Harmful Algae Blooms in Coastal Waters of China in 2011

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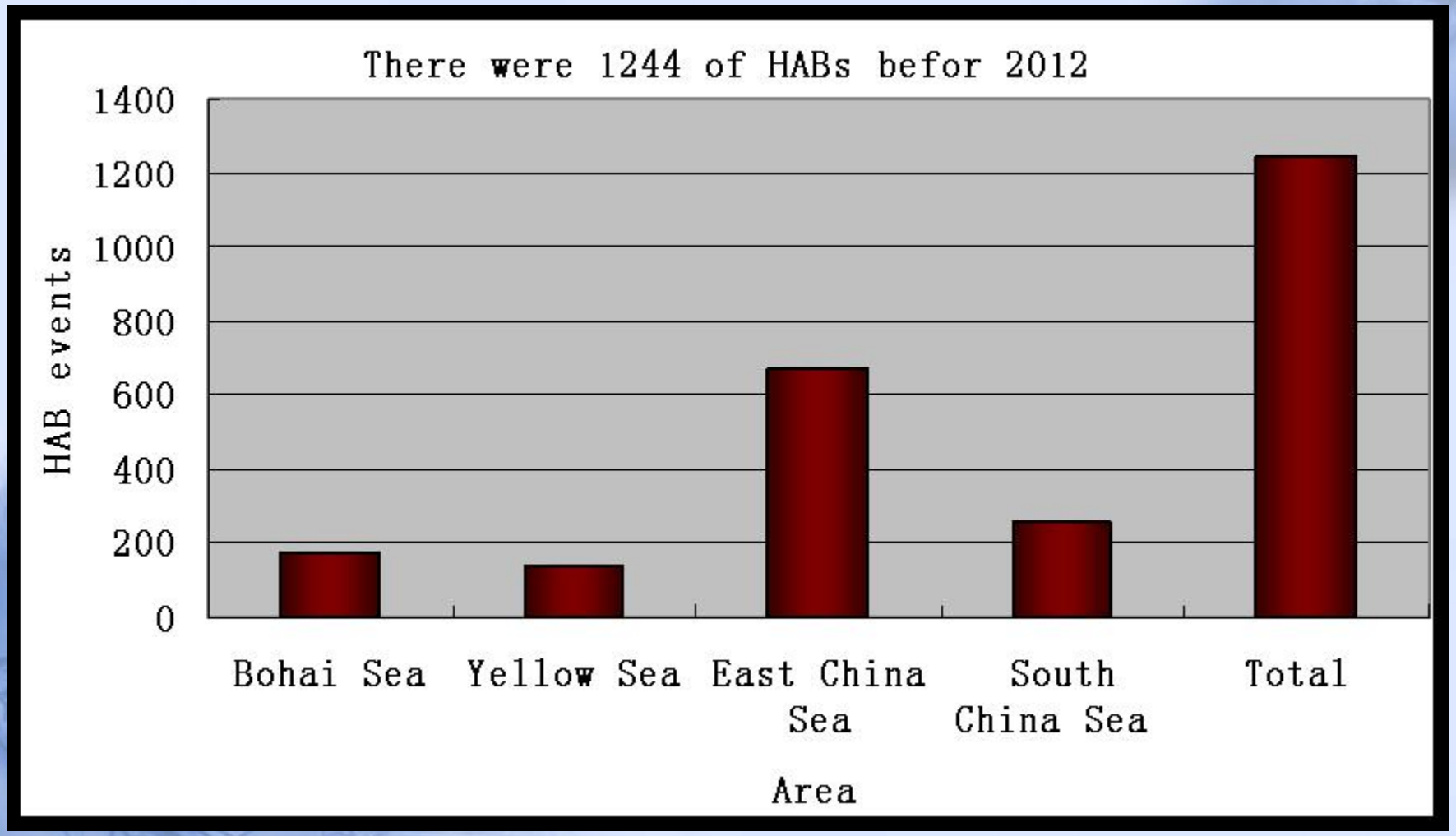
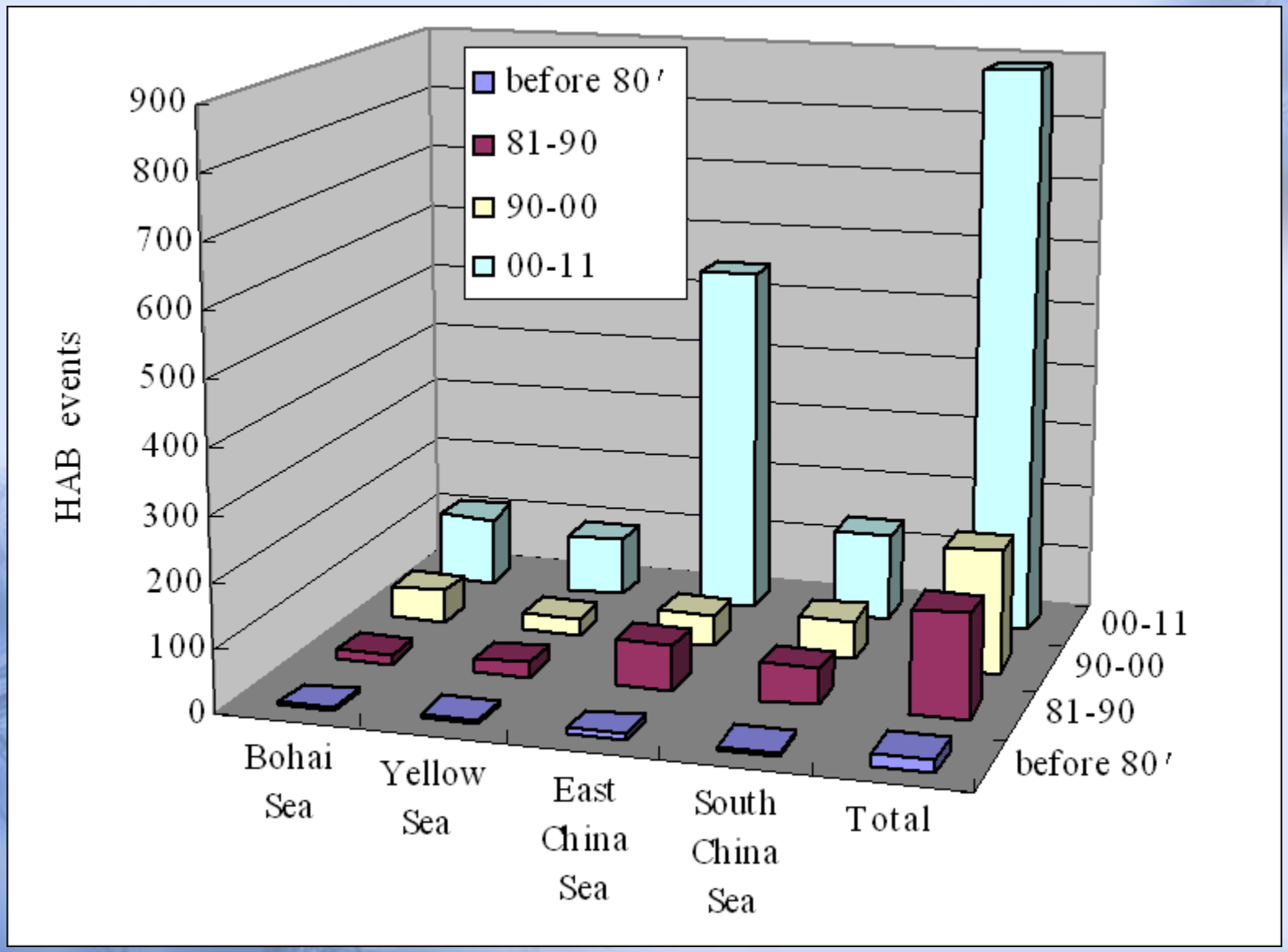
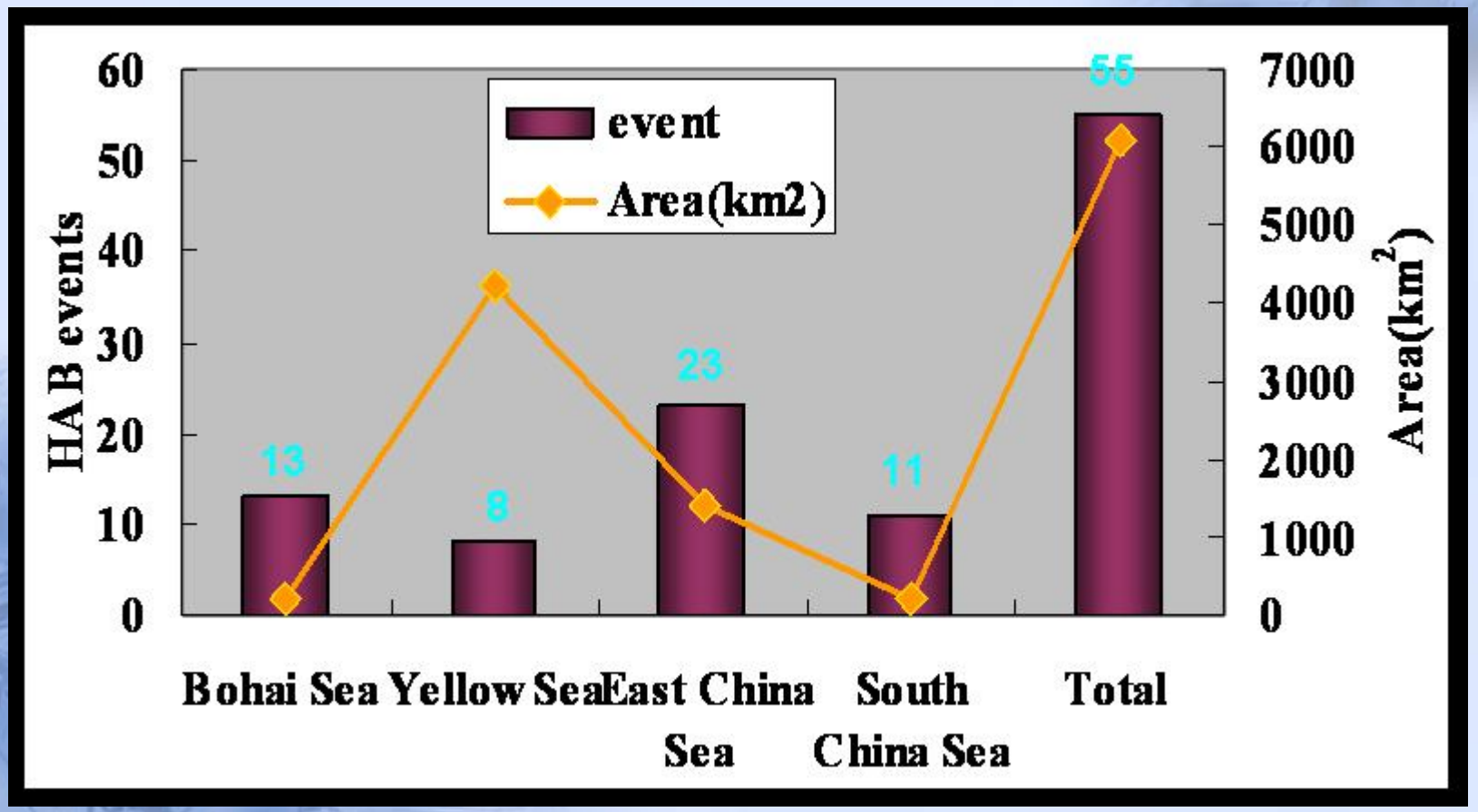

There were 1244 of HABs befor 2012
1400
1200
1000
800
600
400
200
0
HAB events
Bohai Sea
Yellow Sea
East China Sea
South China Sea
Total
Area

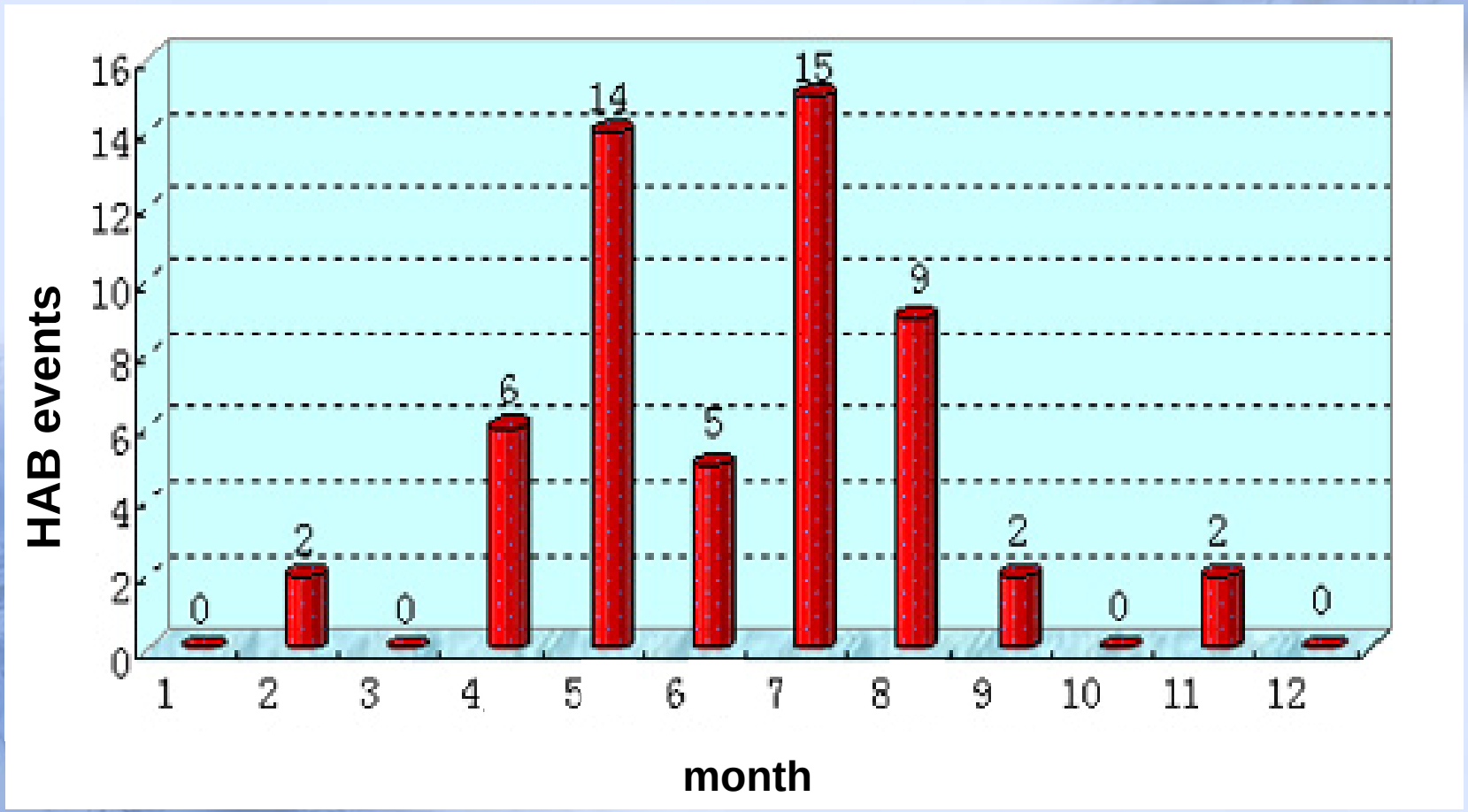

before 80′
81-90
90-00
00-11
HAB events
900
800
700
600
500
400
300
200
100
0
Bohai Sea
Yellow Sea
East China Sea
South China Sea
Total
00-11
90-00
81-90
before 80′

The frequency and Area of HAB in China Sea in 2011



total affected area of 6076 km^2

Season of occurrence of HABs in 2011



There were 21 species of HAB in 2011

13 records : *Prorocentrum donghaience* bloom only in East China Sea

11 records: *Noctiluca scintillans*

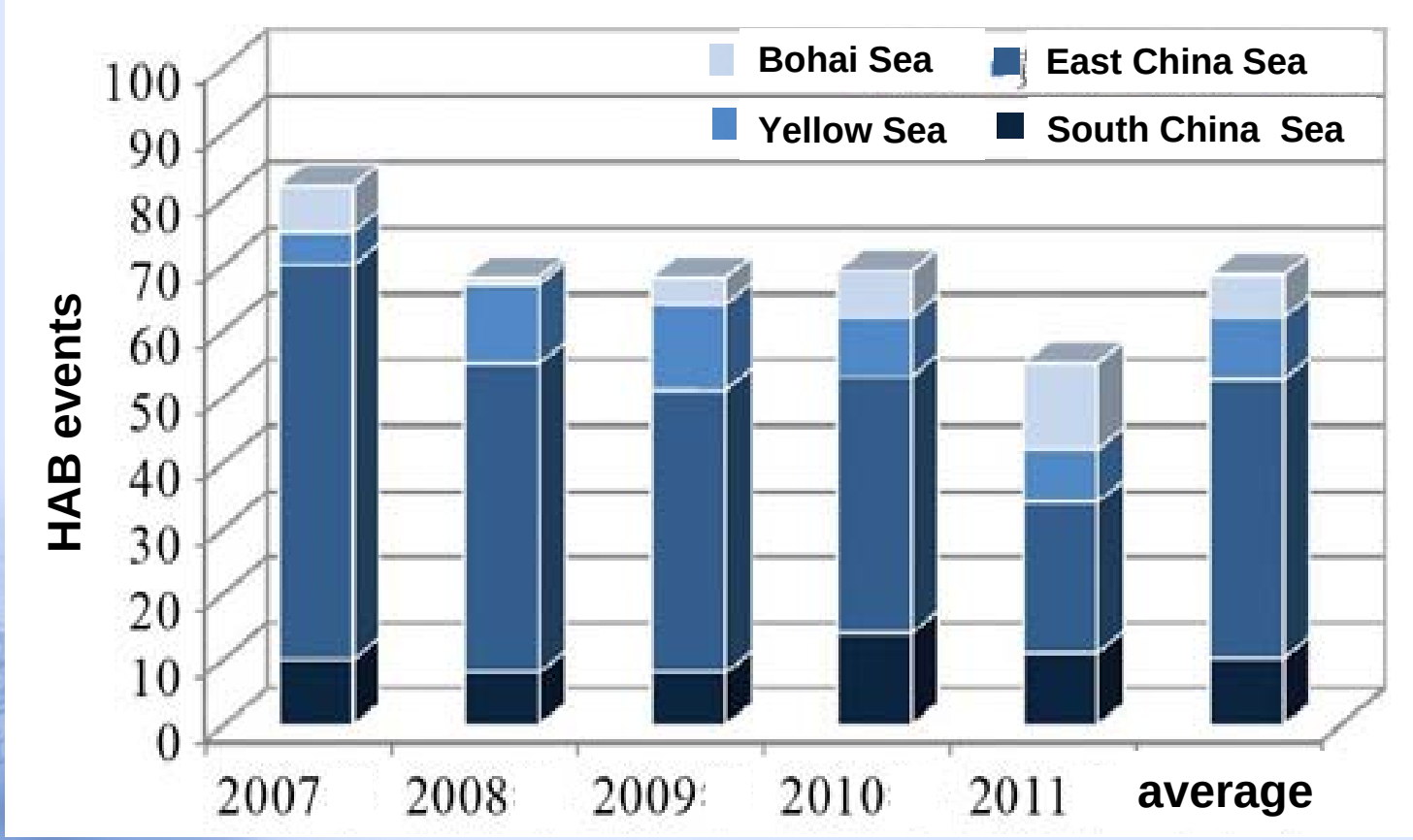
7 records: *Skeletonema costatum*

3 records: *Akashiwo sanguinea*

2 recoeds: *Phaeocystis globosa, Heterosigma akashiwo, Gyrodinium spirale*,

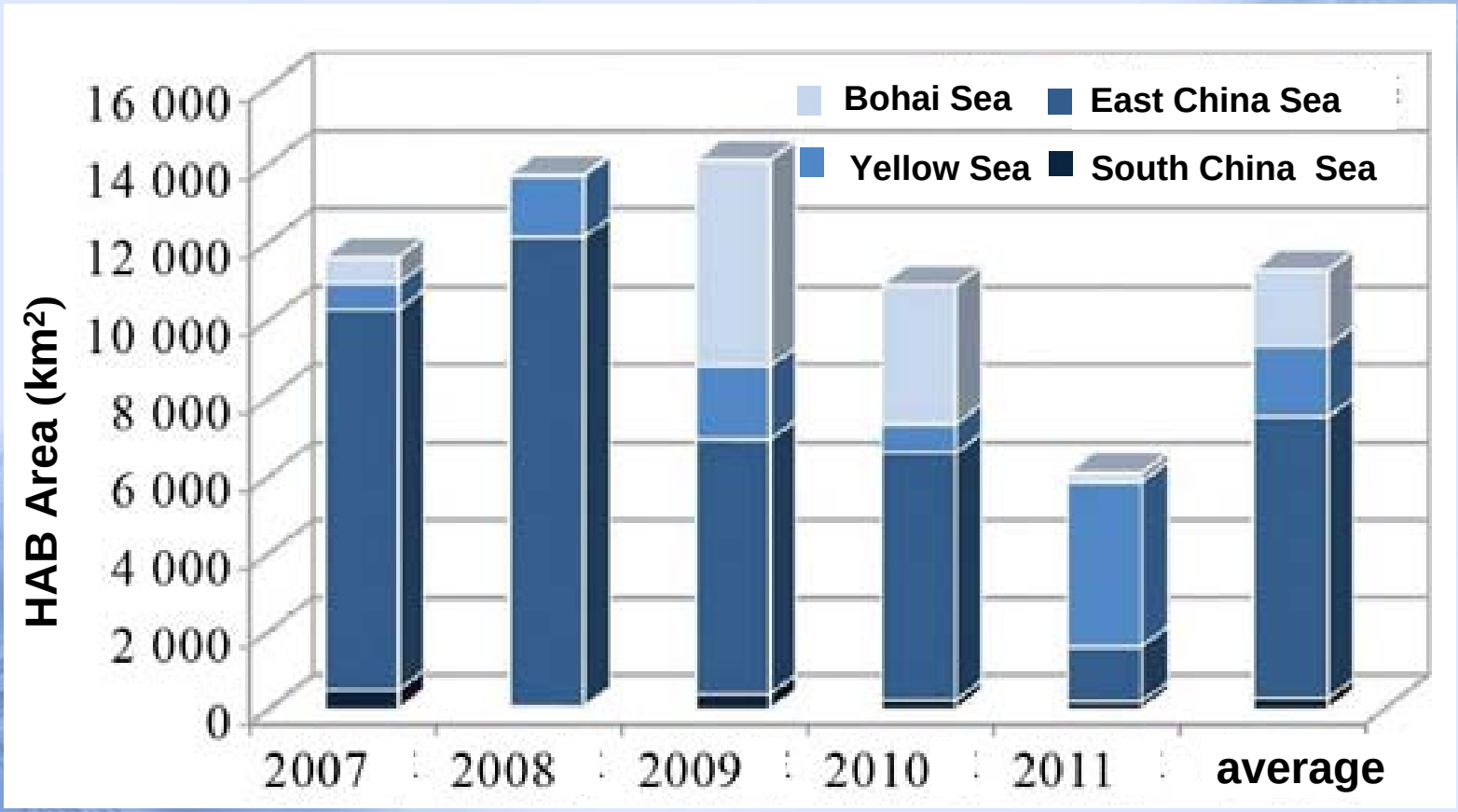
1 record;*Cochlodinium polykrikoidis,Prorocentrum minimun, Karenia breve*，*Chattonella,*sp.，*Chattonella antiqua*，*Gymnodinium* sp.(may be *Karlodinium*） ，*Pseudonitzschia pungens, Eucampia zoodiacus, Leptocylindrus danicus, Rhizosolenia delicatula, et.al.,*

Aureococcus anophagefferen (Belong to PELAGOPHYCEAE)



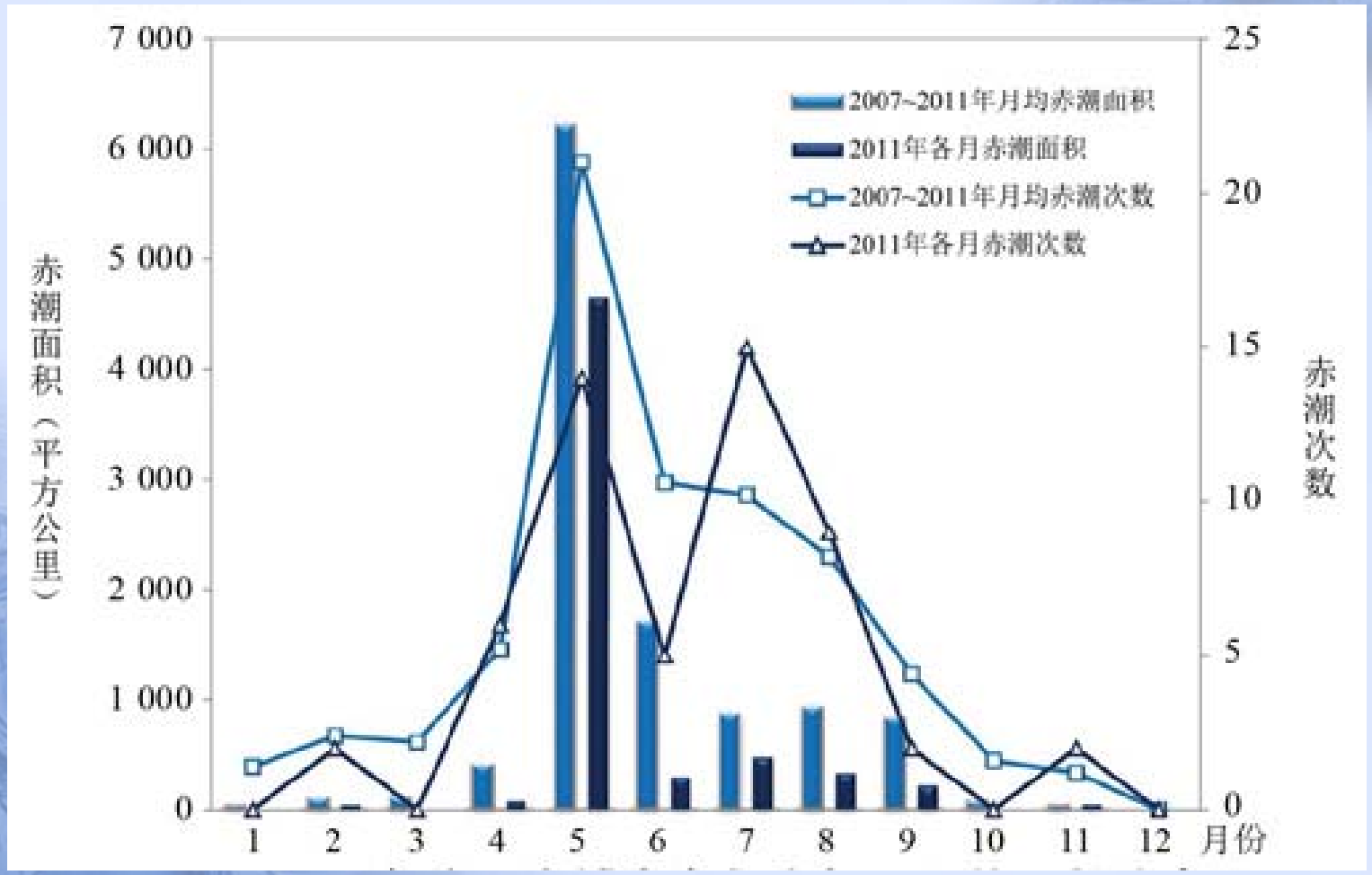
HABs in coastal waters of china from 2007 to 2011

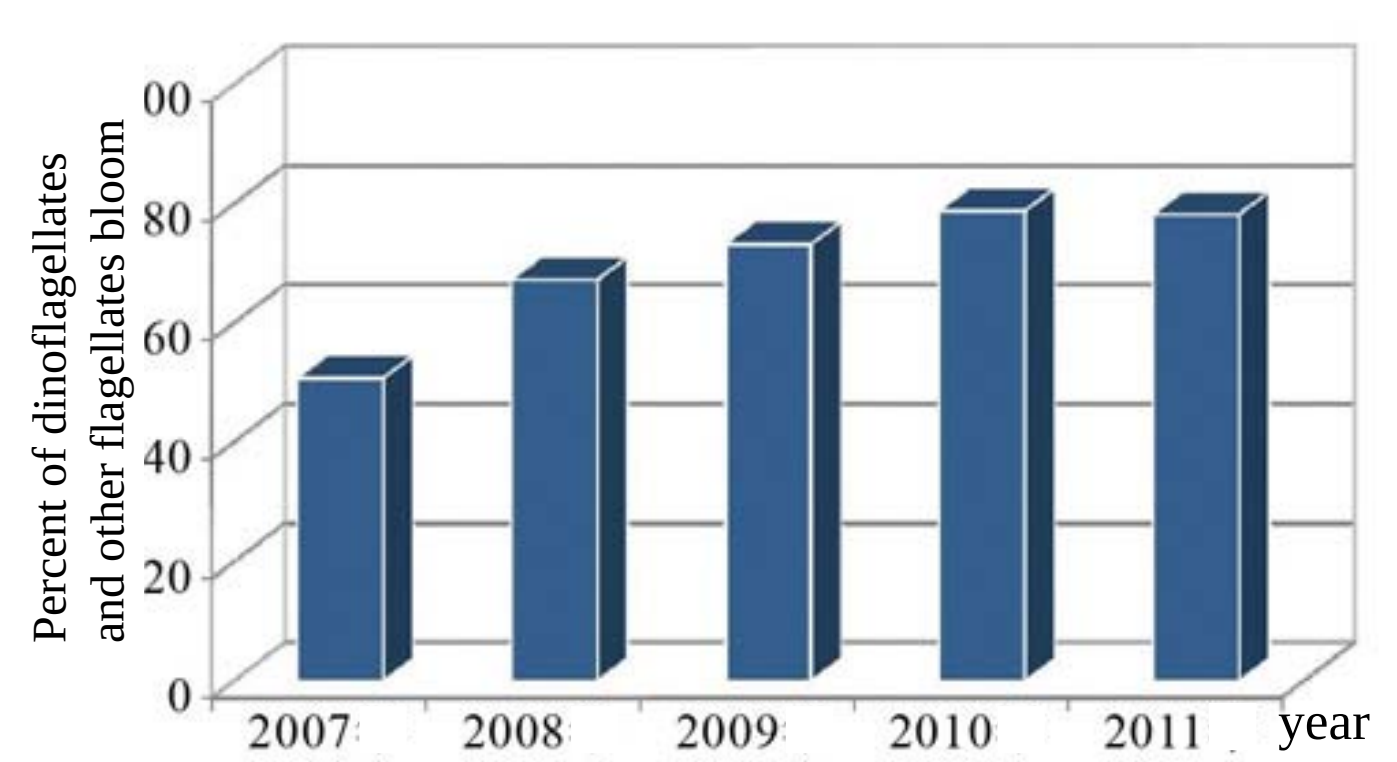
Area of HABs in coastal waters of china from 2007 to 2011



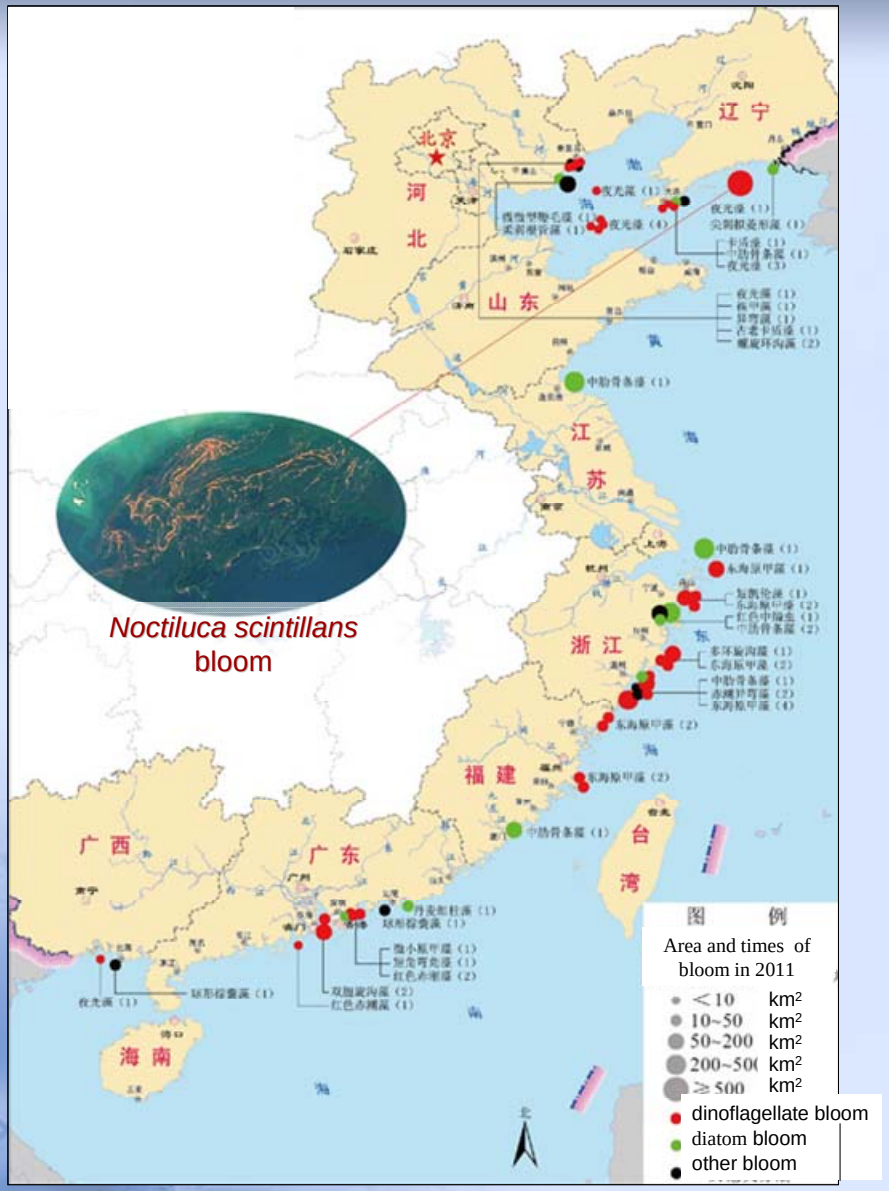
Compared with HAB in recent 5 years, HABs in 2011 were lowest both in frequency and area affected.

The season with frequent HAB was from May to September





The HAB caused by dinoflagellates and other flagellates were increased.



HABs in coastal waters in China in 2011

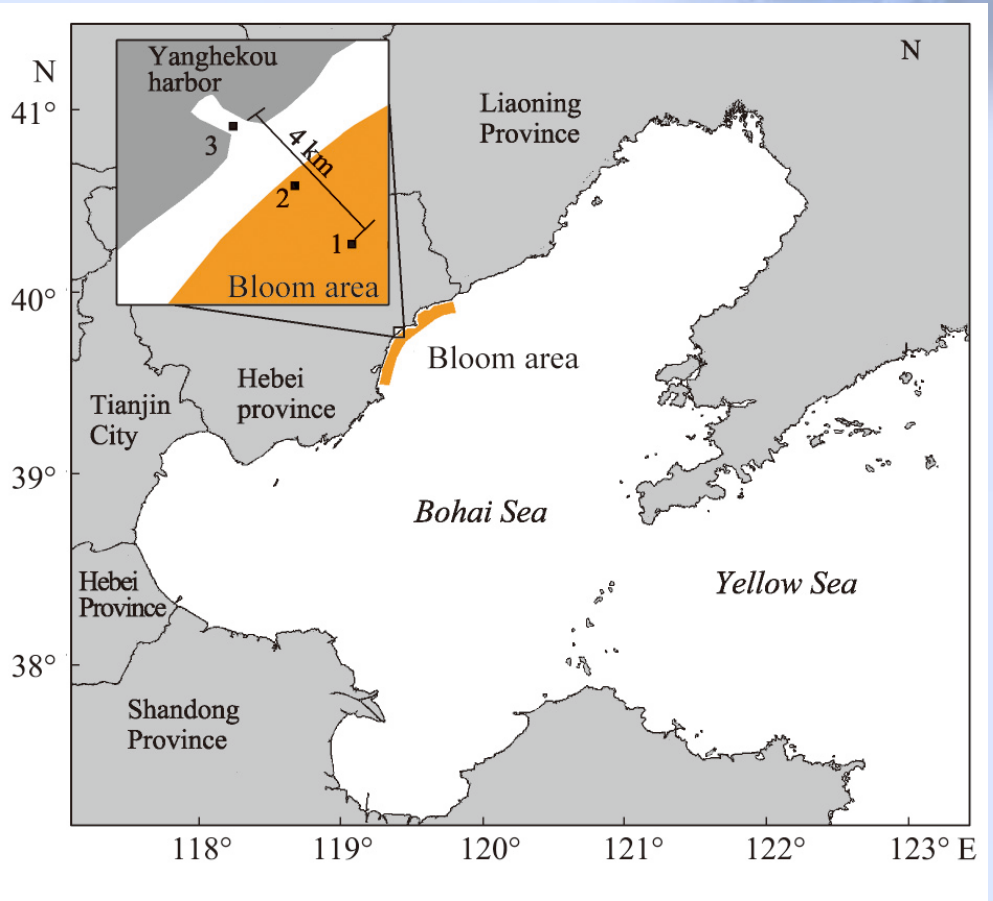
Fengao Lin et.al divided HABs causative species in coastal waters of China into three categories based on their average annual number and total area of occurrence from 2006 to2010:

high, frequent and common bloom-forming species

- **4 high occurrence HAB species : *Prorocentrum donghaiense*, *Skeleonema costatum*,*Noctiluca scintillans* and *Karenia mikimotoi*;**
- **4 frequent occurrence HAB species :*Phaeocystis globosa*, *Chaetoceros* sp., *Heterosigma akashiwo* and *Rhodomonas* sp.;**
- **8 common bloom-forming species :*Thalassiosira* sp.,*Mesodinium rubrum*, *Scrippsiella trochoidea*, *Ceratium* sp., *Gonyaulax spinifera*, *Akashiwo sanguinea*, *Chattonella marina* and *Gymnodinium* sp.**

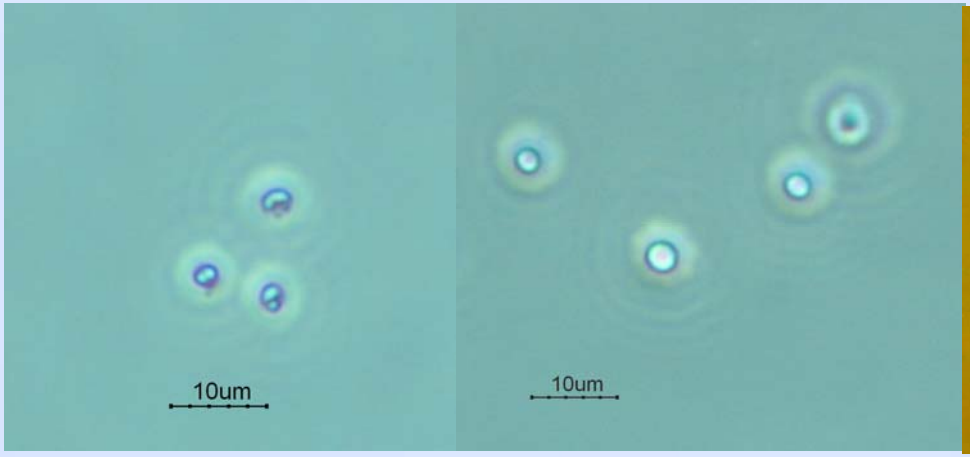
Bloom of *Phaeocystis globosa* in Beihai coast of Guangxi Province in 2011

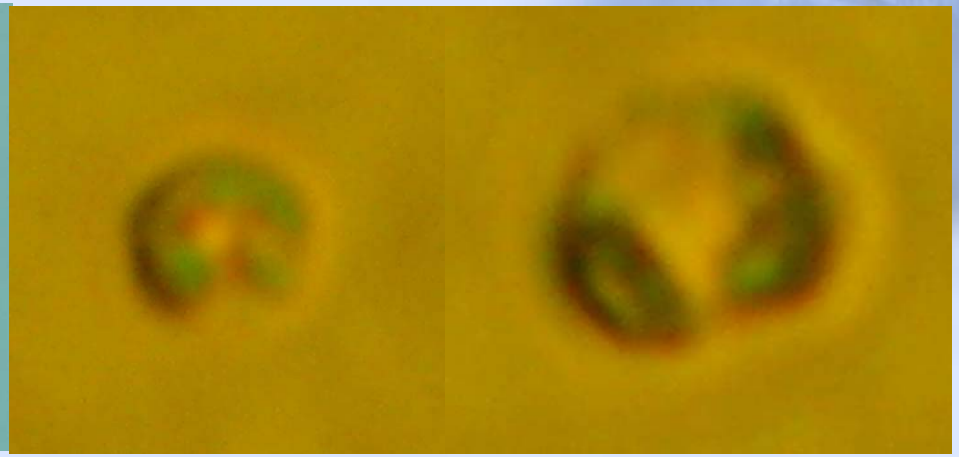
Brown tide in coast waters of Qinghuangdao ,Hebei Province-a small new HAB species

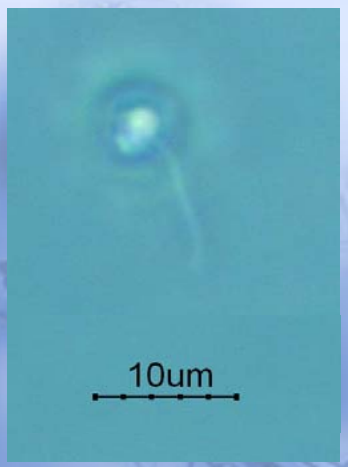


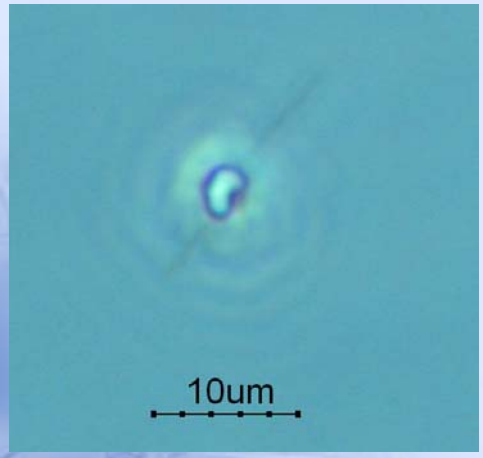
(From Kong Fanzhou, et .al.,2012)

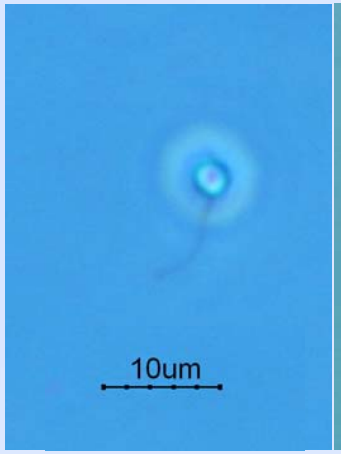
The specimen picture from field samples in July/2010

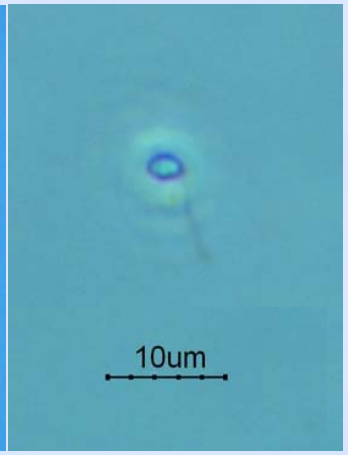




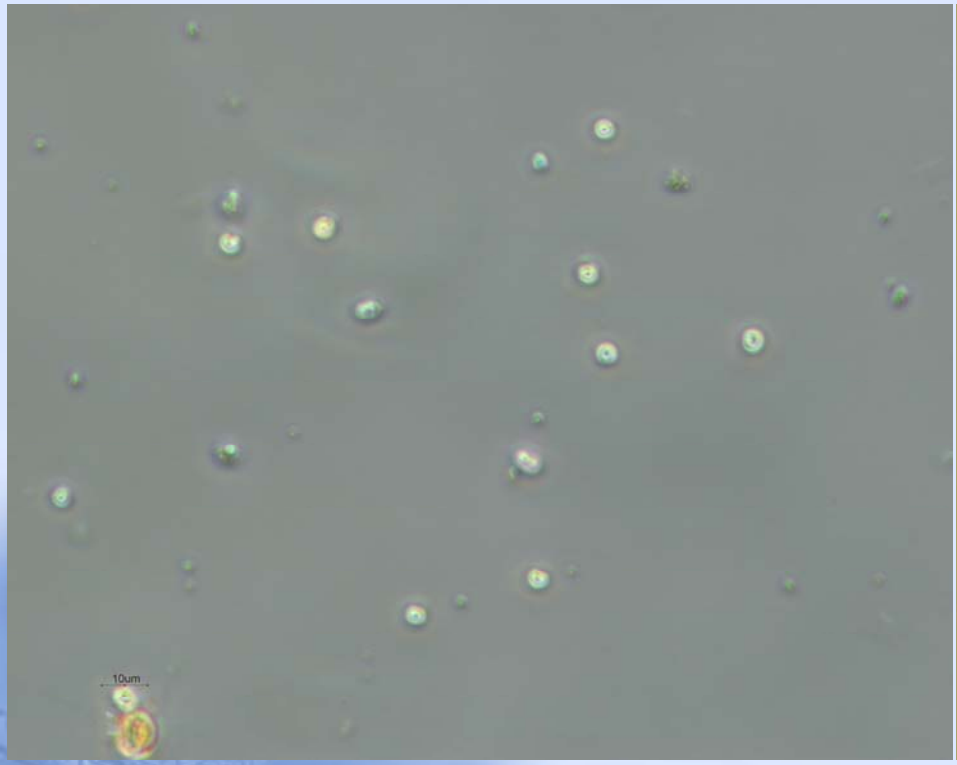


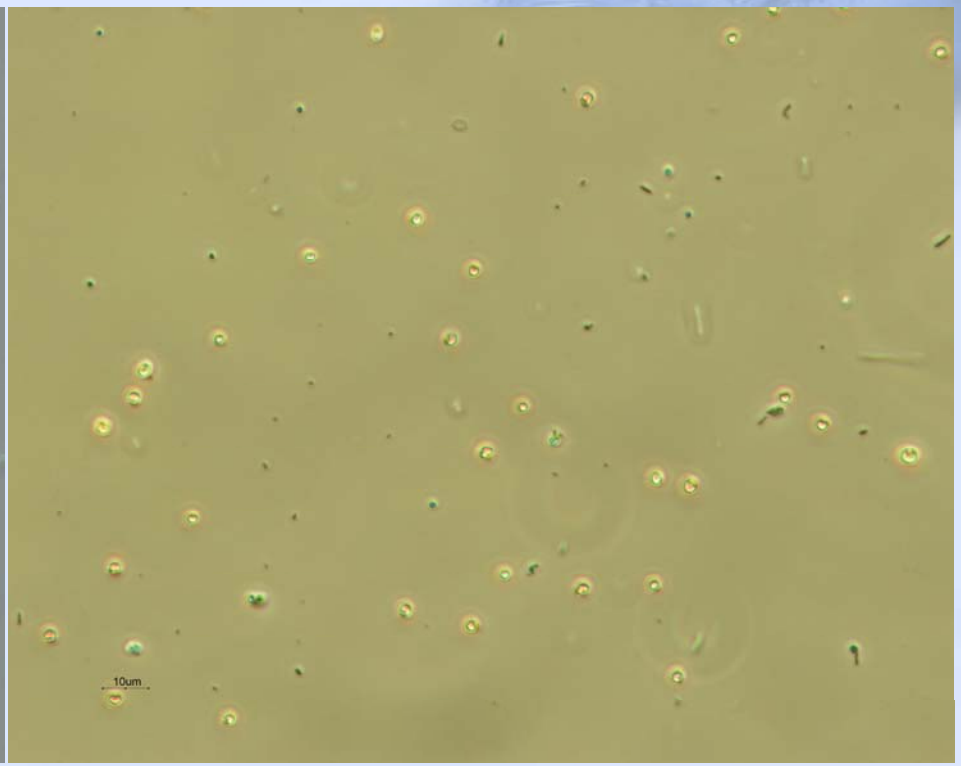






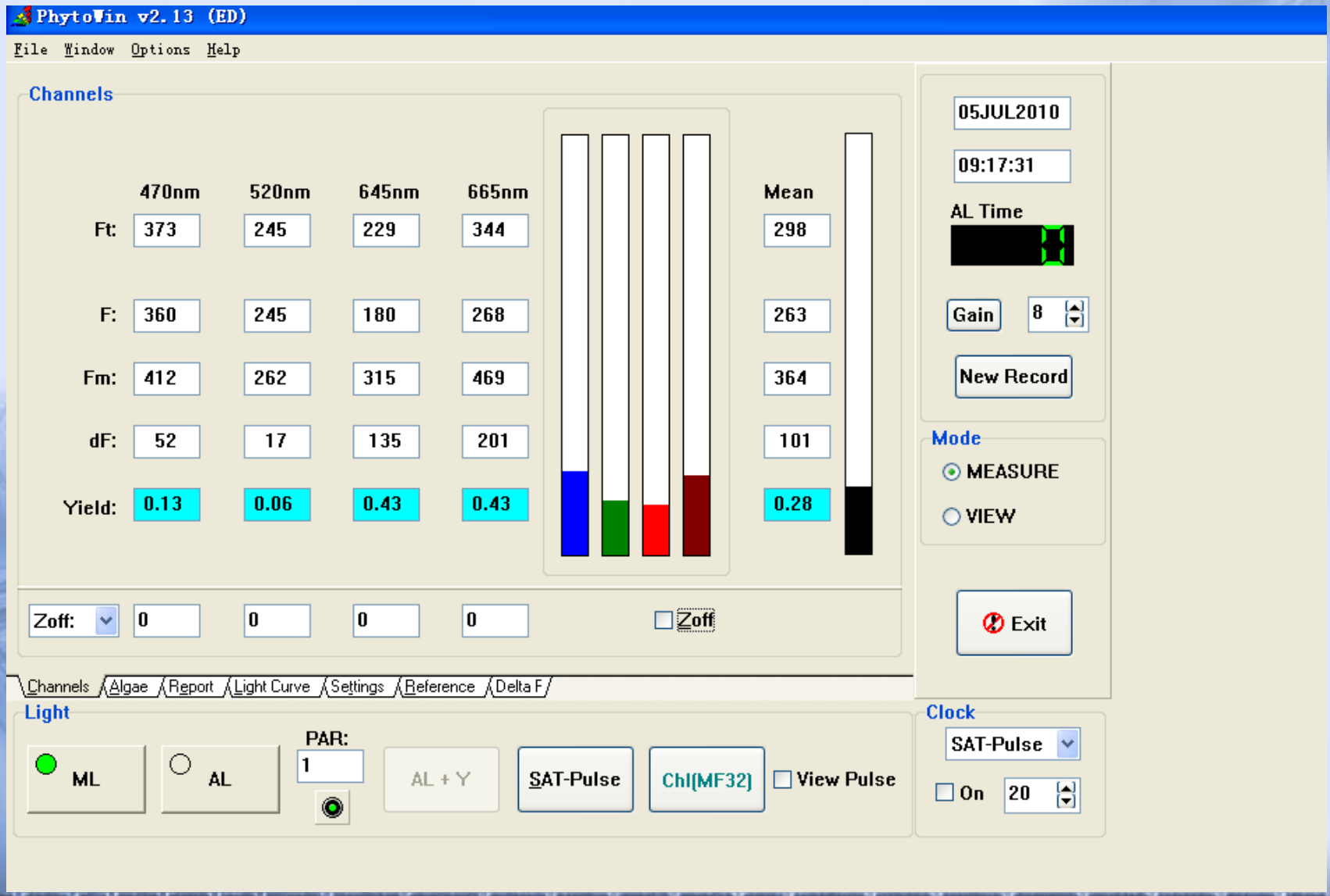
The specimen picture from field samples in June/2011

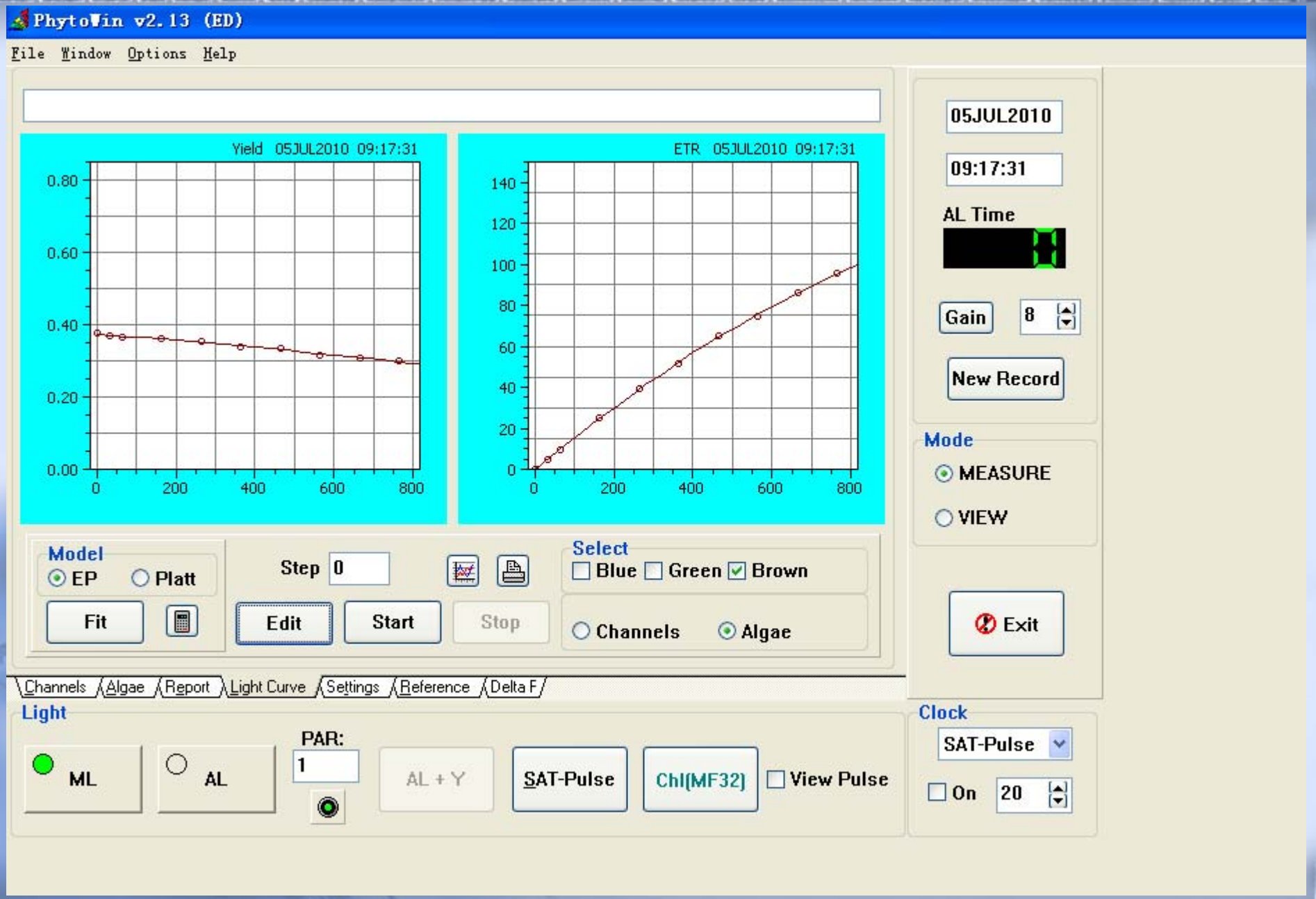




Similar with *Aureococcus anophagefferens*

PHYTO-PAM datum




PhytoWin v2.13 (ED)
File Window Options Help
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ETR 05JUL2010 09:17:31
140
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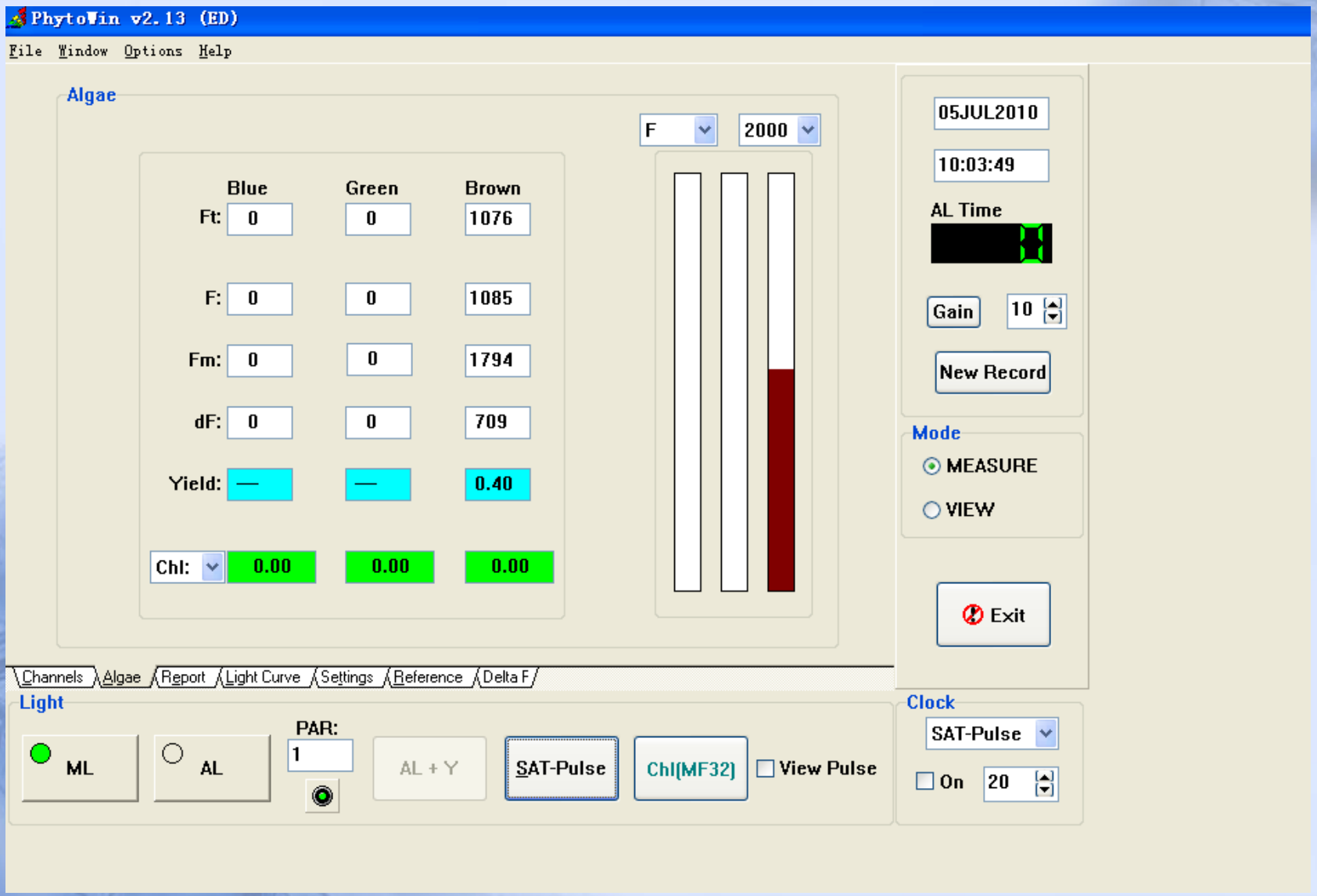
PhytoWin v2.13 (ED)
File Window Options Help
Algae
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2000
Blue Green Brown
Ft: 0 0 1076
F: 0 0 1085
Fm: 0 0 1794
dF: 0 0 709
Yield: — — 0.40
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05JUL2010
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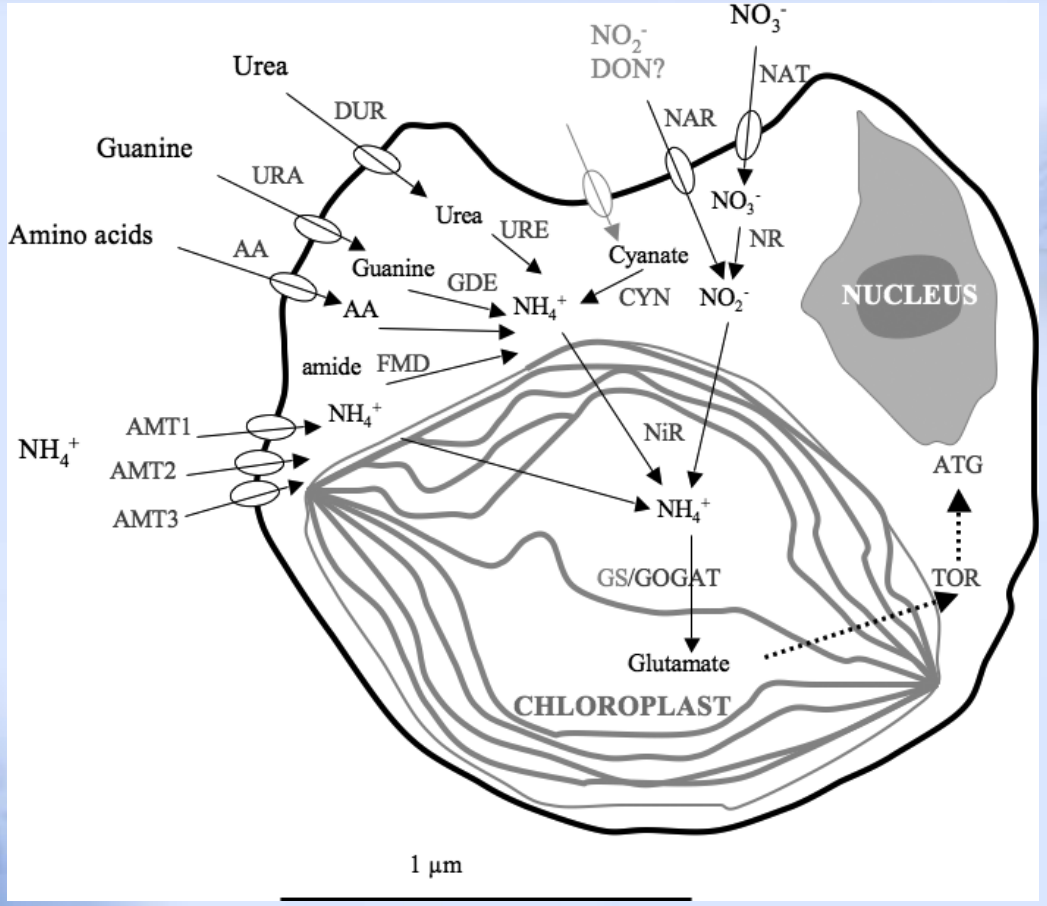

Schematic of partial N transport and assimilation network present in *Aureococcus anophagefferens*.（Gry Mine Berg et al.,2008

From (http://psort.nibb.ac.jp)

Macroalgae bloom in Yellow Sea

year	The largest distribution area (km^2)	Covered area (km^2)
2009	58 000	2 100
2010	29 800	530
2011	26 400	560

The distribution image of *Ulva prolifera* by aviation in 13/July/2011of Qingdao beach

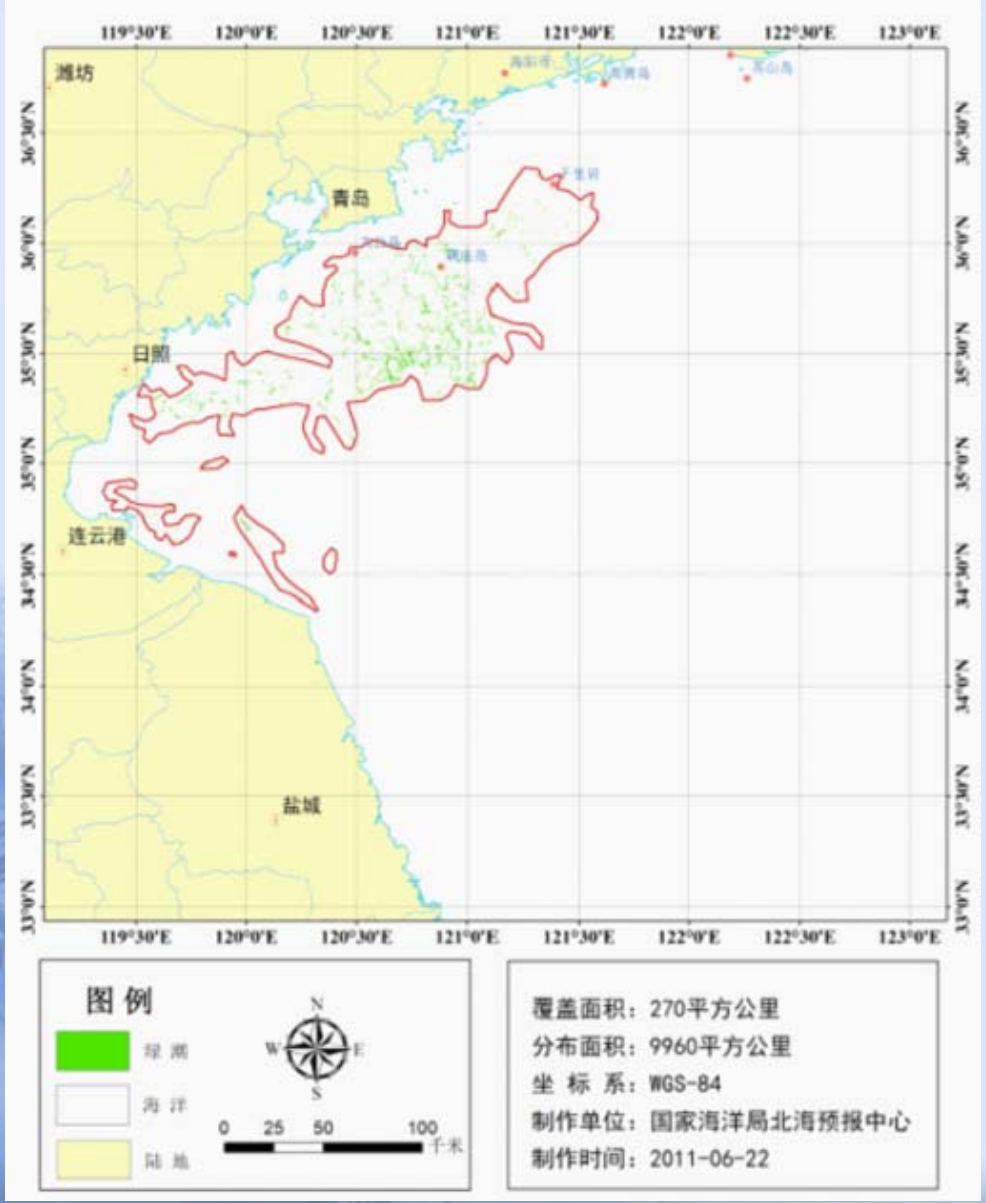

Image of remote sensing in 2011-06-22

(form Beihai Branch,SOA)

Green algae bloom may be correlated with culture of Porphyla ?

Summary

- The frequency and area of HABs was decreased than befor,and was the lowest compared with recent 5 years
- New HAB species appear continously,for exsample, *Aureococcus anophagefferens* .
- But Macroalgae bloom (*Ulva prolifera*) still continue and develop in west coast in Yellow Sea every year

Thank you for your attention