SMHI
Oceanographic Services
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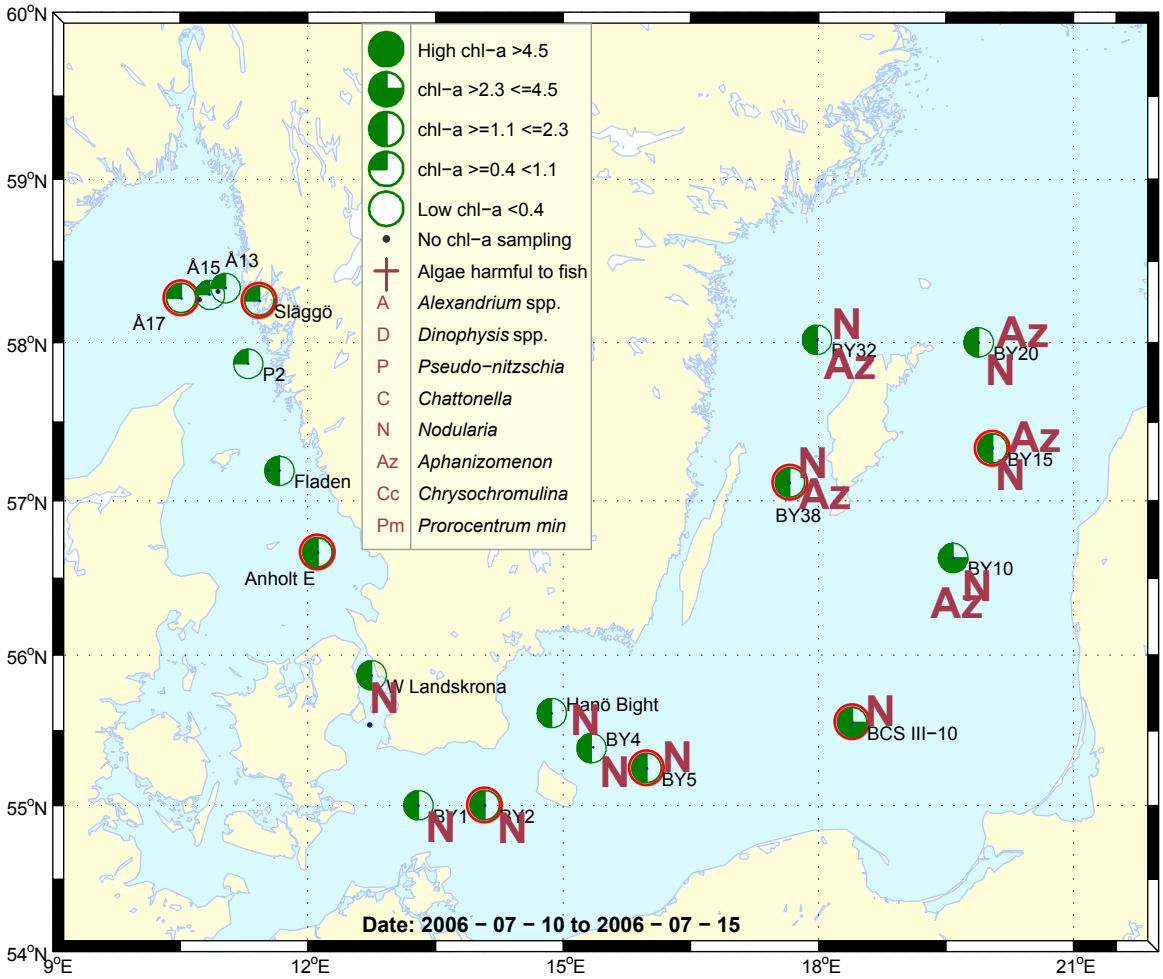
AlgAware
ALGAL SITUATION IN MARINE WATERS SURROUNDING SWEDEN

Sammanfattning
Både i Skagerrak och i Kattegatt visade planktonprover på relativt glesa bestånd med få arter och låga cellantal. I bägge områdena fanns ett fåtal filament (trådar) av cyanobakterier, vilka troligtvis har förts dit av Baltiska strömmen.

En omfattande blomning pågick i Östersjön, med stora områden av ytansamlingar av cyanobakterier, framförallt dominerade av *Nodularia spumigena**. För detaljer, se engelsk text.

Abstract
Plankton samples from the Skagerrak and the Kattegat areas contained few species in low cell numbers. In both areas a few filaments of cyanobacteria were observed, probably brought there by the Baltic current.

Plankton samples from the Baltic Sea were totally dominated by filamentous cyanobacteria and the micro ecosys-



tems that surrounds the accumulated filaments. Very few other species were observed, as the shadowing effects of the cyanobacteria makes growing conditions difficult. In the southern Sound, the first signs of an ongoing cyanobacteria bloom in the Baltic were observed, both in plankton samples and by accumulations on the sea surface. The accumulations increased rapidly and dense patches of floating cyanobacteria were passed throughout the Arkona and Bornholm basins. The samples taken in the area were dominated by *Nodularia spumigena**. Close to BCS III-10 the patches became less dense and ceased, although small white cyanobacteria aggregations were clearly visible when looking down in the water. Soon the surface accumulations increased again and created dense patches until half the way to Fårö deep was passed and they decreased and disappeared. Still the white aggregations were visible though. East of Fårö thin surface accumulations were observed, and north of Gotland an area of dense patches was passed. The accumulations ceased once again and reappeared south of Öland. Here the accumulations were rather thin until the station in Hanö bight was reached where they got more dense. The accumulations then decreased and were quite thin along the southern coast of Skåne.

Om AlgAware

SMHI genomför ca en gång per månad expeditioner med U/F Argos i Östersjön och Västerhavet. Resultat baserade på 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 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.
Chattonella 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- niztschia 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 Publsihing.

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.

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

More detailed information on species composition and abundance. * = potentially toxic.

The Skagerrak

Dactyliosolen fragilissimus

Å17 10th of July

A few species of micro algae at low abundances were observed, the most common being the diatoms *Proboscia alata* and *Dactyliosolen fragilissimus*. Very low cell numbers of the dinoflagellate genus *Dinophysis** were quantified.

Släggö 10th of July

A similar plankton flora as at Å17 was recorded, with somewhat higher abundances. A few threads of the filamentous cyanobacteria *Nodularia spumigena** and *Anabaena* sp. were observed.

The chlorophyll *a* concentrations were below average in the whole Skagerrak area.

The Kattegat

D. norvegica

Anholt E 11th and 15th of July

Similar species compositions and almost equal chlorophyll concentrations were found at the two sampling occasions. *P. alata* dominated the integrated samples (0-10 m), and a few dinoflagellate and diatom species were observed at low numbers. During the first visit, the dinoflagellate *Ceratium macroceros* and the diatom *Guinardia flaccida* dominated in the chlorophyll fluorescence maximum at 20 meters. These two species are quite large, which is why they contribute considerably to the chlorophyll contents in the water even when present at low cell numbers as here (ca 4000 cells/l). *Dinophysis norvegica** was present with 200 cells/l.

Selection of observed species Red = potentially toxic species	Å17 06-07-10 cells/L	Släggö 06-07-10 cells/L	Anholt E 06-07-11 cells/L	Anholt E 06-07-15 cells/L
Chaetoceros spp			present	
Dactyliosolen fragilissimum	present	common	present	
Guinardia flaccida		present	4060	
Proboscia alata	common	very common	very common	250 000
Ceratium longipes	present		present	present
Ceratium macroceros	present		4180	
Ceratium tripos		present	present	
Nitzschia spp				present
Dinophysis acuminata	present	120	present	
Dinophysis acuta	present	present	present	present
Dinophysis norvegica	present	present	present	
Phalacroma rotundatum	present	present	present	present
Protoperidinium steinii	present	present		
Chrysochromulina spp.				13 000
Anabaena sp.		present	common	
Nodularia spumigena		present		

The Sound

W Landskrona 11th of July

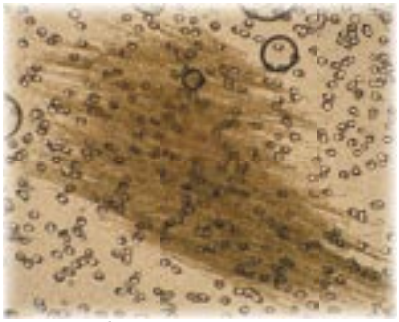
In the central Sound, all three of the common filamentous cyanobacteria in the Baltic, *Anabaena* sp., *Nodularia spumigena** and *Aphanizomenon* sp. appeared, of which the latter was the most common. The dinoflagellate *Prorocentrum minimum** was present in the surface layer with a cell number of 2700 cells/l. *P. alata* and the genus *Ceratium* were quite common. A fluorescence maximum was observed on a depth of 10 meters and was dominated by *P. alata* och *Ceratium* spp. *D. norvegica** was present with an abundance of 1600 cells/l, rather close to its critical limit of 2000 cells/l.

Drogden 11th and 14th of July

At the first visit in the southwestern Baltic / southern Sound, the surface layer was totally dominated by the three species of cyanobacteria, of which *N. spumigena** was the utter most abundant with the huge amount of 40 m/l. The first signs of surface accumulations of cyanobacteria appeared at this station.

At a revisit at Drogden three days later, increasing wind had had its effects on the surface waters, and the cyanobacteria found there were gone. The water was clear, and very few *N. spumigena** filaments were present in the surface layer. Instead, *P. alata* was common and a few other diatoms were present.

The Baltic Sea



Aphanizomenon sp.

Arkona Basin BY1 and BY2 11th of July

In the Arkona basin, dense, large patches of cyanobacteria accumulated at the surface were observed, which turned out to be dominated by *Nodularia spumigena** at both By1 and By2. *Anabaena* sp. and characteristic colonies of *Aphanizomenon* sp. were less abundant. In the integrated (0-10 m) sample from BY2 however, *Aphanizomenon* sp. was ten times more common than *N. spumigena**. The chlorophyll *a* concentration was above average.

Bornholm Basin BY 4 and BY5 12th of July

Further east, in the Bornholm basin, the situation was similar, though some dead filaments of *Nodularia spumigena** were found in the surface layer samples. As the surface accumulations were wider, the bloom was in a later stage here compared to Arkona. Large amounts of pennate diatoms were found on the *N. spumigena** filaments, mostly *Nitzschia* spp and some *Cylindrotheca closterium*. In the integrated sample (0-10 m) a few cells of the dinoflagellates *Ceratium macroceros* and *Dinophysis acuminata**, the diatom *Chaetoceros danicus* and the flagellate *Ebria tripartita* were found. In the eastern Bornholm basin the surface accumulations were eaven more dense and the water was mustard coloured. The situation was the same almost all the way to BCS III-10 in the southeastern Baltic.

The South East Baltic BCS III-10 12th of July

As the expedition got closer to BCS III-10 in Polish waters, the surface accumulations decreased and at the station the water had a healthy blue colour, although small white cyanobacteria aggregations were clearly visible when looking down into the water. Analysis revealed chlorophyll concentrations above normal and a domination of *N. spumigena**. The dinoflagellate *Heterocapsa triquetra* and the green alga *Scenedesmus* sp. were present at very low numbers.

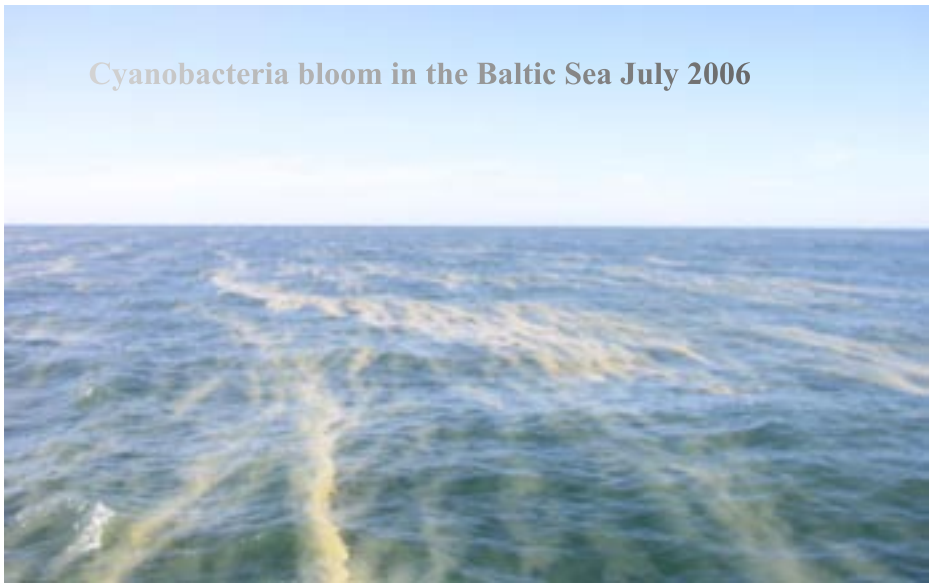
Nodularia spumigena

Eastern Gotland Basin BY10, BY15 and BY20 12 th and 13th of July

In the By 10 surface layer the amounts of *N. spumigena** and *Aphanizomenon* sp. were about the same. Some dead filaments of *N. spumigena** were observed, often accompanied by bleached filaments of *Anabaena* sp. A chlorophyll maximum of 4 µg/l at 8 meters was dominated by *Aphanizomenon* sp.. *N. spumigena** was common and a few *Anabaena* sp. filaments were present. At this depth the cyanobacteria seemed healthy. At BY 15 and BY 20, *Aphanizomenon* sp. dominated the surface layers, the chlorophyll fluorescence maxima as well as the integrated (0-10 m) sample.

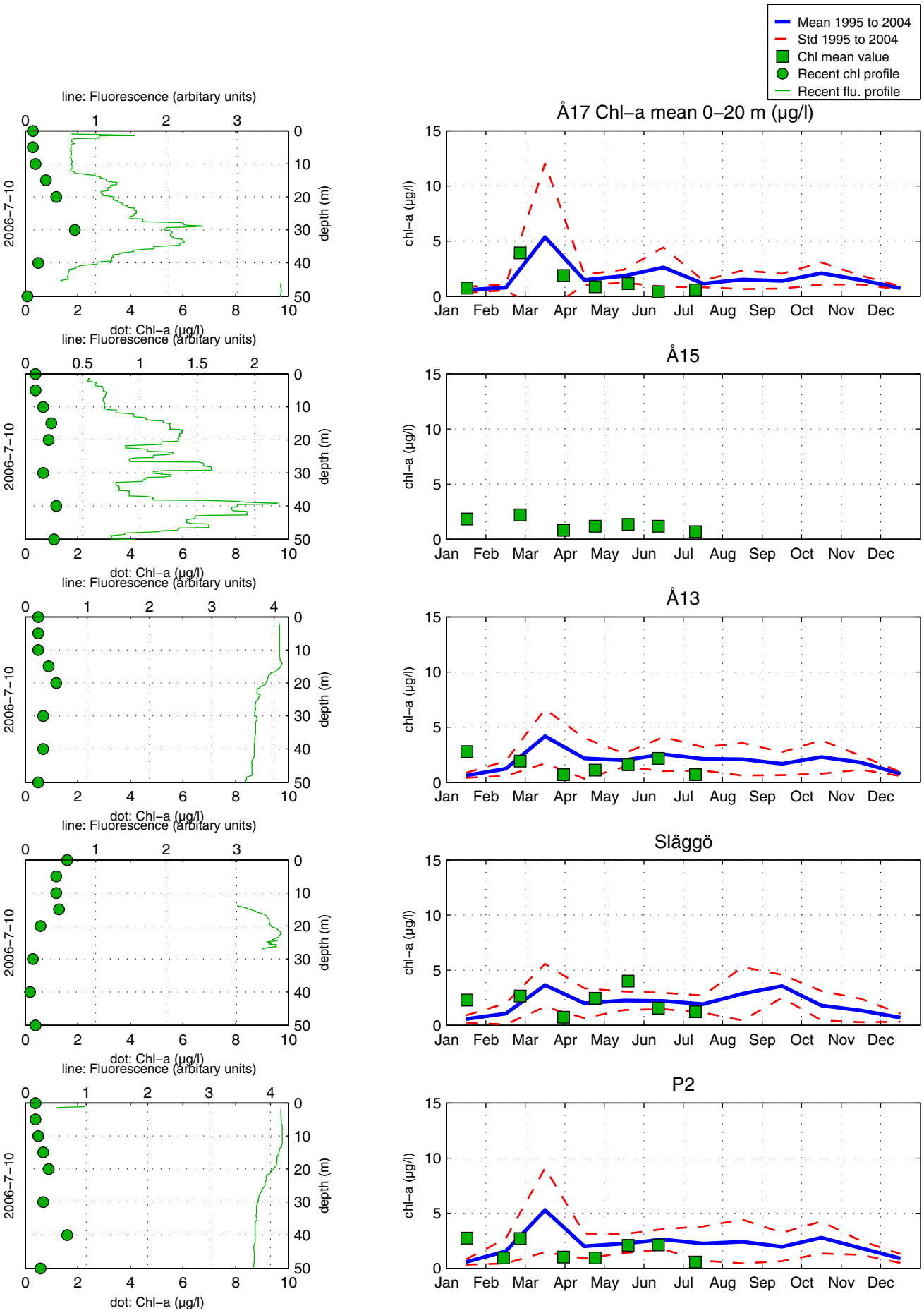
Western Gotland Basin BY32 and BY38 13th of July

The whole area was without surface accumulations, but as in similar earlier observations the small white cyanobacteria aggregations were visible when looking down into the water. In the BY 32 surface layer *N. spumigena** was abundant with some dead filaments, but Aphanizomenon sp. dominated. At BY 38 the amounts of *N. spumigena**, *Aphanizomenon* sp. och *Anabaena* sp. were about the same. Small amounts of the dinoflagellate genus *Dinophysis** and the flagellate *Ebria tripartita* were observed. In the integrated (0-10 m) sample, the amount of *Aphanizomenon* sp. was about 5 times the amounts of *N. spumigena** and *Anabaena* sp.

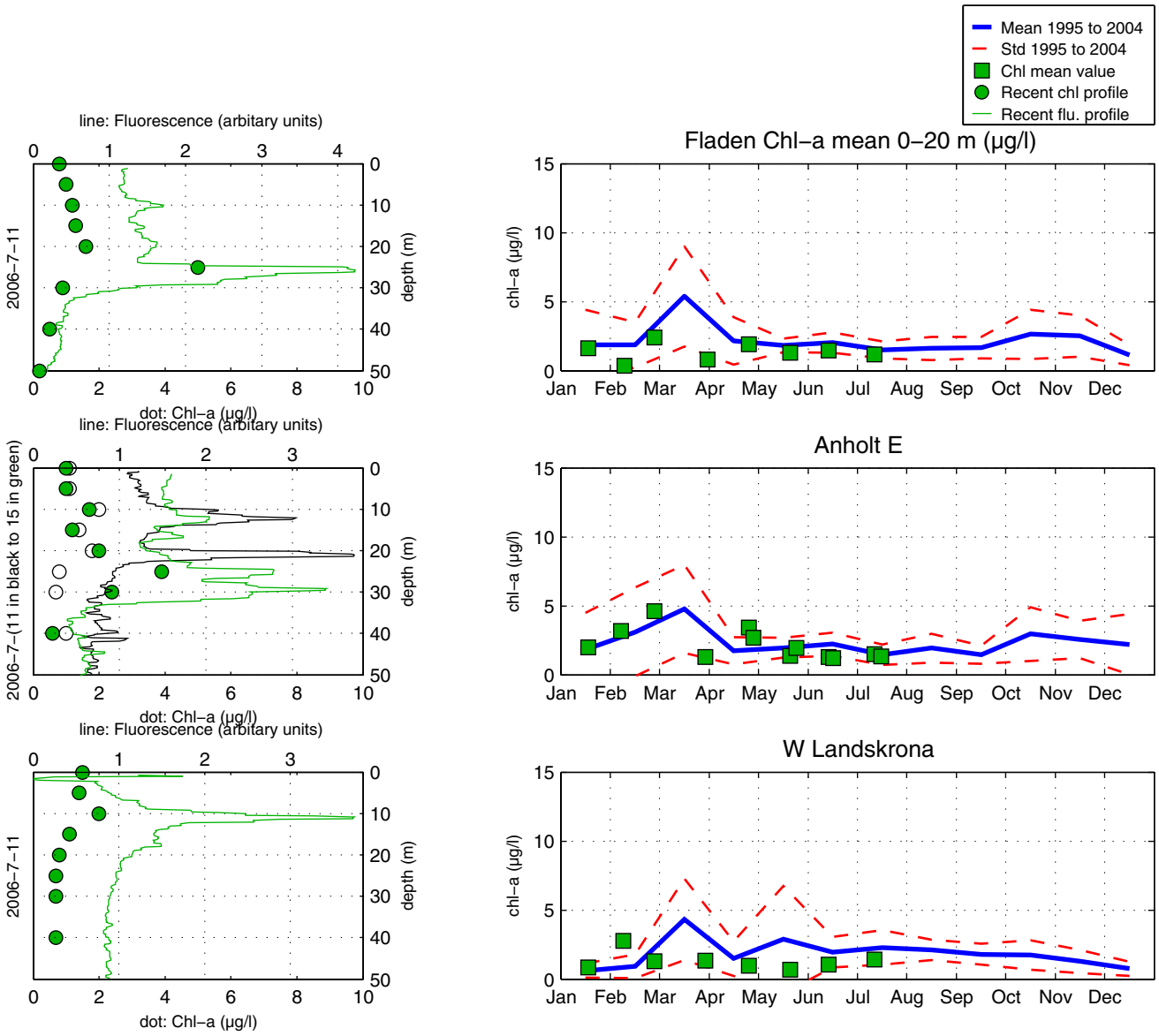


Selection of observed species Red = potentially toxic species	BY2 06-07-11 cells/L	BY5 06-07-12 cells/L	BCS III 10 06-07-12 cells/L	BY15 06-07-13 cells/L	BY38 06-07-13 cells/L
Chaetoceros danicus		present			
Cylindrotheca closterium	13 000	common	common	common	3500
Nitzschia sp.	500 000	very common	very common	very common	very common
Amphidinium crassum				present	
Ceratium tripos	present				
Dinophysis norvegica				present	
Dinophysis acuminata				present	
Dinophysis acuta				present	
Heterocapsa triquetra			present		
Phalacroma rotundatum				present	
Scenedesmus sp.			present		
Ebria tripartia		present			
Chrysochromulina spp	27 000				3500
Anabaena sp	very common	very common	very common	0.3 m/L	very common
Aphanizomenon spp	4.9 m/L	9.8 m/L	4.1 m/L	1.0 m/L	very common
Nodularia spumigena	7.9 m/L	13.3 m/L	9.6 m/L	0.3 m/L	very common

The Skagerrak



The Kattegat and the Sound



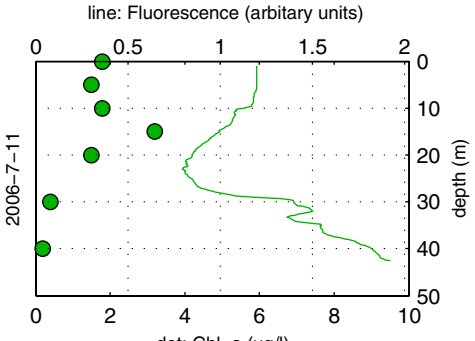
Om klorofylldiagrammen

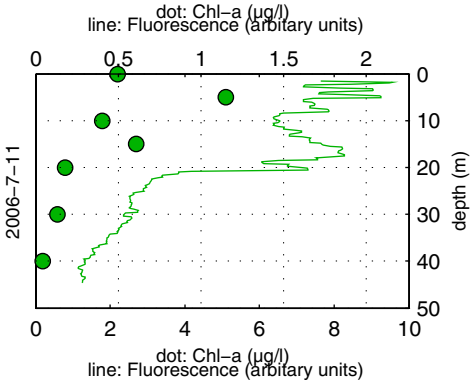
Klorofyll *a* är ett mått på mängden växtplankton. Prover tas från ett antal djup från U/F Argos. Data presenteras både från de fasta djupen och som medelvärden 0-20 m. Utöver resultaten från laboratorieanalyserna av vattenprover mäts klorofyll *a* som fluorescens från ett automatiskt instrument som sänks ned från fartyget. På så sätt kan djupt liggande, ibland, tunna alger av växtplankton observeras.

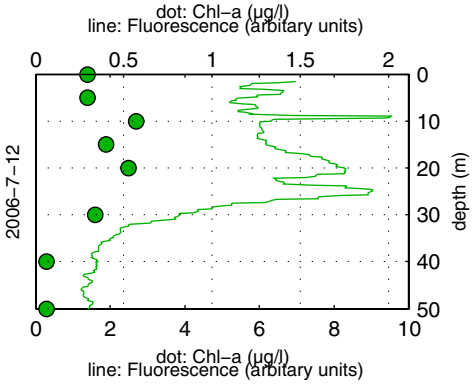
About the chlorophyll graphs

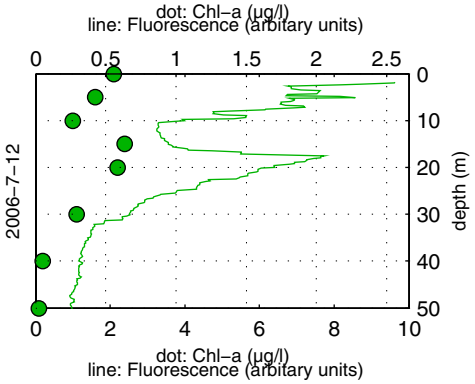
Chlorophyll *a* is sampled from several depths from the R/V Argos. Data is presented both from the discrete depths and as an average 0-20 m. In addition to the laboratory analysis from the water samples chlorophyll fluorescence is measured in continuous depth profiles from the ship. This is a way to observe thin layes of phytoplankton occuring below the surface.

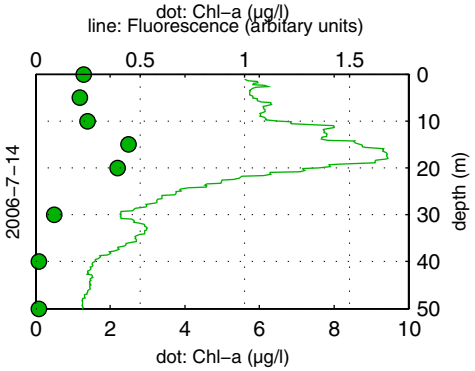
The Southern Baltic

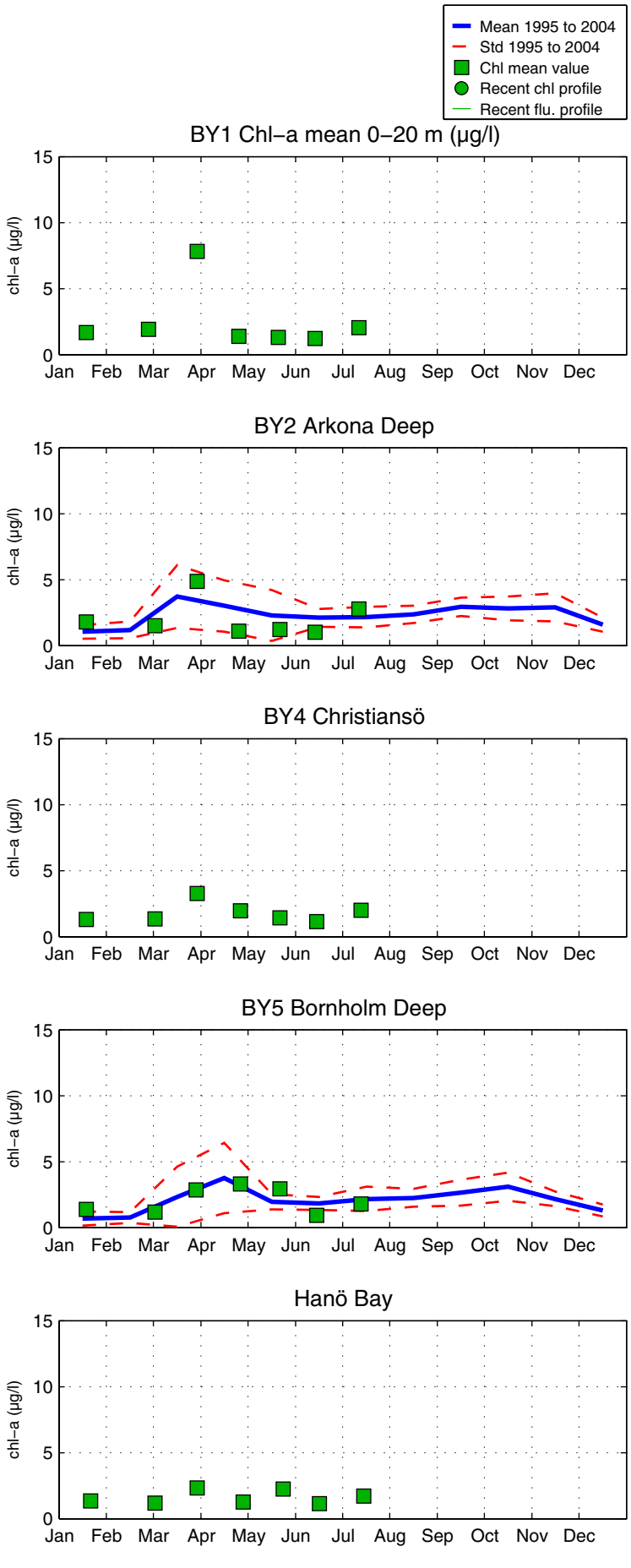




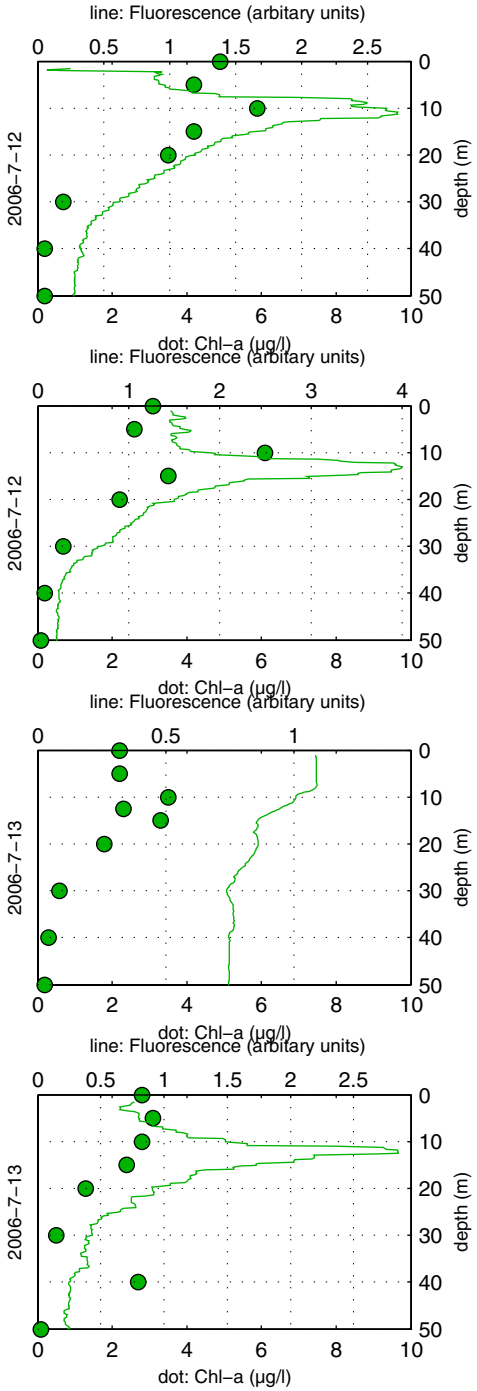


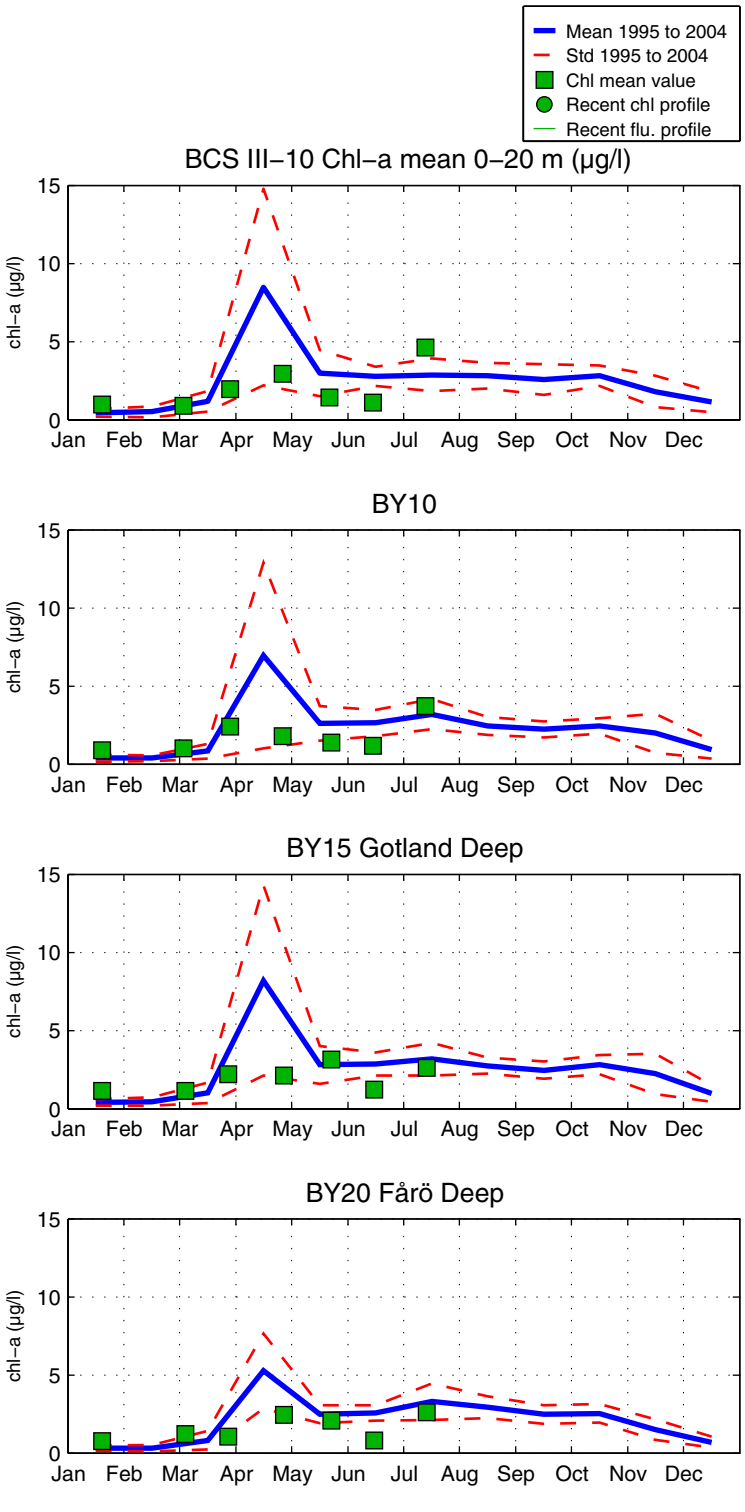




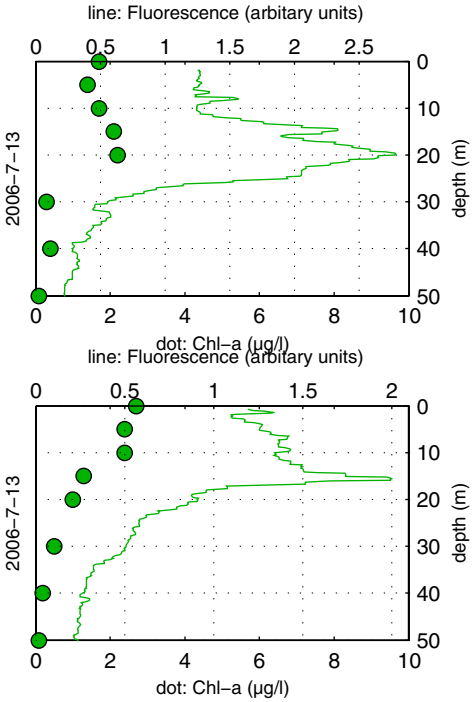


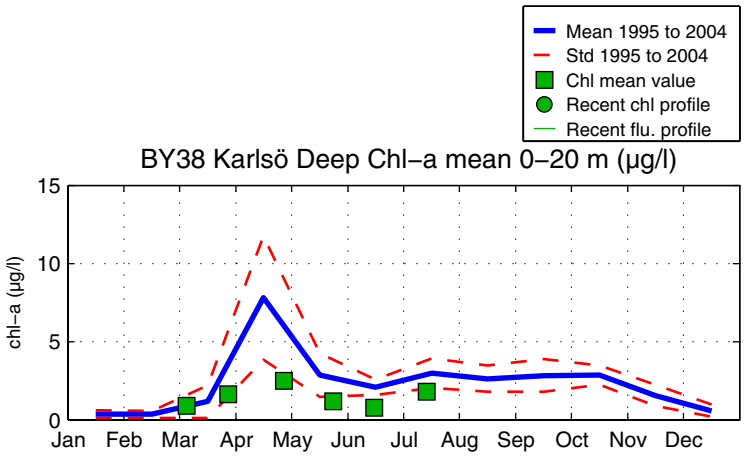
The Eastern Baltic

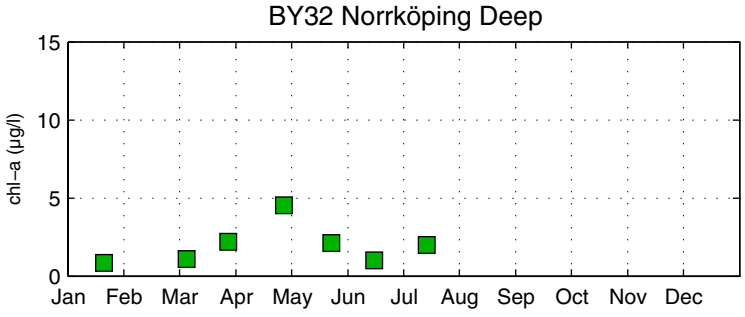




The Western Baltic







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