

Water Monitoring

Methods

Specific for Low cost monitoring method

NIGLAS 2013.10



Monitoring – The Context

Policy:

- Who are involved in
- What's the different purpose
- What's the division on monitoring area

Standard:

- Contents, parameters, emphases
- Standard development

Technology:

- Traditional technology
- Current technology

Policy

Who are involved into Water Monitoring



Who are involved into Water Monitoring

State Level



中华人民共和国水利部

The Ministry of Water Resources of the People's Republic of China

M.Of Water resources



中华人民共和国环境保护部

Ministry of Environmental Protection of the People's Republic of China

M.Of Environmental Protection



国家海洋局

State Oceanic Administration People's Republic Of China

State Oceanic Administration



中华人民共和国住房和城乡建设部

Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD)

M. Of Housing and Urban-Rural development



中华人民共和国卫生部

MINISTRY OF HEALTH OF THE PEOPLE' S REPUBLIC OF CHINA

M. Of Health



国务院国有资产监督管理委员会

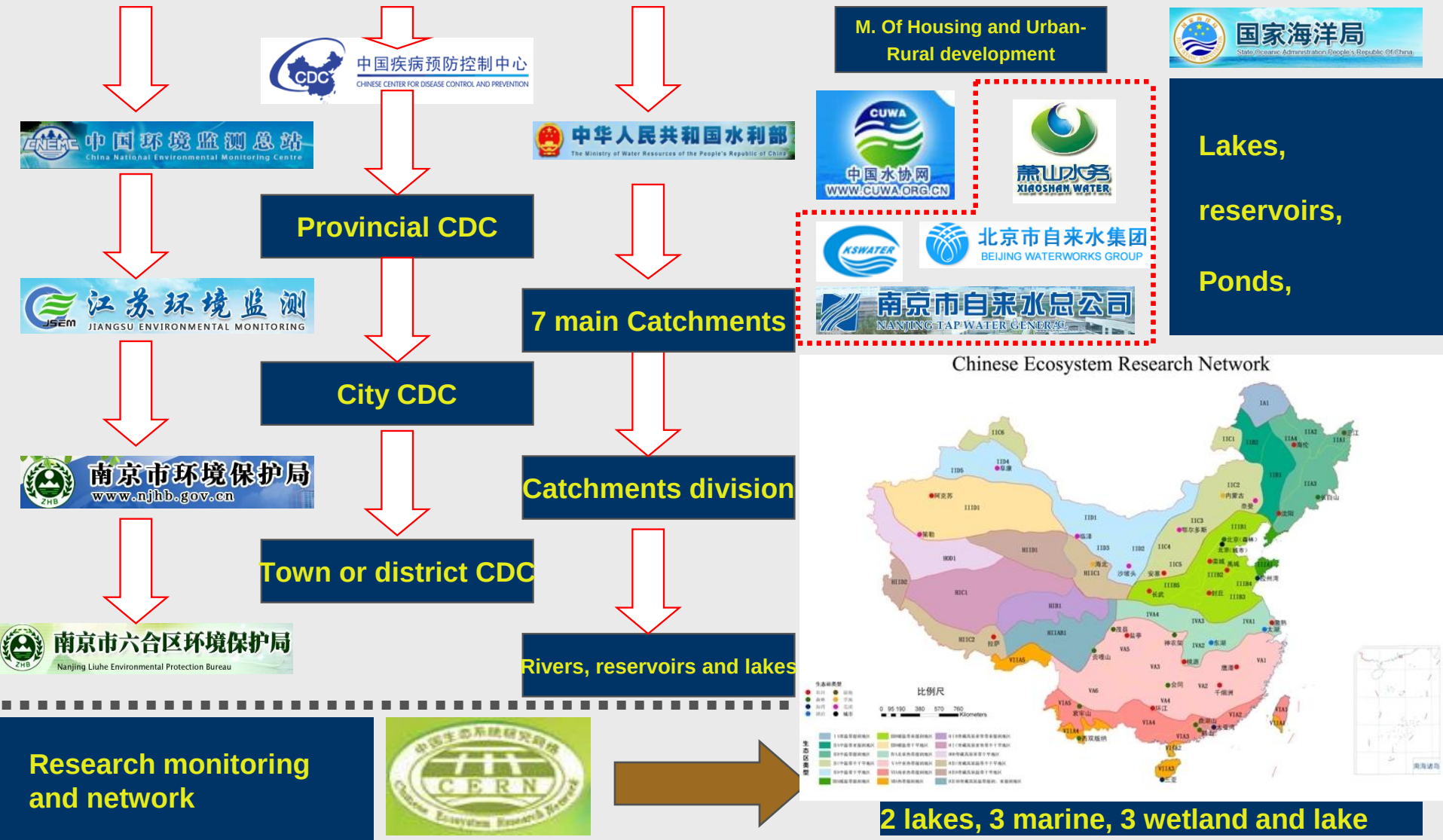
State-owned Assets Supervision and Administration Commission of the State Council

State-owned Assets supervision and administration commission

And Even More

- Agriculture (irrigation...)
- Forest (Nature reserve, Wetland)
- Special industry, such as:
Electricity, Electronic, Pharmaceutical

WATER MONITORING SYSTEM



NIGLAS – Water monitoring

Nanjing, China





中华人民共和国环境保护部

Ministry of Environmental Protection of the People's Republic of China

State Level

State level (3 sets of data reported every day)
137 Automatic/Continuous Monitoring Station

State level (3 sets of data reported every month)
759 Control profile covered Rivers, Reservoirs and Lakes



● 为已建的四十二个水质自动监测站

Hydrology Station: > 3450

Rain Station: > 16273

Underground water station: > 13648

Many of them had the water environment monitoring system covers the rivers, lakes and reservoirs

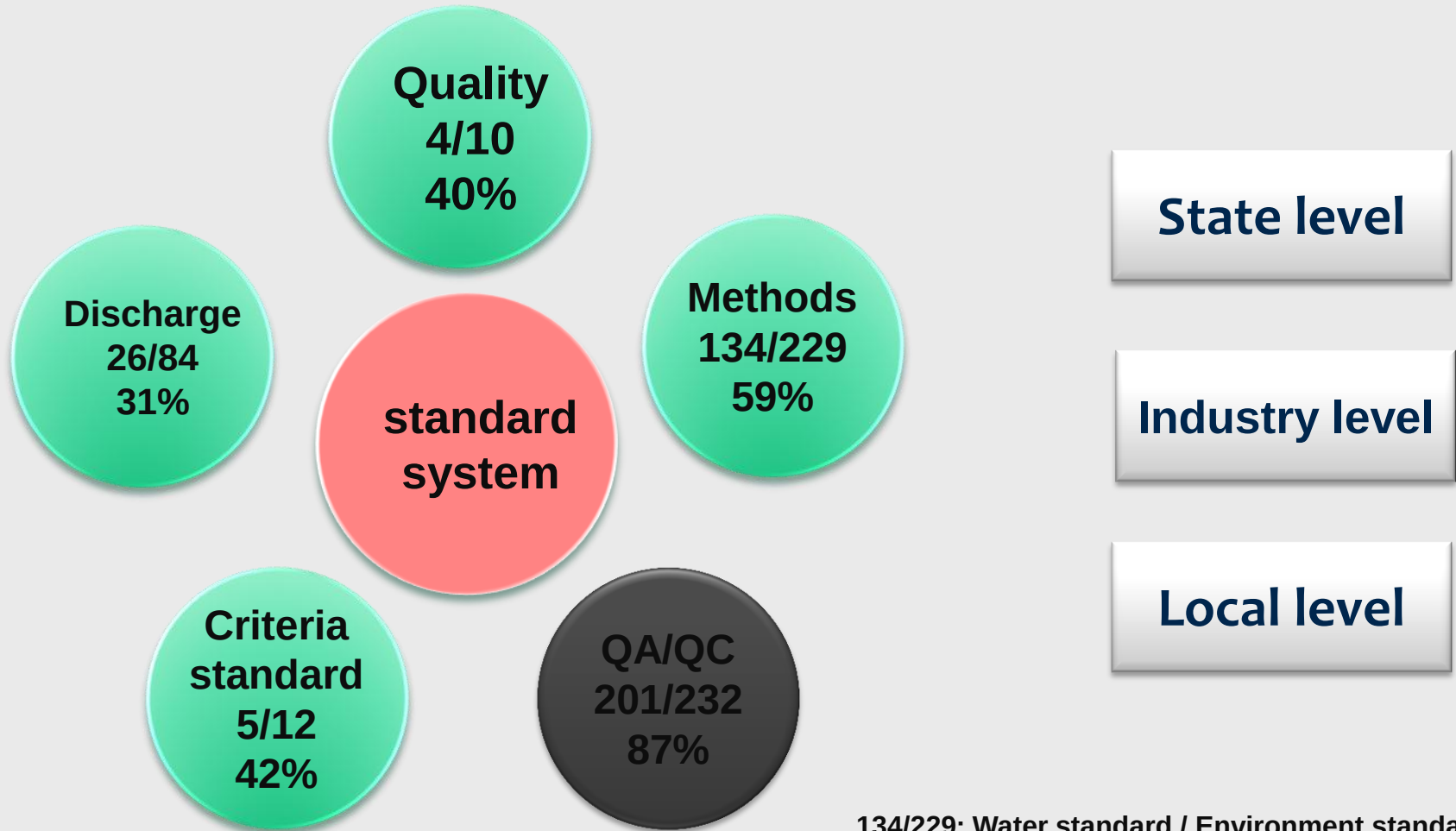


桂江平乐水文站

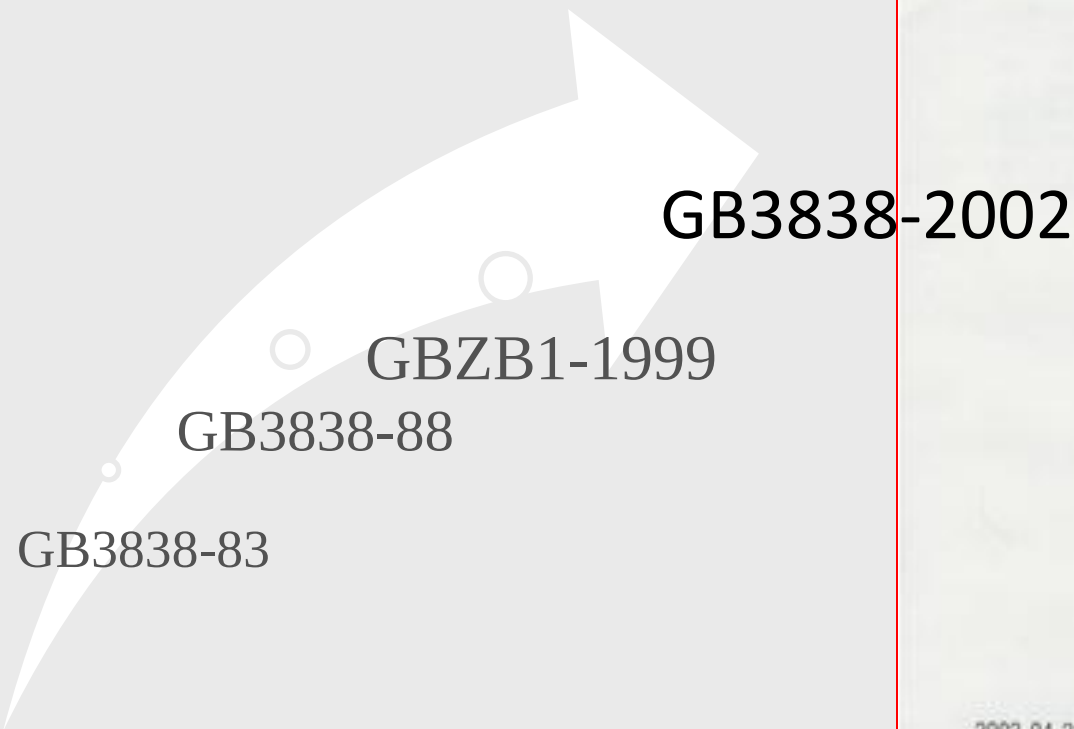
摄影: 杨静波



Standards



**Standard Evolvment
For surface water
M.of Environment protection**



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ICS 13.040
Z 50



中华人民共和国国家标准

GB 3838—2002
代替 GB 3838—88、GBZB 1—1999

地表水环境质量标准

Environmental quality standards for surface water

2002-04-28 发布

2002-06-01 实施

国家环境保护总局
国家质量监督检验检疫总局 发布

Standard Evolvement For surface water ---- M. of Health

- 1985, parameters increased to **35**, (GB 5749-1985)。
- 2001, increased to **124**, Aluminum、COD_{Mn}、Microcystin、chlorite and halogenated hydrocarbon
- 2006, GB 5749-2006



Technology And Method



Water monitoring

- **General indicators: Weather, Air Temp., Water Temp, pH, DO, EC, Secchi Depth**
- **Nutrients: TIN (Nitrate, Nitrite, Ammonium), DIP, TN, TP, COD_{Mn}**
- **Contaminants (heavy metals, organics...)**
- **Suspended Solid (SS), Alkalinity,**
- **Processes: PP, Uptake, Absorption.....**

WHAT'S THE REQUIREMENT

FOR WATER MONITORING

Requirements

- How long can we get the results – Efficiency
- How often can it be monitored – Frequency
- How large area can be monitored – Coverage
- How precise can it be monitored – Precision
- How much it would be cost – Expense

Requirements

- Efficiency
 - Frequency
 - Coverage
 - Precision
-
- Expense

- Sensors
 - Online, *insitu*
 - Remote sensor
 - Classical, Expensive instruments
-
- low cost, sustainable
- 

Efficiency

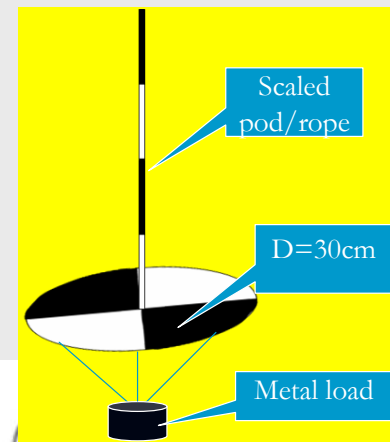
Efficiency

YSI:

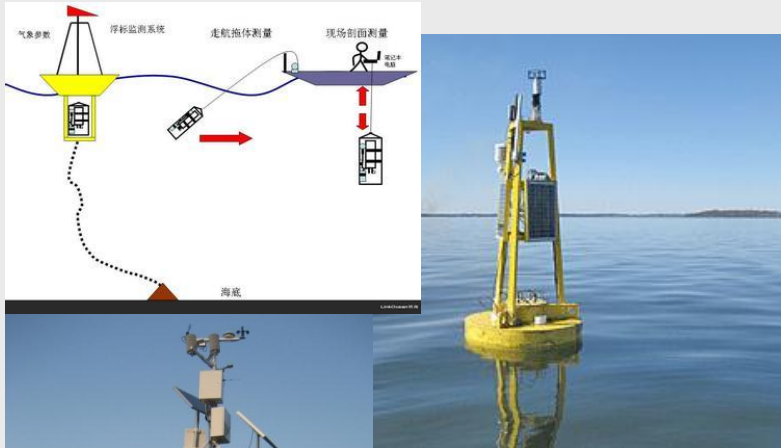
DO
pH
Depth
Temp
EC
Turb
Chla
Ions...



Portable- specific



Sensor – Best way for increasing the speed

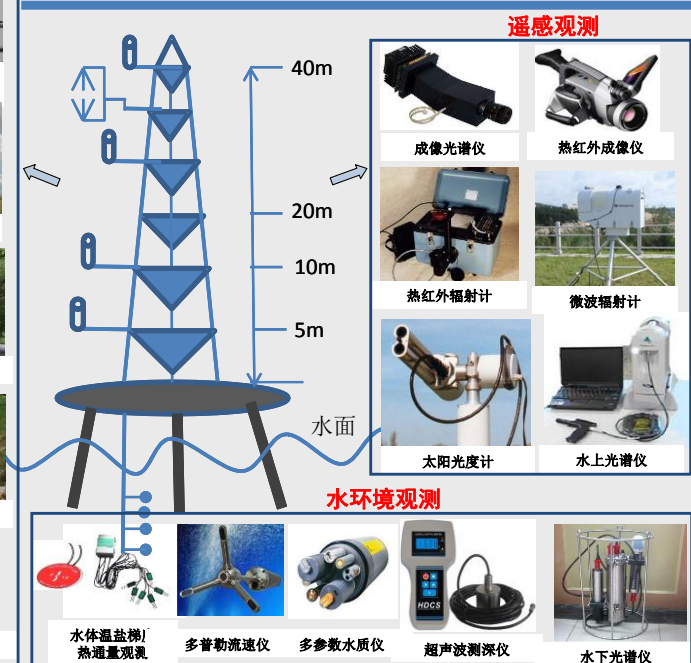


alibaba.com

水文气象观测



鄱阳湖湿地水文-水环境-遥感综合观测平台



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Nanjing, China



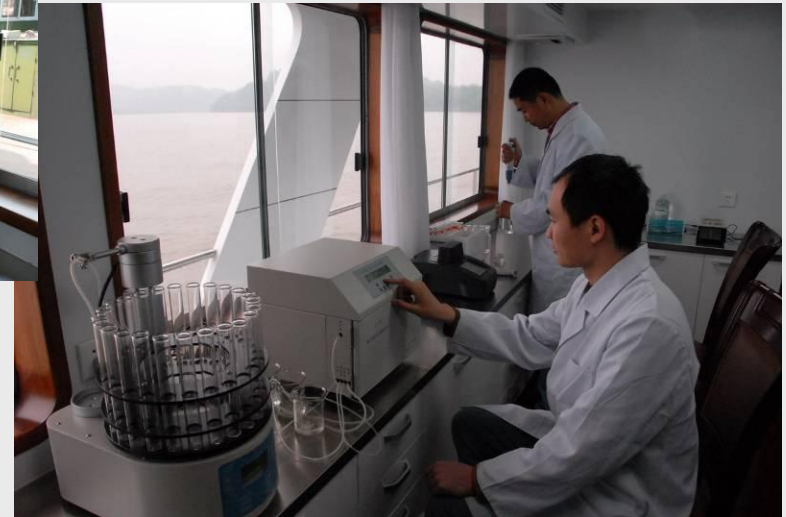


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Shipboard monitoring Lab

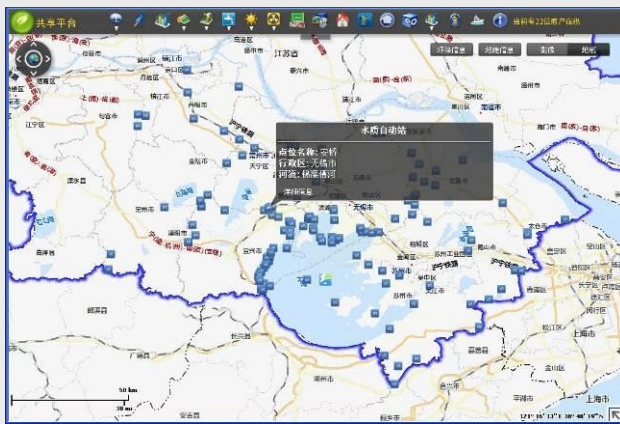


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Frequency



•Frequency

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National Automatic Monitoring Station

100 stations in 25 Provinces, 83 of which on the rivers and 17 on the lakes.

in which, 6 was on the national border; 37 was on the province border; 5 was on the river outflow to the ocean; and 42 was on the lakes and rivers. 36 more is under-construction.

		I	II	III	IV	V
1	pH	6~9				
2	DO ≥	90% (7.5)	6	5	3	2
3	COD _{Mn} ≤	2	4	6	10	15
4	NH ₃ -N ≤	0.15	0.5	1.0	1.5	2.0

TOC, and other parameters

国家地表水 水质自动监测实时数据发布系统

当前日期：2012年8月27日

国家地表水水质自动监测系统介绍



水质自动监测站			
测量时间	项目	测量值	水质类别Ⅲ类标准
	pH		6-9
	溶解氧		≥5
	氨氮		≤1.0
	高锰酸盐指数		≤6
	总有机碳		-
断面属性			
站点情况			
站点简介			
备注	* 为待更新仪器 - 为待检修仪器 pH无量纲，其他参数单位mg/L		

全国水质自动监测站
实时运行状况

Sentech

国家地表水 水质自动监测实时数据发布系统

当前日期：2012年8月27日

国家地表水水质自动监测系统介绍

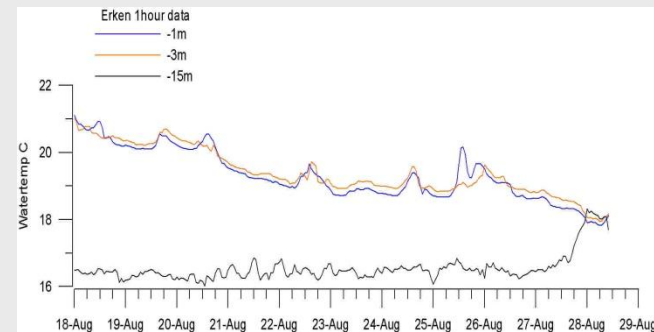
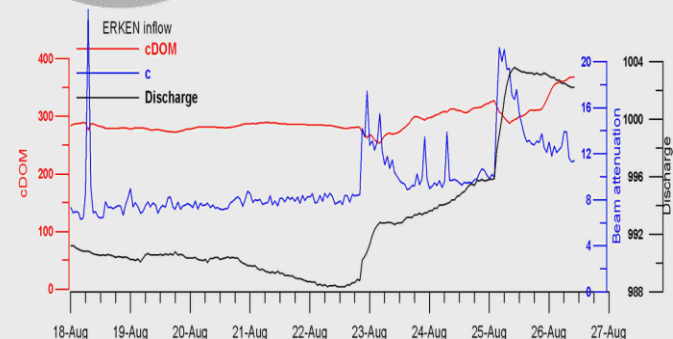
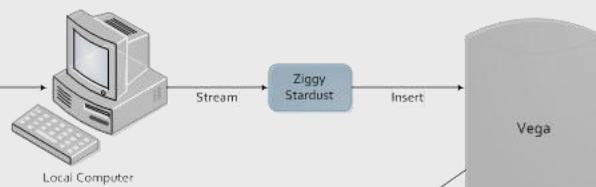
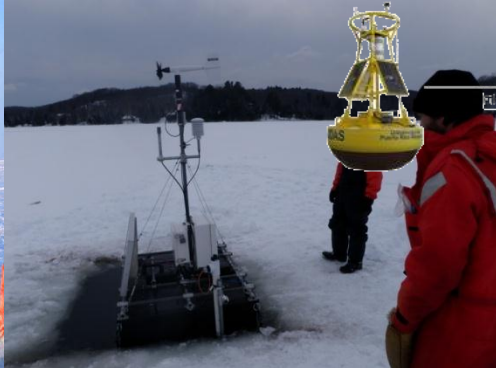
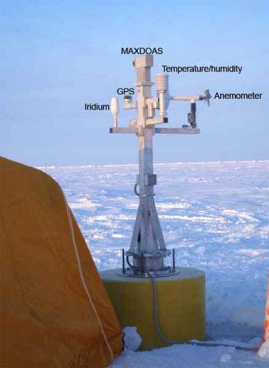


山东临沂沂沭沟桥水质自动监测站

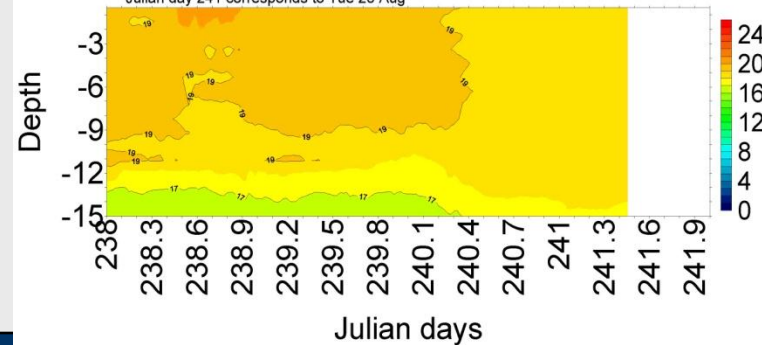
测量时间	项目	测量值	水质类别	III类标准
2012-08-27	pH	7.95	I	6-9
	溶解氧	4.19	IV	≥5
08:00:00	氨氮	0.32	II	≤1.0
	高锰酸盐指数	3.83	II	≤6
	总有机碳	4.72	-	-
断面属性	白马河（鲁-苏省界）			
站点情况	正常			
站点简介	点击查看站点简介			
备注	* 为待更新仪器 - 为待检修仪器 pH无量纲，其他参数单位mg/L			



Sentech



Erken temperature chain 3 day contour plot of depth vs julian days
Julian day 241 corresponds to Tue 28 Aug



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Welcome to LSPA Live Buoy 08/29 05:48 AM
LSPA buoy is back at Loon Island!



Avg Wind Speed (mph)



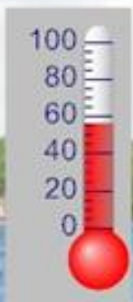
Wind Direction



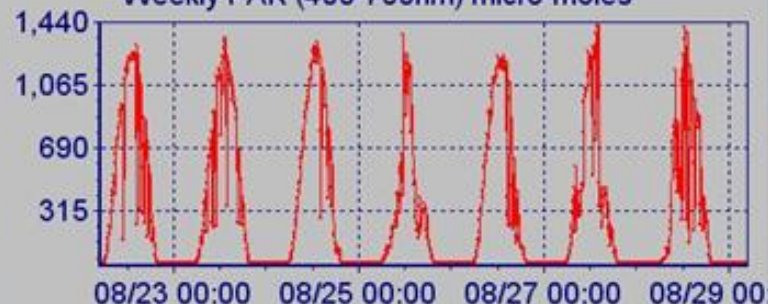
Max Wind Speed (mph)

Air Temp F

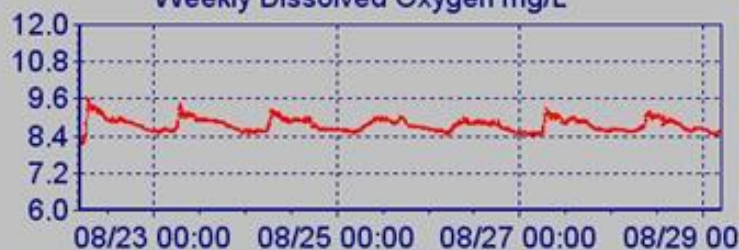
Humidity %



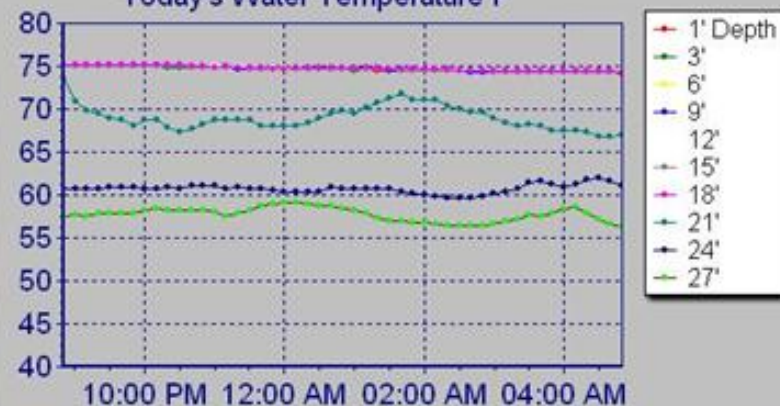
Weekly PAR (400-700nm) micro-moles



Weekly Dissolved Oxygen mg/L



Today's Water Temperature F



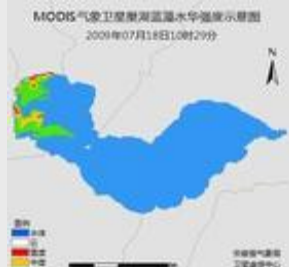
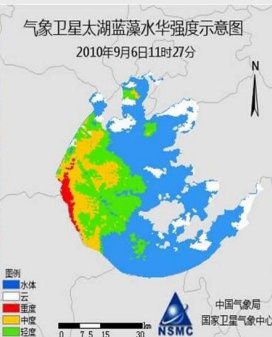
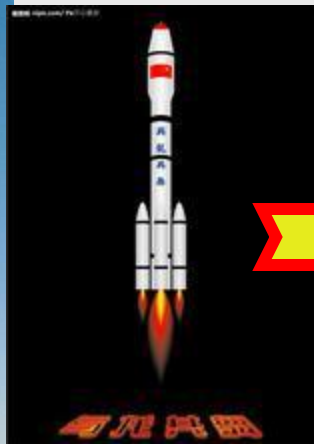
泽铭在太湖投放第28套水质监测浮标

2010年7月上海泽铭环境科技有限公司在太湖边投放了6台浮标水质自动量达到28套。



我公司的浮标运用信息传感技术等多种先进技术，浮标采用GPS卫星定位，通过三块太阳能电池板提供工作电力，搭载的多参数水质监测仪6600V2-4可监测太湖水的PH值、电导、浊度、叶绿素、蓝绿藻和溶解氧等七项水质数据，并通过GPRS将数据无限传输到后方的水质监测平台。到目前为止28台投放的浮标系统已正常工作。浮标站对水质的实时监测，不会受风雨雷电等恶劣天气的影响。

Remote sensor

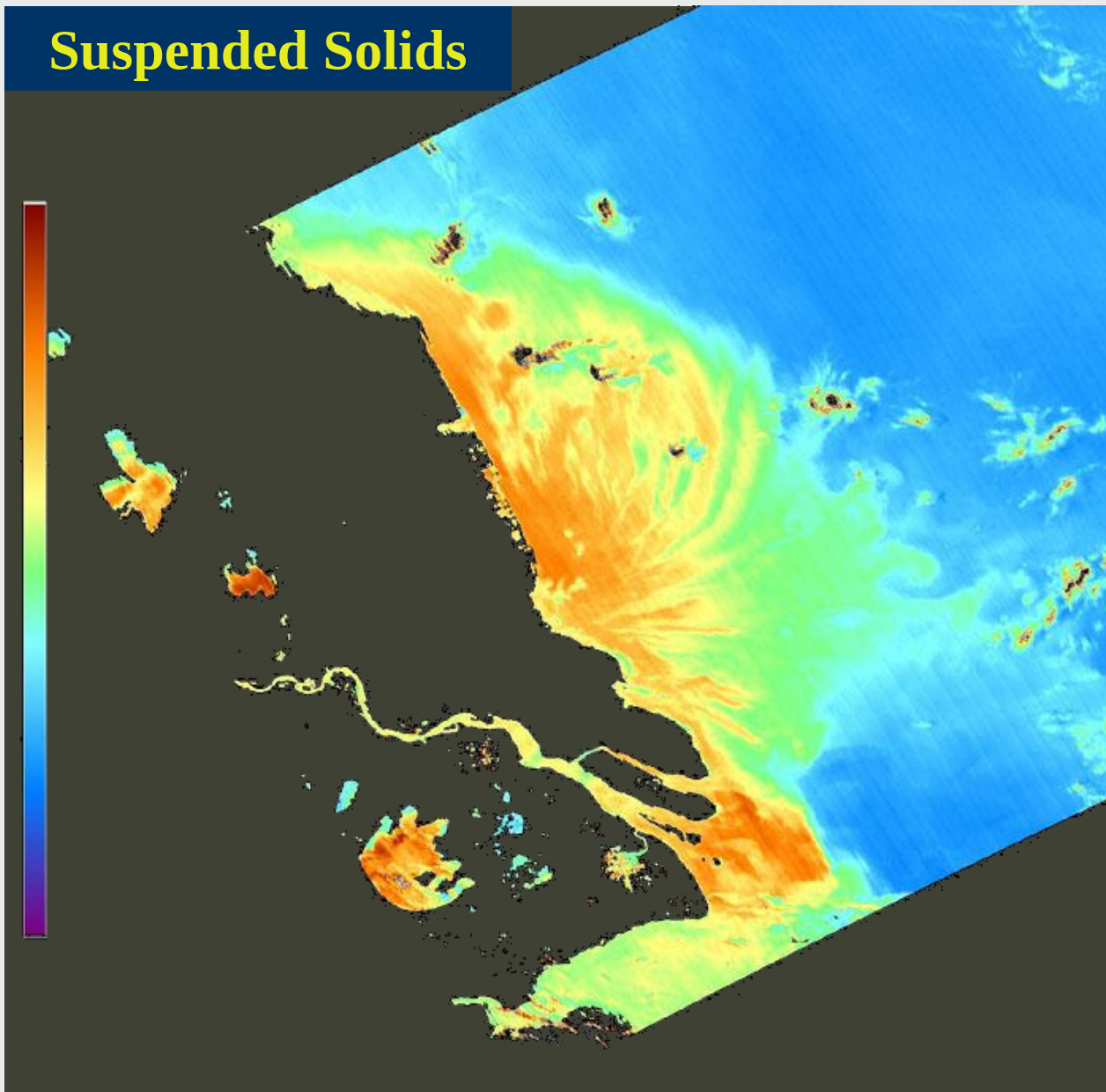


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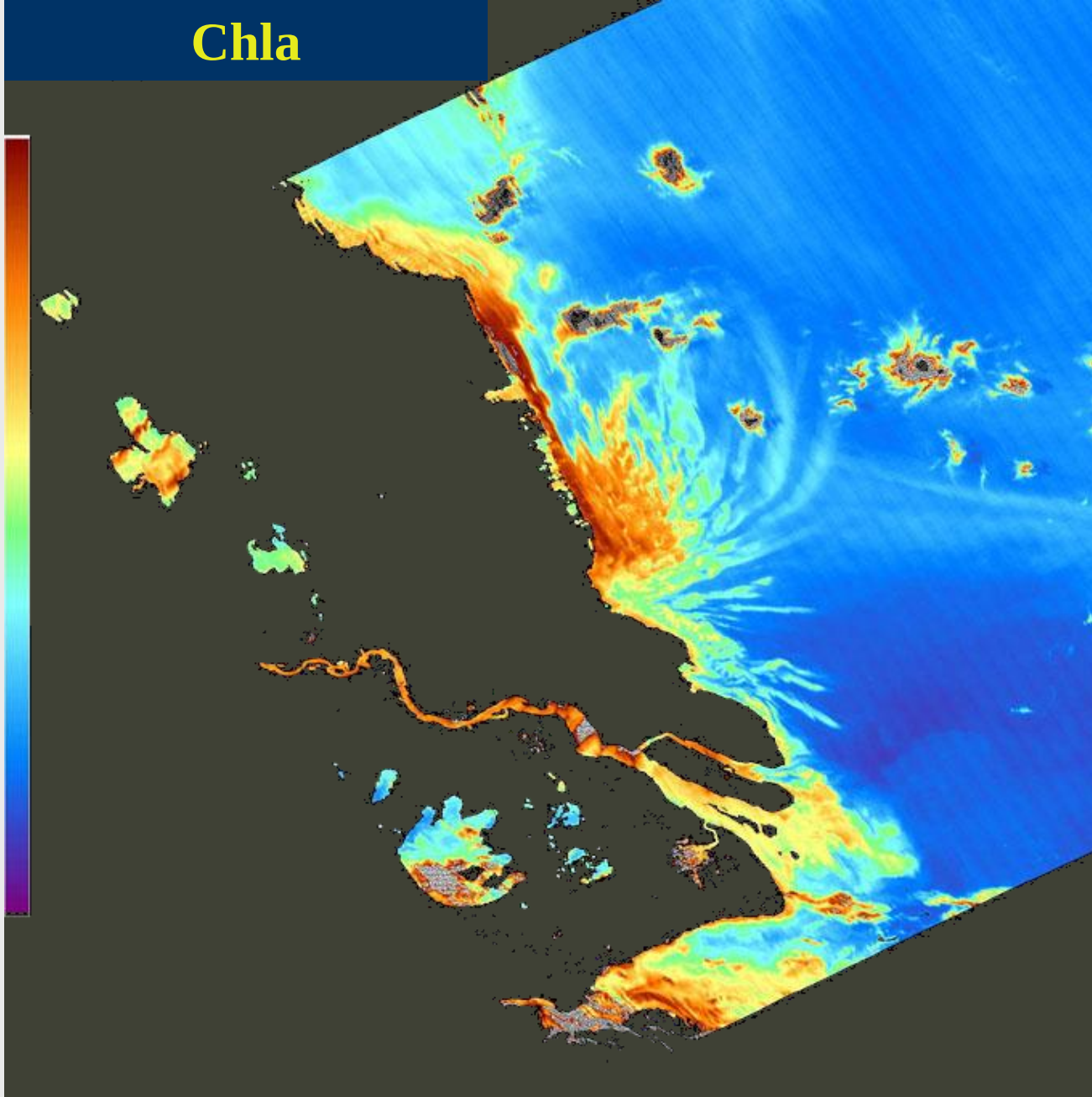
Nanjing, China



Suspended Solids



Chla



Chla

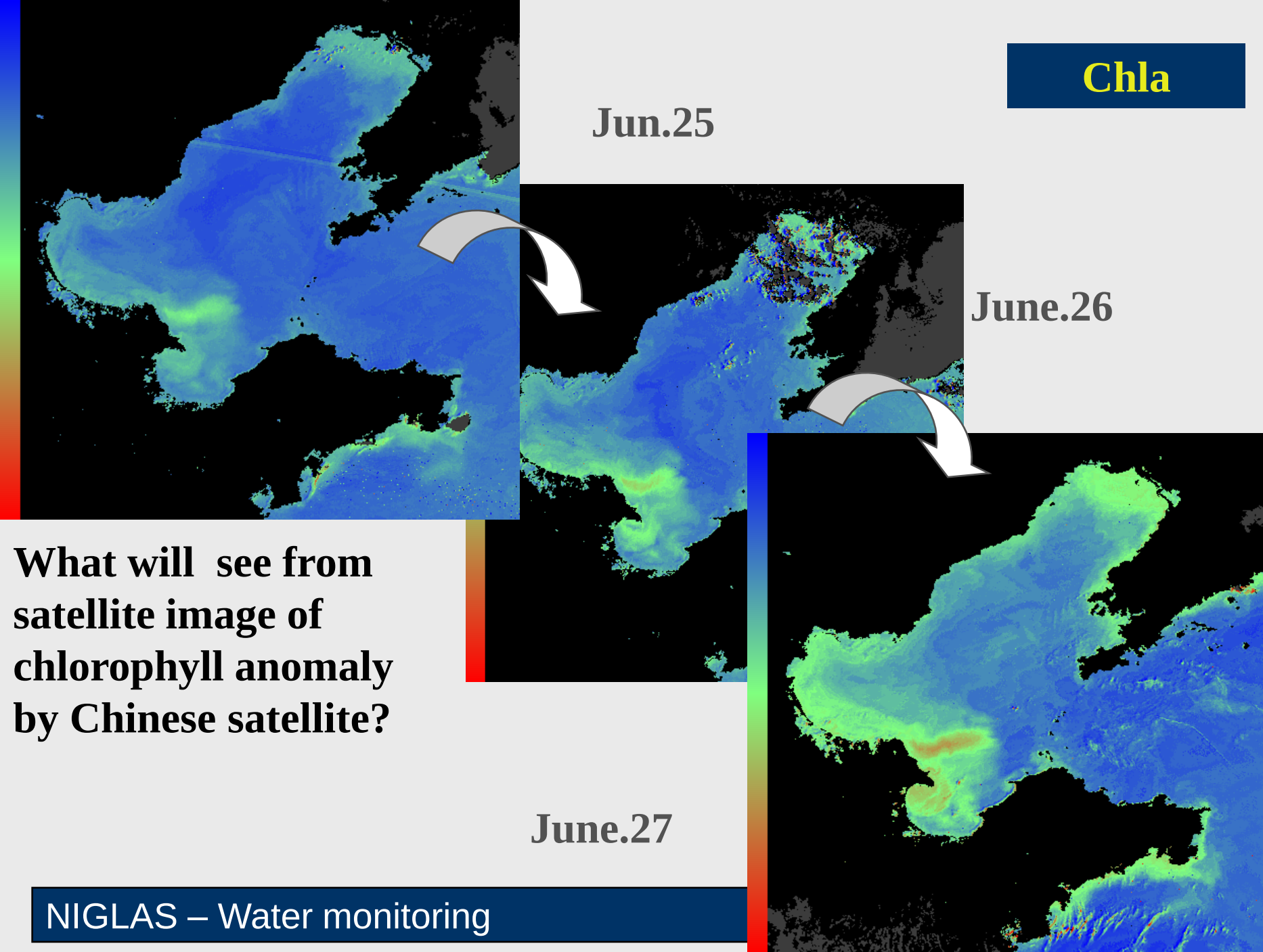
Jun.25

June.26

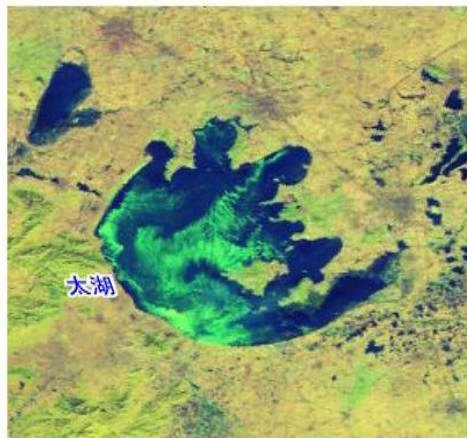
June.27

**What will see from
satellite image of
chlorophyll anomaly
by Chinese satellite?**

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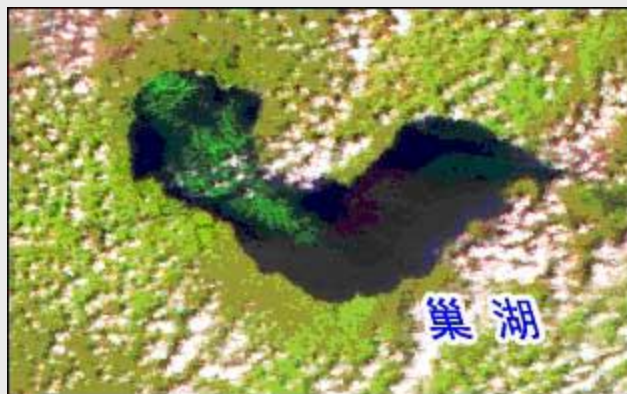
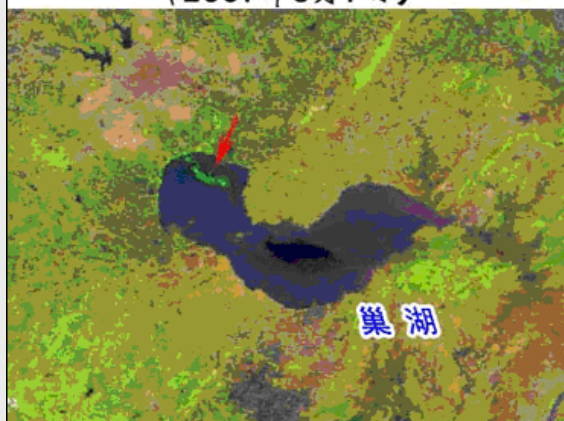


Algal bloom



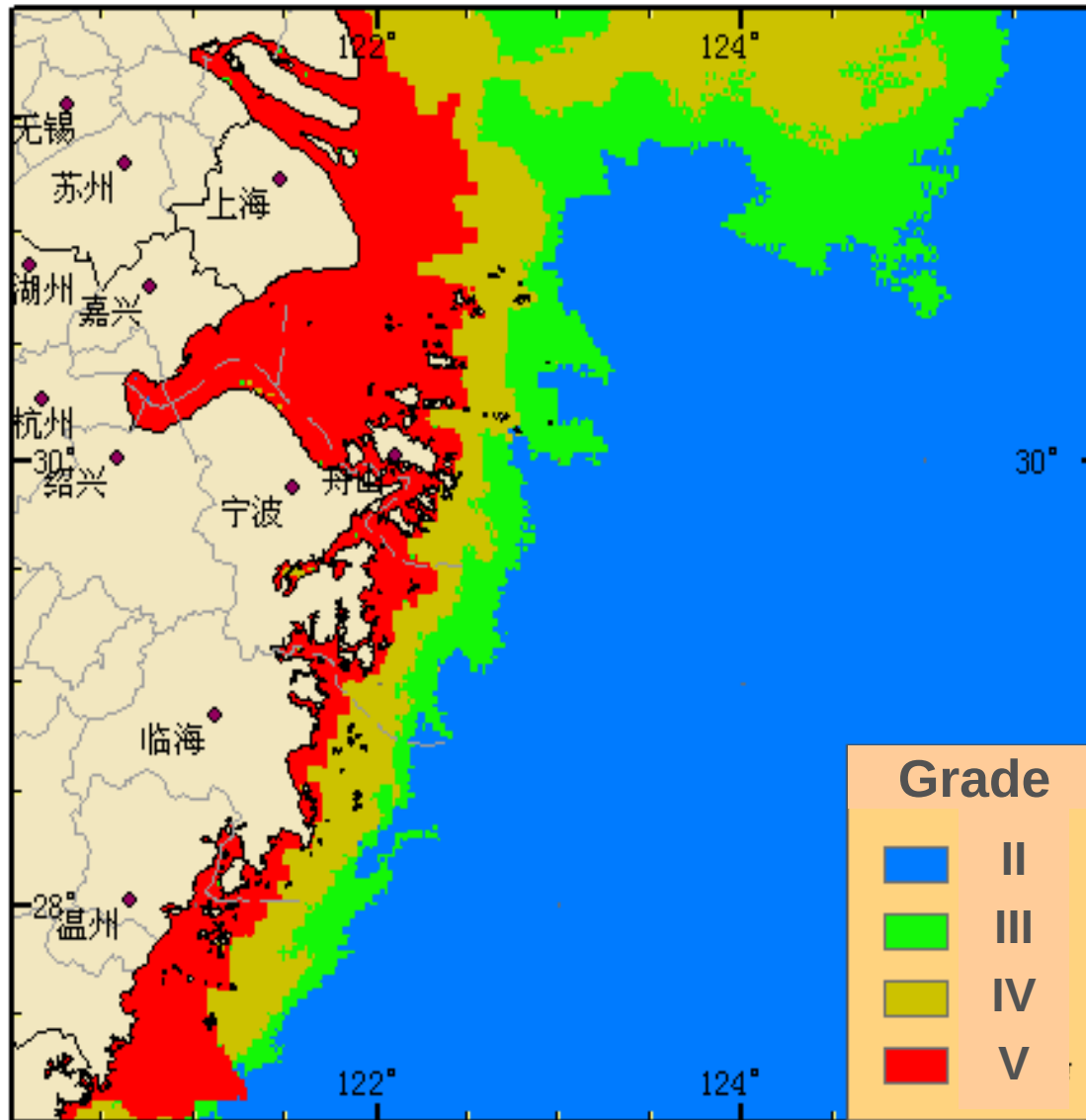
太湖蓝藻监测图像 2007年11月21日11时02分(北京时间)

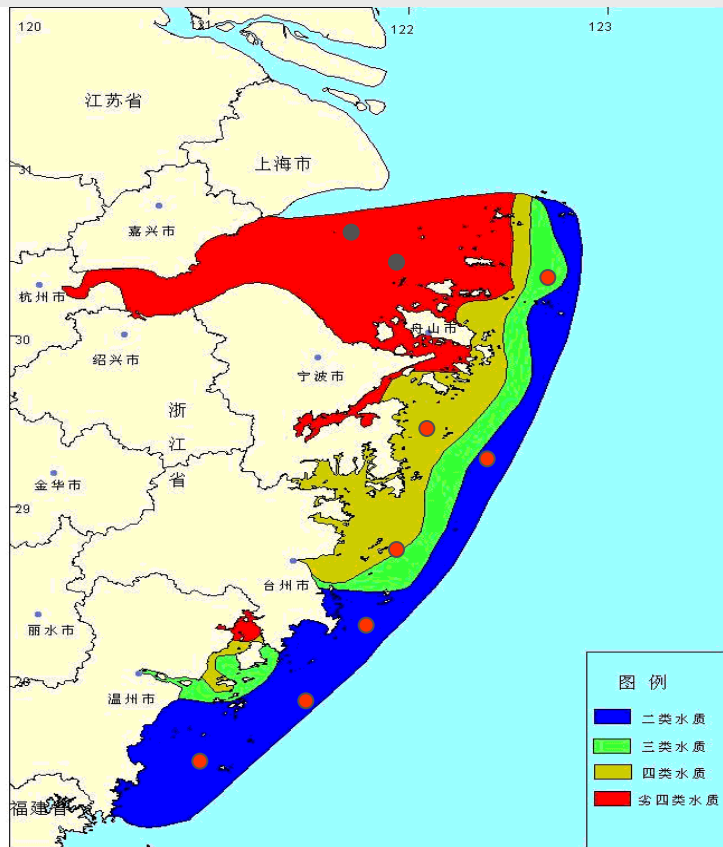
EOS/MODIS巢湖水情监测图
(2007年6月7日)



Water quality

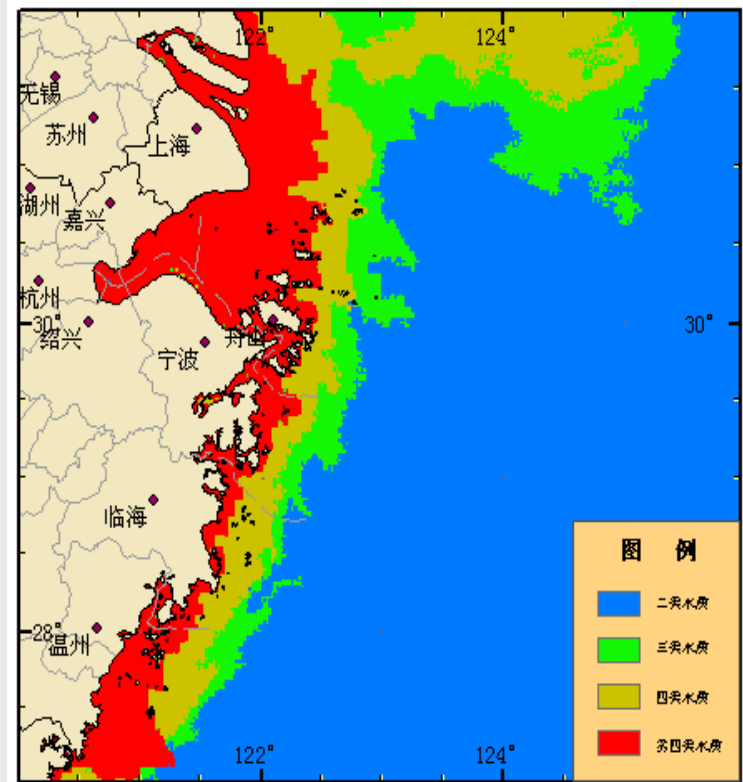
- 1、Big area
- 2、Quick
- 3、Convenient

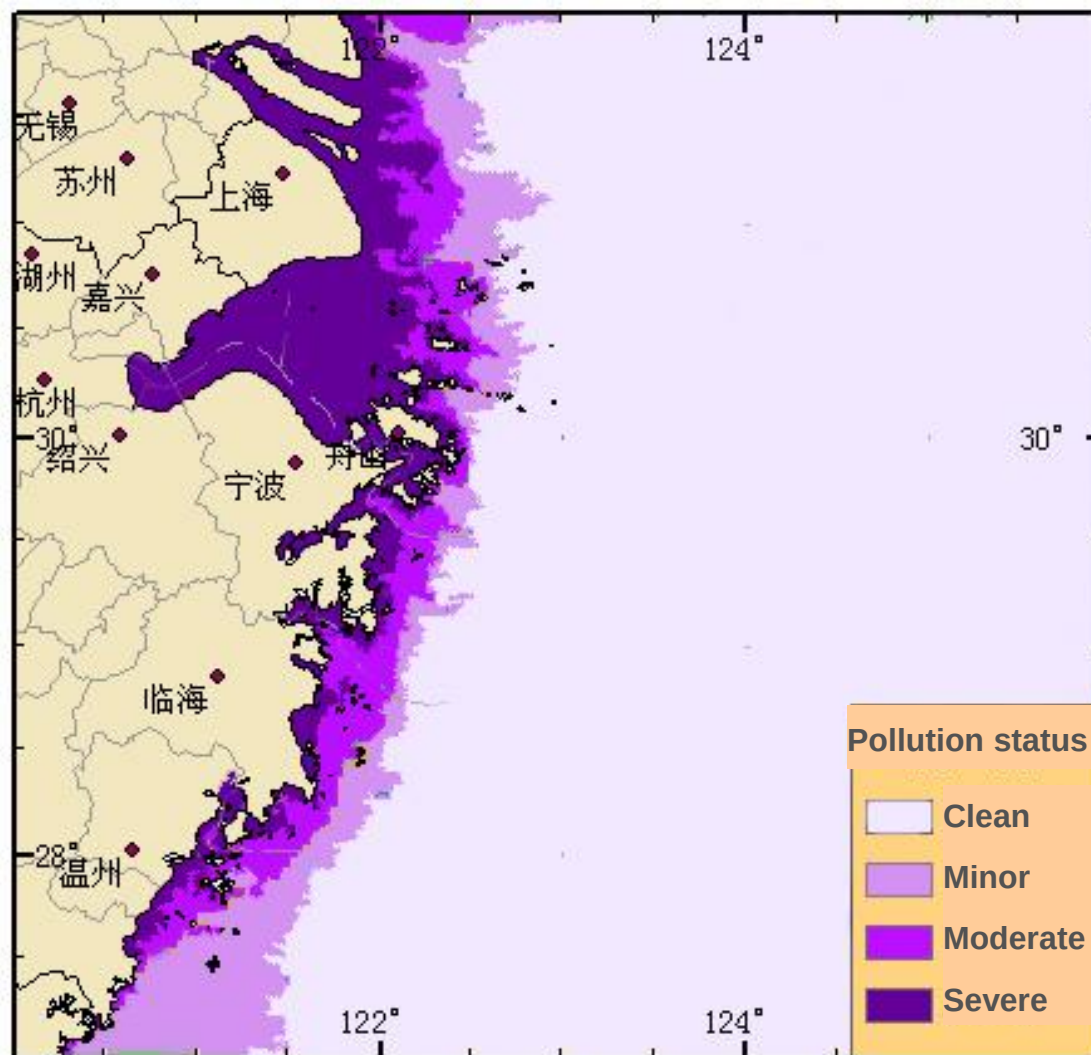




Tradition sampling – Analysis - Mapping

Remote sensing





Low Cost

Water physical and chemical parameters:

Temp, Water depth, Color, Secchi Depth, SS, EC, underwater radiation (PAR), pH, DO, Alkalinity, K, Na, Ca, Mg, Cl, SO₄, TP, TN, SRP, Nitrate, Nitrite, Ammonia, Si, CODMn





Ammonia



DO



COD_{Mn}



TP



TN





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	Low Cost	g/sample	RMB/g	RMB/sample
DO	KI	0.15	0.79	0.1185
	MnSO ₄	0.48	0.18	0.0864
	NaOH	0.5	0.12	0.0600
	H ₂ SO ₄	5ml	0.156	0.7800
	K ₂ Cr ₂ O ₇	0.002	0.34	0.0007
NO ₃	HCl	0.08333	0.13	0.0108
	KNO ₃			0.0000
NO ₂	H ₃ PO ₄	0.02	0.36	0.0072
	NH ₂ C ₆ H ₄ SO ₂ NH ₂	0.008	1.08	0.0086
	C ₁₀ H ₇ NHC ₂ H ₄ NH ₂ ×2H ₂ O	0.0004	1.8	0.0007
	Na ₂ C ₂ O ₄	0.001	0.07	0.0001
	KMnO ₄	0.001	0.07	0.0001
	NaNO ₂	0.001	0.06	0.0001

TN/TP	K ₂ S ₂ O ₈	0.2	0.05	0.0100
	NaOH	0.03	0.016	0.0005
	H ₂ SO ₄	0.1ml	0.156	0.0156
	(NH ₄) ₆ Mo ₇ O ₂₄ ·4H ₂ O	0.01	0.45	0.0045
	KSbC ₄ H ₄ O ₇ ·1/2H ₂ O	0.00025	0.21	0.0001
	ascorbic acid	0.0075	0.18	0.0014
CODMn	KMnO ₄	0.032	0.07	0.0022
	Na ₂ C ₂ O ₄	0.008	0.07	0.0006
	H ₂ SO ₄	1.25	0.156	0.1950
NH ₄	NH ₄ Cl	0.002	0.07	0.0001
	HgI ₂	0.02	1.032	0.0206
	KI	0.014	0.79	0.0111
	NaOH	0.04	0.12	0.0048
PO ₄	H ₂ SO ₄	0.1ml	0.156	0.0156
	(NH ₄) ₆ Mo ₇ O ₂₄ ·4H ₂ O	0.01	0.45	0.0045
	KSbC ₄ H ₄ O ₇ ·1/2H ₂ O	0.00025	0.21	0.0001
	ascorbic acid	0.0075	0.18	0.0014

Prepaired chemical bags

	RMB /sample	RMB /PKG	Samples /PKG	¥ /sample
DO	1.05	380.00	25.00	15.20
NO ₃	0.01	420.00	100.00	4.20
NO ₂	0.02	360.00	100.00	3.60
TN/TP	0.03	600.00	25.00	24.00
		1218.00	50.00	24.36
CODMn	0.20	458.00	24.00	19.08
NH ₄	0.04	1100.00	50.00	22.00
PO ₄	0.02	380.00	100.00	3.80
SUM	1.36			116.24
Precision	same			
Speed	Low	Higher		
Waste	Few	More		

60 RMB



600 RMB



600 RMB



9,000 RMB



15,000 RMB



58,000 RMB



75,000 RMB



V.S.

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Nanjing, China



Thanks

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