	
Leptocylindrus danicus			present		present
Proboscia alata		present	30 000	present	common
Rhizosolenia hebetata		present	present		
Rhizosolenia setigera				present	
Skeletonema costatum complex				present	
Thalassionema nitzschioides			present	present	present
Ceratium furca		present			
Ceratium fusus	present	common	present	present	
Ceratium lineatum		present		present	
Ceratium longipes	present				
Ceratium macroceros	present				
Ceratium tripos	present	present	present	present	present
Dinophysis acuminata		present			
Dinophysis rotundata		present			
Prorocentrum micans		present			
Protoperidinium conicum			present		
Protoperidinium steinii		present			
Protoperidinium spp.		present	present		
Scrippsiella complex		present			
Chrysochromulina spp.					144 000
Emiliania huxleyi	common			present	
Planctonema lauterbornii				common	common
Anabaena spp.[1]		present	0.6	0.4	very common

Surface accumulations of cyanobacteria west of Gotland.
Photo: Lars Andersson

The Baltic Sea

Summary of visually observed surface accumulations.
The first signs of surface accumulations of cyanobacteria were observed in the Sound, north and south of Drogden. In the rest of the Sound the water was clear and the next accumulations were seen east of BY 5. A surface sample was taken underway and analysis made clear that the filamentous cyanobacteria *Aphanizomenon* spp. and *Nodularia spumigena** were abundant. The accumulations persisted about half of the distance to BCS III-10, but pollenlike grains of cyanobacteria were still visible the second half of the distance.

At the station BCSIII-10 the accumulations had increased again and large areas of cyanobacteria belts could be seen whilst heading north. Northwest of Gotland the surface accumulations decreased and small grains could be seen in the water southwards to BY38. The accumulations increased again and were dense in many patchy areas north of Öland and southwards in the sound of Kalmar. In the Hanö bight, the surface accumulations were gone due to wind and waves, but the cyanobacteria were certainly there and have been reported to have reached the beaches in the area.

Approaching Sandhammaren, thick accumulations were observed and a surface sample showed dominance of *Nodularia spumigena**. Further observations of dense accumulations were made along the south coast of Skåne.

Nodularia spumigena

Arkona Basin BY2 and Bornholm Basin and BY5 1st of July
Aphanizomenon spp. was the most common of the cyanobacteria and *Nodularia spumigena** was present. The chlorophyte *Planctonema lauterbornii* and the diatom *Chaetoceros impressus* were very common at BY2 and BY5 respectively.

South East Baltic BCS III-10 1st of July
Both *Aphanizomenon* spp. and *Nodularia spumigena** were present in the integrated sample in moderate amounts.

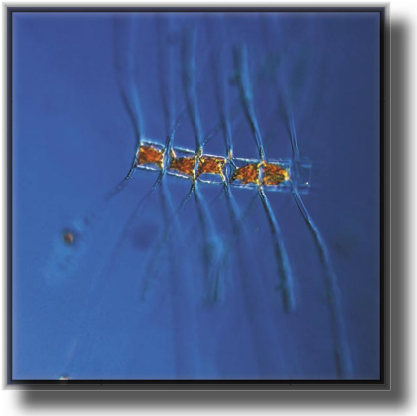
Eastern Gotland Basin BY15 2nd of July
Aphanizomenon spp. dominated the sample and *Nodularia spumigena** and the dinoflagellate *Dinphysis norvegica** were very common.

Western Gotland Basin BY 38 2nd of July
Aphanizomenon spp. and *N. spumigena** were both very abundant although *Aphanizomenon* spp. was found in twice the amount of *N. spumigena**. A third cyanobacterium, *Anabaena* spp., and the diatom *Chaetoceros impressus* were very common.

Kalmar Sound Ref. M1-V1 3rd of July
Aphanizomenon spp. dominated the sample and *Anabaena* spp. and *N. spumigena** were very common. A few diatom and dinoflagellate species were present with low cell numbers. In the bucket sample, both *Aphanizomenon* spp. and *N. spumigena** were very abundant and the latter was the most dominant species.

Small species and fluorescence maxima
Fluorescence maxima were sampled at BY4 (20 m), BY15 (20 m), BCSIII-10 (17 m) and BY10 (20 m) and the prymnesiophyte *Chrysochromulina polylepis** dominated the phytoplankton samples with 370 000 cells/l at BY4 and 256 000 cells/l at BY10, the others are listed in the excel table on page 5. *C. polylepis** was present in some of the integrated (0-10 m) samples as well with very low cell numbers.

Phytoplankton analysis and text by: Ann-Turi Skjevik



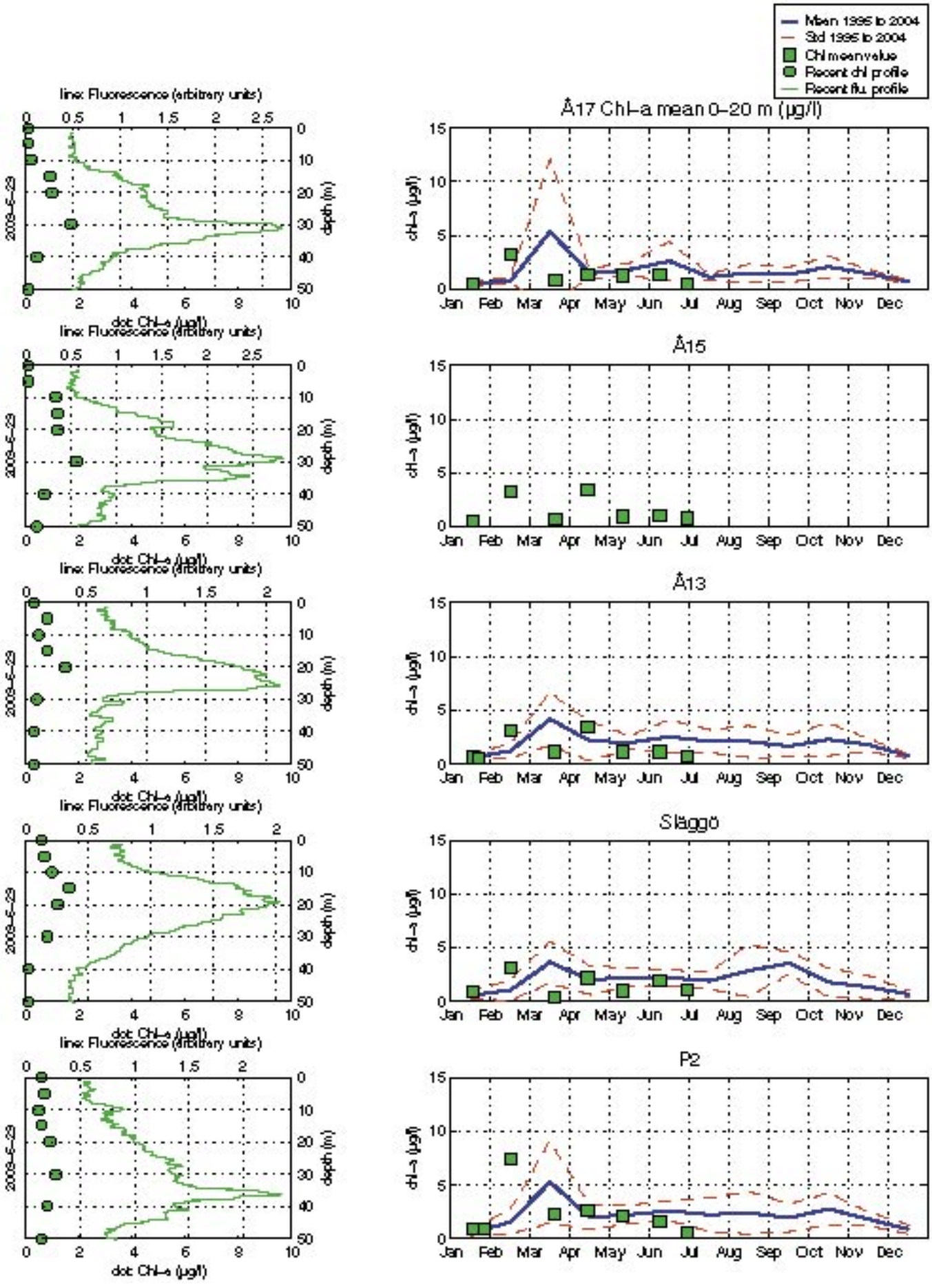
Chaetoceros impressus

Selection of observed species	BY2	BY5	BCS III-10	BY15	BY38	Ref. M1-V1
Red=potentially toxic species	2009-07-01	2009-07-01	2009-07-01	2009-07-02	2009-07-03	2009-07-03
[1] quantified in m/l	cells/l	cells/l	cells/l	cells/l	cells/l	cells/l
Chaetoceros danicus						
Chaetoceros impressus	present	2 900		present	8 100	present
Chaetoceros similis						present
Chaetoceros subtilis						present
Cyclotella choctawhatcheana	present					
Ceratium tripos	present					
Dinophysis acuminata					present	present
Dinophysis norvegica			present	common	present	
Heterocapsa triquetra						present
Chrysochromulina polylepis			480000 (17m)	780000 (20m)		
Chrysochromulina spp.	very common			common		
Dinobryon faculiferum	very common					
Planctonema lauterbornii	common	present	common	present	present	present
Anabaena spp.					0.4	0.4
Aphanizomenon spp.	0.3	1.0	present	13.2	8.8	3.0
Nodularia spumigena	present	0.5	common	0.8	4.0	0.2

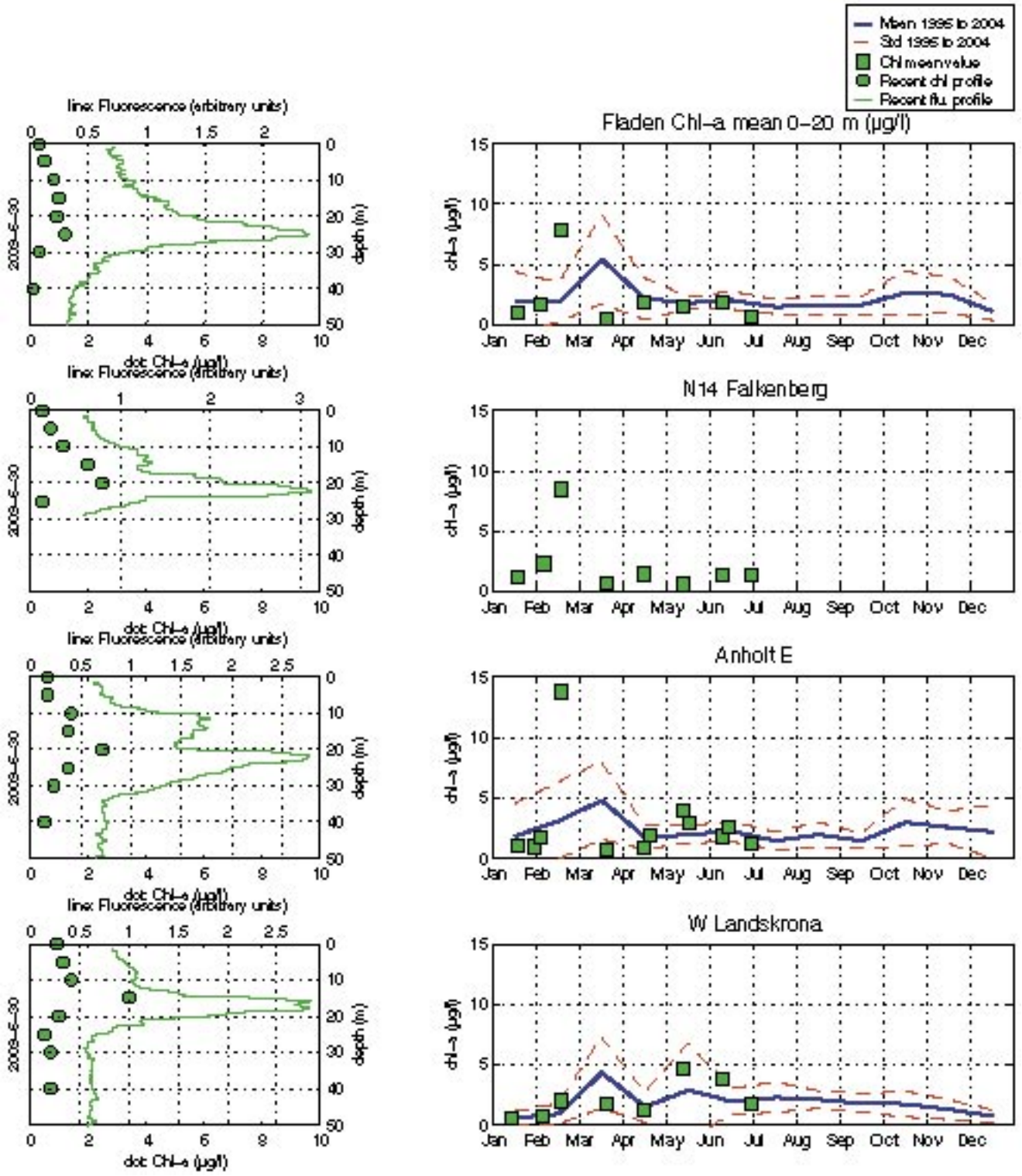
Surface sampling using a bucket.	Observations of the following filamentous cyanobacteria:		
Station:	***Aphanizomenon*spp.**	***Nodularia spumigena****	***Anabaena* spp.**
BY2	common	present	
BY4	4.6 m/l	0.2 m/l	present
BY5	5.3 m/l	2.4 m/l	
East of BY5	3.7m/l	4.1 m/l	
BCS III-10	Very common	dominant	
BY10	3.9 m/l	2.2 m/l	
BY15	32.4 m/l	6.4 m/l	
BY20	31 m/l	11 m/l	
BY38	7.5 m/l	0.4 m/l	1.9 m/l
Hanö bight	1.7 m/l	2.2 m/l	common
Ref M1 V1	1.8 m/l	3.1 m/l	0.7 m/l
Southeast of Sandhammaren	common	dominant	

NB! The amounts of cyanobacteria in the surface vary due to diurnal rhythms.

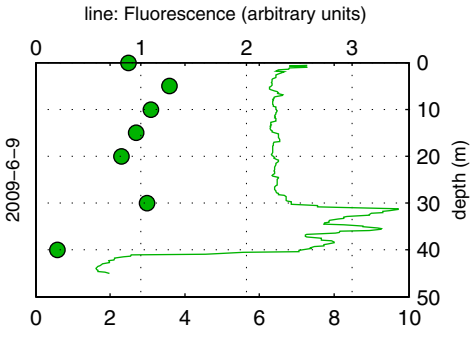
The Skagerrak

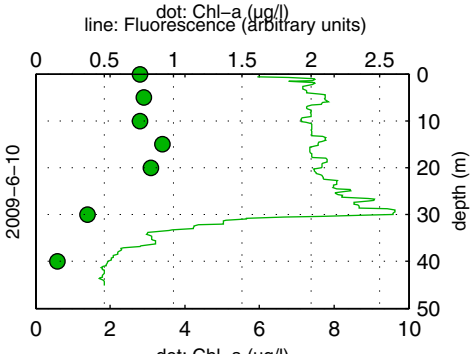


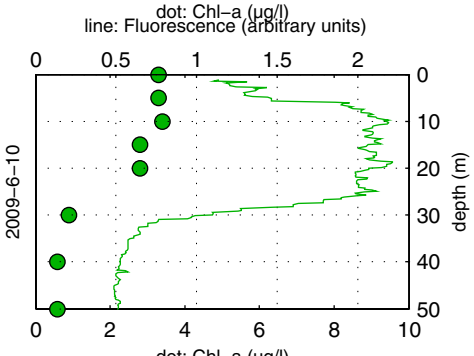
The Kattegat and the Sound

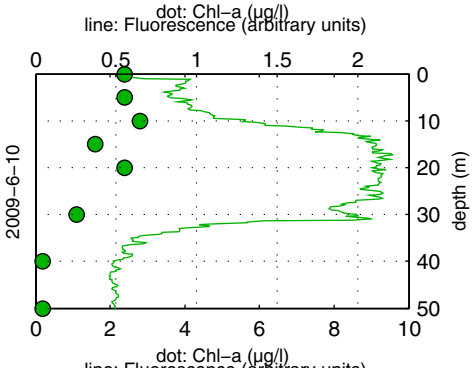


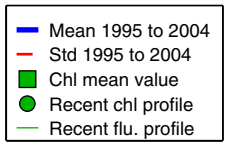
The Southern Baltic

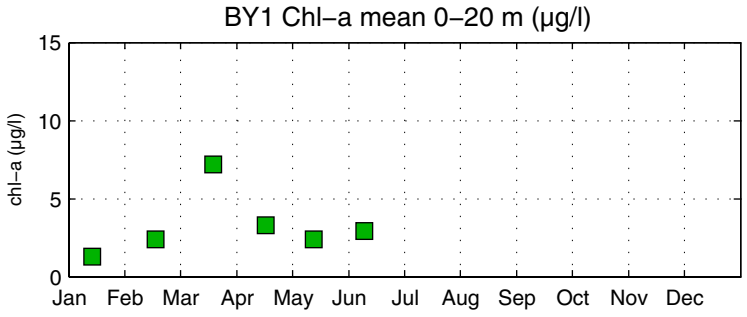


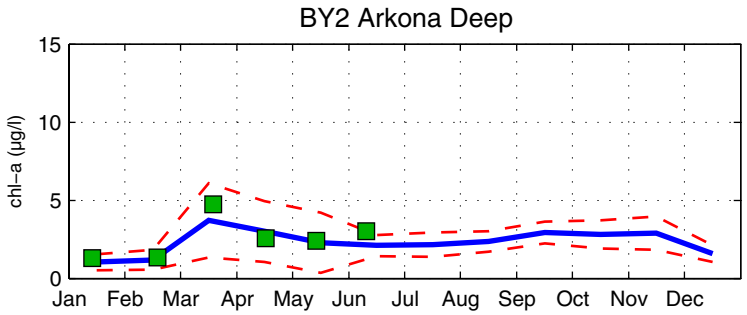


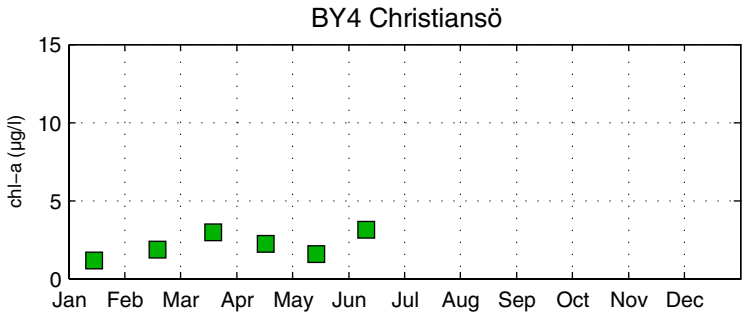


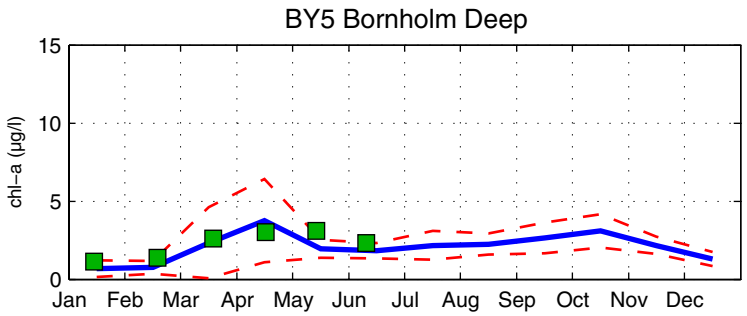




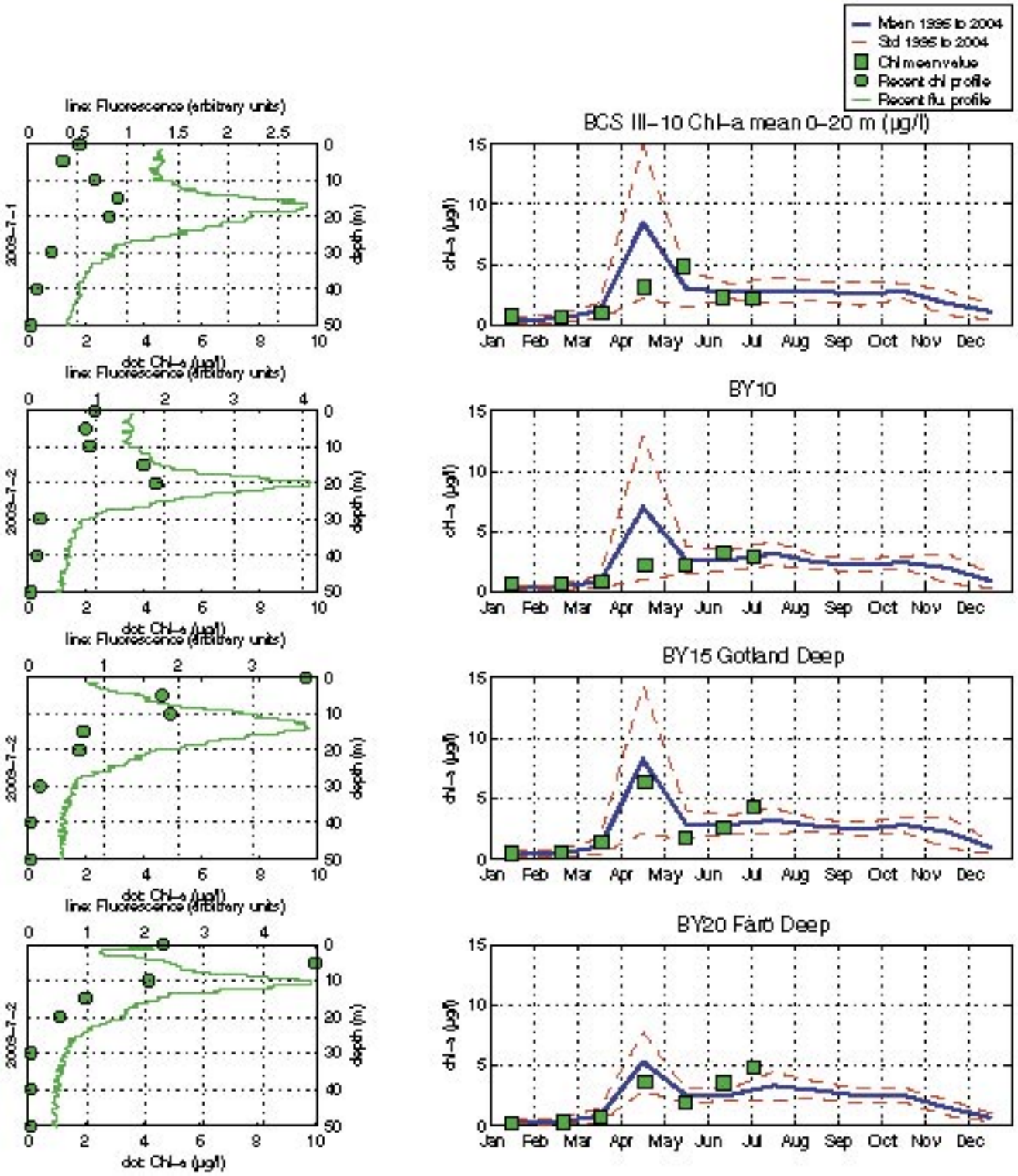


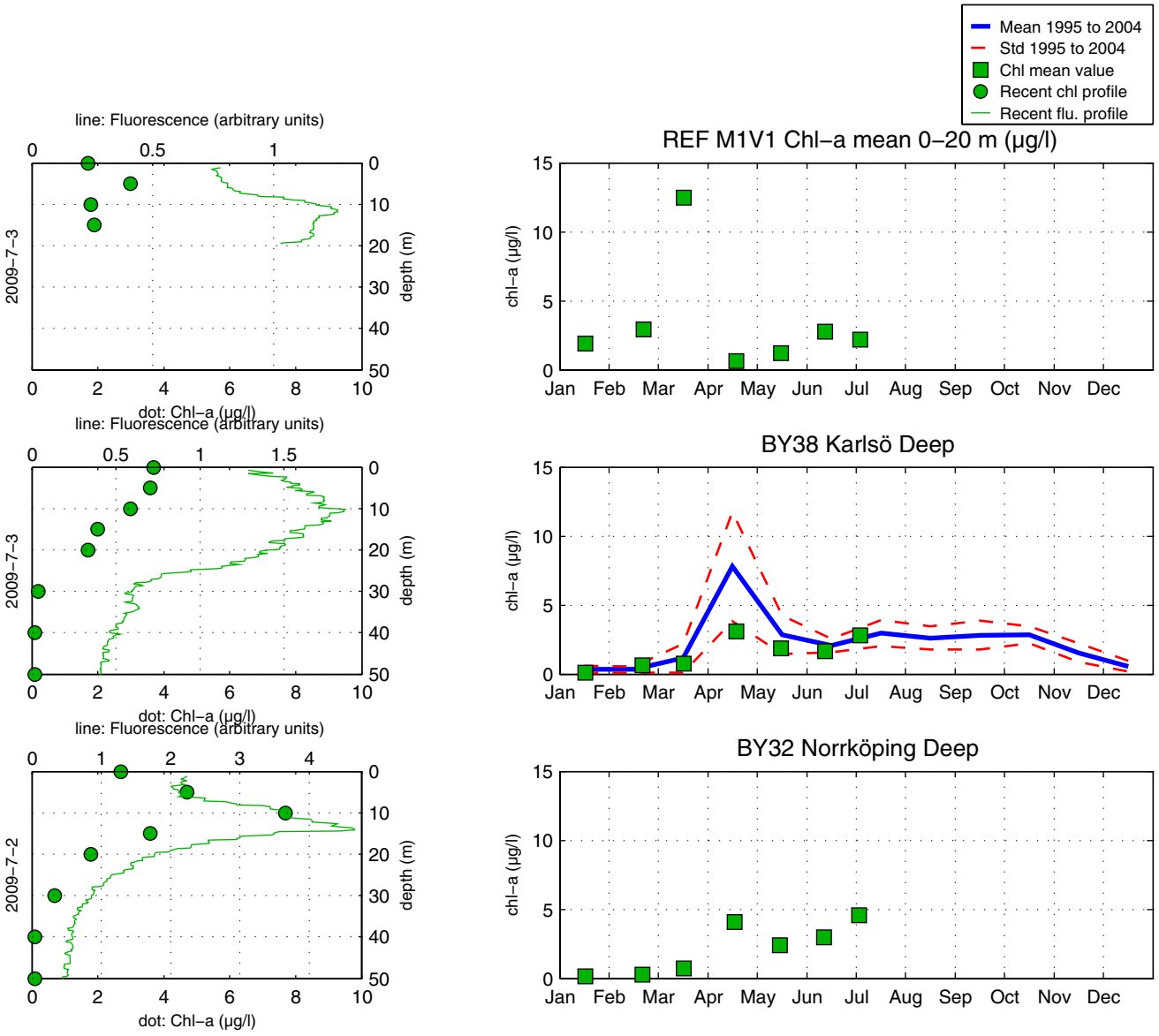






The Eastern Baltic





Om klorofylldiagrammen

Klorofyll *a* är ett mått på mängden växtplankton. Prover tas från ett antal djup från U/F Argos. 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 from the R/V Argos. Data is 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 layes of phytoplankton occuring below the surface.

Om AlgAware

SMHI genomför ca en gång per månad expeditioner med U/F Argos i Östersjön och Västerhavet. Resultat baserade på semikvantitativ mikroskopanalys av planktonprover samt klorofyllmätningar presenteras kortfattat i denna rapport. Information från SMHI:s satellitövervakning av algblomningar finns på www.smhi.se.

About AlgAware

SMHI carries out monthly cruises with R/V Argos 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 SMHI:s satellite monitoring of algal blooms is found on www.smhi.se.

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 ro 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.
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.
Pseudo- nitzschia spp.	Amnesic shellfish poisoning (ASP)	**Milda symptom:** Efter 3-5 timmar: yrsel, illamående, kräkningar, diarré, magkramper **Extrema symptom:** Yrsel, hallucinationationer, 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.

Översikt av 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 (0-20 m) vid de olika stationerna. Förekomst av skadliga alger vid stationer där arter analyseras markeras med symbol. Då cirkeln är tom innebär detta att stationen inte provtagits.

The map on the front page shows weighted mean of chlorophyll *a*, µg/l (0-20 m) at sampling stations. Presence of harmful algae at stations where species analysis is performed is shown with a symbol An empty cirkel indicates that there has been no sampling at that station.