DRAGONESS WP1
Review of in-situ observing system-I
Activity Report 2008 September

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Content

- Marine Observing Station
- Marine Buoy
- Marine Survey Ship
- Voluntary Observing Ships (VOS) Observing System

1. Marine Observing Station

At present, China has set up more than 130 marine observation stations along the coast(part at bayou), some of them are in the possession of the Water Conservancy Bureau, the Transportation and the Geological Department, most of these observation stations are tide level stations. The stations which observe the wave, temperature, salinity, meteorology and other elements, about 60, are mainly in the possession of the SOA.

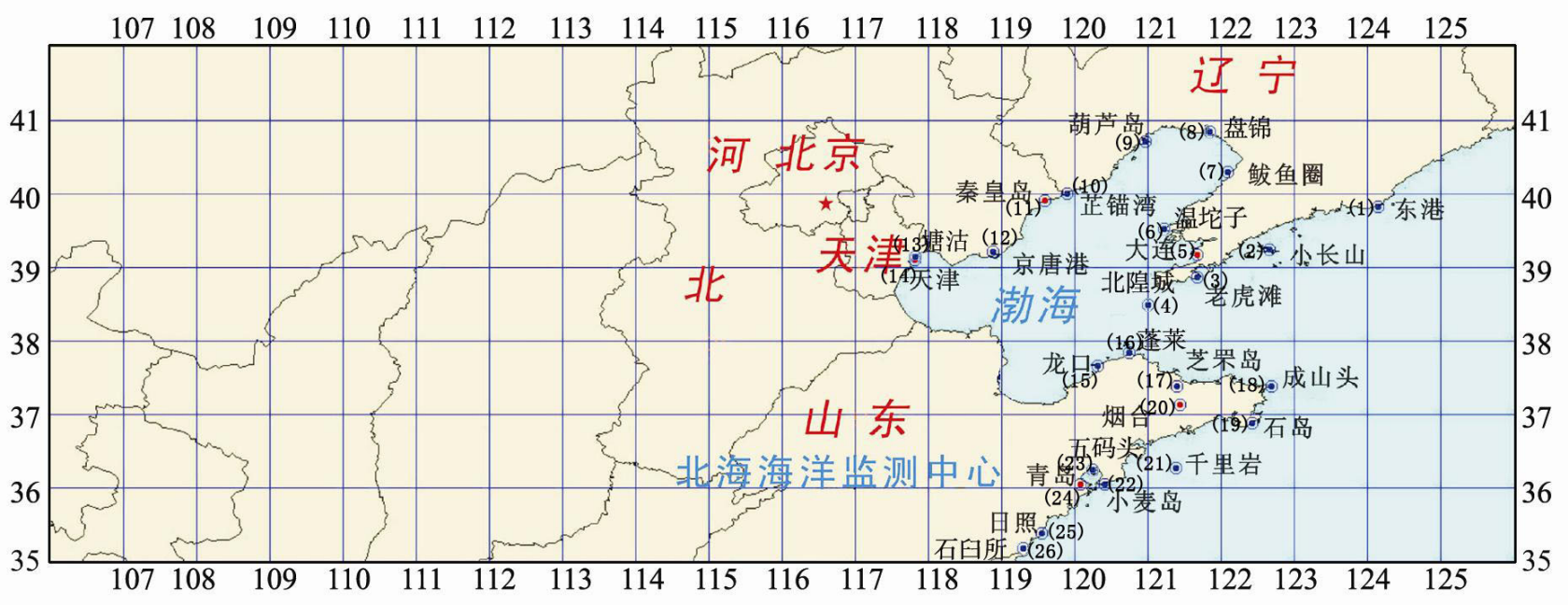


Figure 1-1 North Sea observation station distribution of SOA

(1) Donggang, (2) Xiaochangshan, (3) Laohutan, (4) Beihuangcheng, (5) Dalian, (6) Wentuozi, (7) Bayuquan, (8) Panjin, (9) Huludao, (10) Zhimaowan, (11) Qinhuangdao, (12) Jingtanwan, (13) Tanggu, (14) Tianjin, (15) Longkou, (16) Penglai, (17) Zhifudao, (18) Chengshantou, (19) Shidao, (20) Yantai, (21) Qianliyan, (22) Xiaomaidao, (23) Wumatou, (24) Qingdao, (25) Rizhao, (26) Shijiusuo.

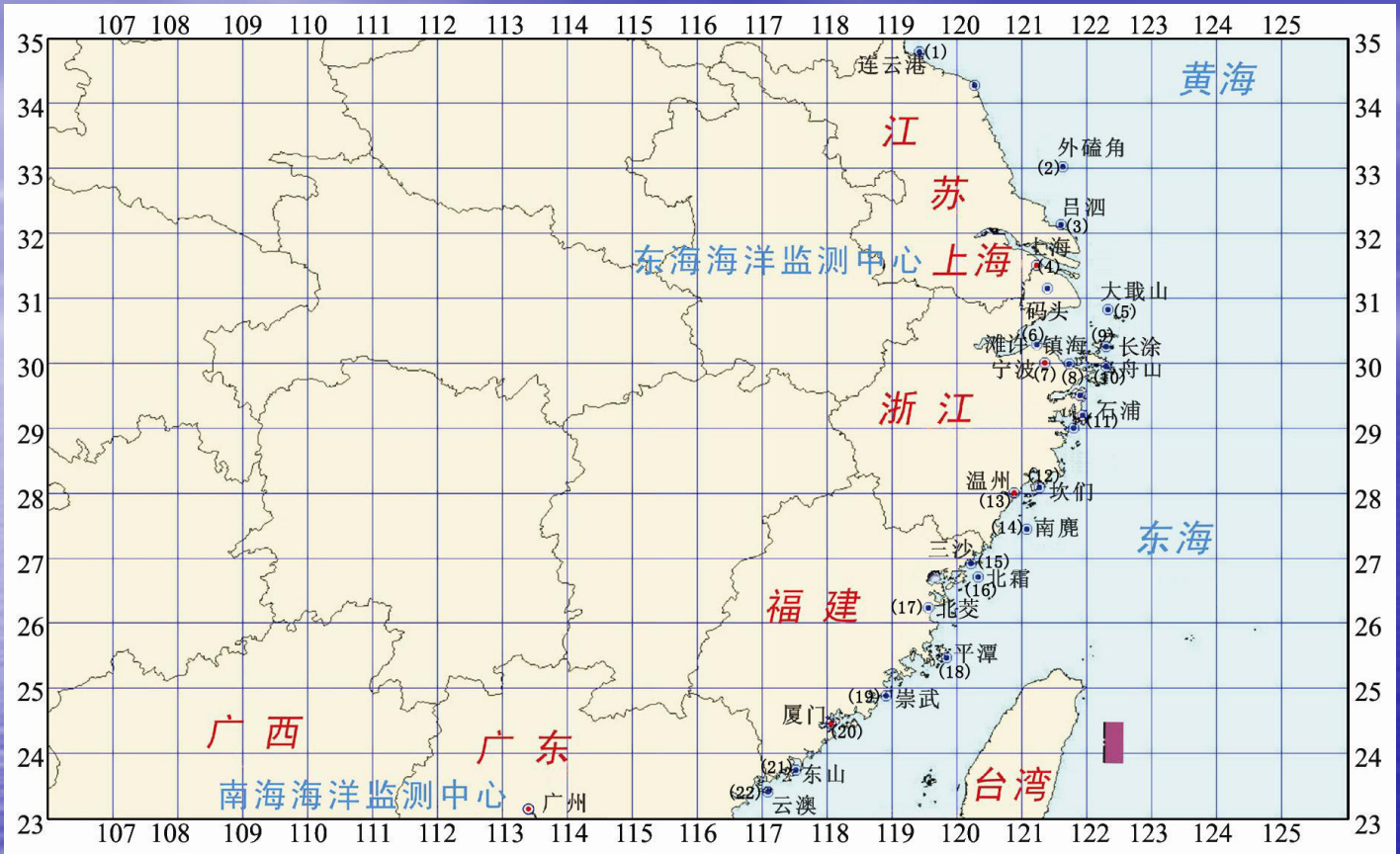


Figure 1-2 East Sea observation station distribution of SOA

(1) Lianyungang, (2) Waikejiao, (3) Lvsi, (4) Shanghai, (5) Dajishan, (6) Tanxui,
(7) Ningbo, (8) Zhenhai, (9) Changtu, (10) Zhoushan, (11) Shipu, (12) Kanmen,
(13) Wenzhou, (14) Nanji, (15) Sansha, (16) Beishuang, (17) Beijiao, (18) Pingtan,
(19) Chongwu, (20) Xiamen, (21) Dongshan, (22) Yunao,

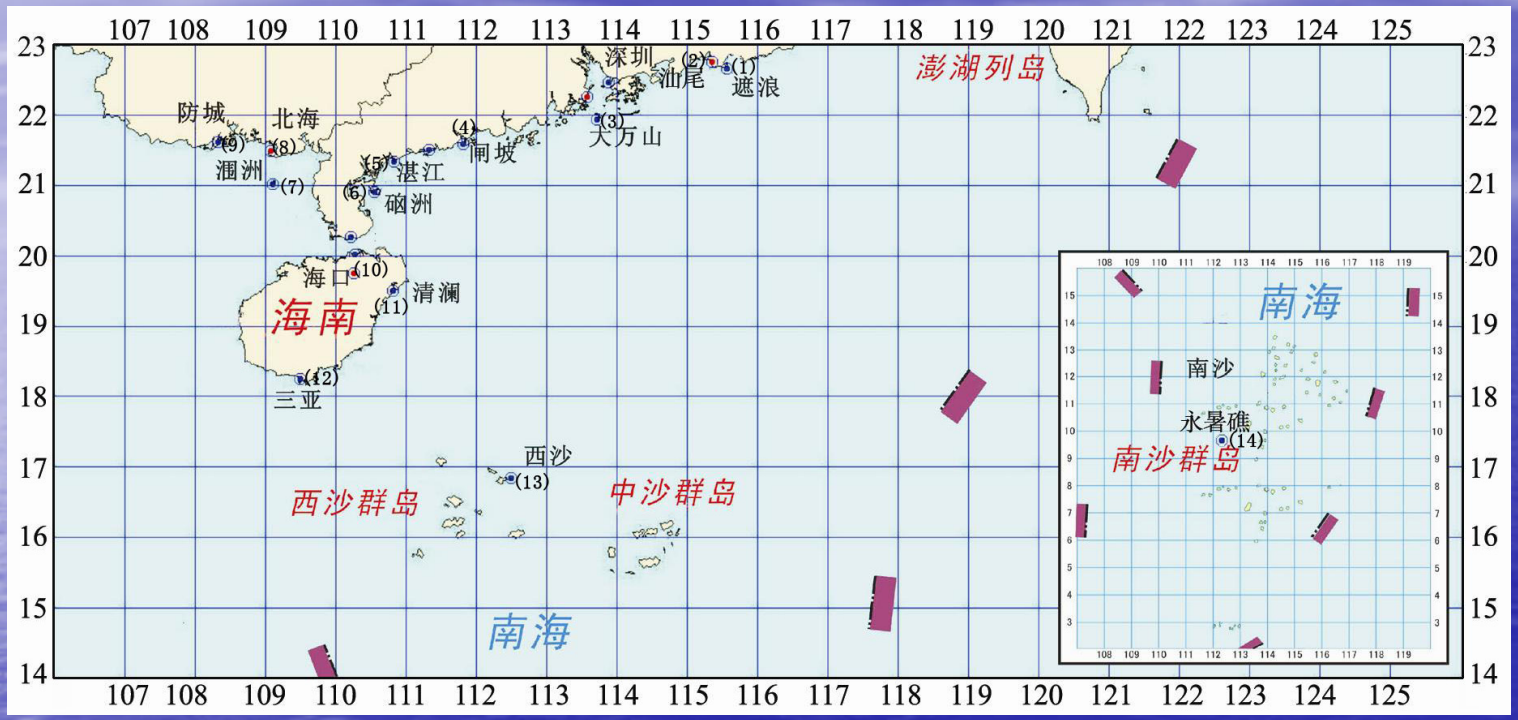


Figure 1-3 South Sea observation station distribution of SOA

(1) Zhelang, (2) Shanwei, (3) Dawanshan, (4) Zhapoi, (5) Zhanjiang, (6) Naozhou, (7) Weizhou, (8) Beihai, (9) Fangcheng, (10) Haikou, (11) Qinglan, (12) Sanya, (13) Xisha, (14) Yongshujiao,

Automatic observation technology in the observation stations is widely used. There into, the Xiaomaidao stations's automatic observation system has been built up and put into use, has a certain representation.

Name	Measuring range	Accurate	Measuring time	Sampling Technology
Wind speed	0.5~60m/s	(±0.5+0.05*V)m/s(≤5m/s); ±10%(>5m/s)	continuing	Photoelectric frequency, Induction
Wind direction	0° ~360°	±10°	continuing	Photoelectric encoder
Temperature	-30℃~45℃	±0.3℃ ±0.5℃（extremum）	continuing	Platinum Resistance
Air pressure	850~1,050hPa	±1hPa	continuing	Air compress box
Humidity	0~100%	‹50%，±2%；≥50%，±5%	continuing	Lithium chloride
Precipitation rain fall	0~999mm	‹10mm，±0.2mm；≥10mm， 2%	continuing	Precipitation Bottle
Marine wave	Wave height 0~20m Cycle 2~20s	≤±5% ≤±0.5s	continuing or timing	Ultrasonic sensors
Tide	0~10m	±1.0cm	continuing	Mechanical encoder
Water temperature	-5.0℃~30.0℃	±0.1℃	timing	Platinum Resistance
Salinity	25~35	±0.2	timing	conductivity

Table 1-1 the observation elements of Xiaomaidao and technology indicators

2. Marine Buoy

The main types of Chinese marine buoy are marine data buoys, special marine buoys, measuring current dive buoys and drifting buoy. And the marine data buoy is the development key, so far altogether China has developed the large-scale, medium and small-scale 14 sets of marine data buoy since 1965, and has built the corresponding shore receiving station separately in the South China Sea, East China Sea and North China Sea.

1). H23-marine hydro- meteorology telemetering buoy

Sequence number	Item	Range	Accuracy	Sensor
01	Average wind speed	0~20 m/s		Cup anemometer
02	Wind direction	16 directions	±1	Two-impeller
03	Air temperature	-15℃~+35℃	±0.5℃	Copper resistance
04	Air pressure	950 hPa~1，050 hPa	±2 hPa	aneroid barometer
05	Water temperature	-2℃~+30℃	±0.2℃	Copper resistance
06	Current speed	0.03~0.5 m/s		printing current meter
07	Current direction	36 directions	±1	

2). Marine data buoys of I-type

Sequence number	Item	Range	Accuracy	Sensor
01	Wind speed	0~50 m/s	±(1+5% V) m/s	Cup anemometer
02	Wind direction	16 directions	±1	Two-impeller
03	Air temperature	-10℃~+40℃	±0.5 hPa	Thermistor
04	Air pressure	930~1,040 hPa	±1.5 hPa	aneroid barometer
05	Humidity	40%~100%RH	±10% RH	Psychrometer
06	Surface water temperature	-2℃~+35℃	±0.2℃	Thermistor
07	Deep water temperature	-2℃~+35℃	±0.2℃	Thermistor
08	Salinity	28~34	±0.1	Induce conductivity meter
09	current speed	0.03~2.5 m/s	±5% full scale division	printing current meter
10	current direction	0° ~360°	±5°	

3). “Nanfu 1” marine data buoy

Sequence number	Item	Range	Accuracy	Sensor
01	Average wind speed	0~50 m/s	±（1+5%V） m/s	Cup anemometer
02	Maximum wind speed	50 m/s maximum	±（1+5%V） m/s	
03	Wind direction	16 directions	±1	Two-impeller
04	Air temperature	0℃~40℃	±0.5℃	Thermistor
05	Water temperature	0℃~35℃	±0.2℃	Thermistor
06	Salinity	28~35	±0.1	Induce salinity meter
07	Average wave height	0~15 m	±10%	Induce acceleration meter
08	Average wave cycle	0~20 s	±1 s	
9	Current speed	0.03~2.5 m/s	±2% standard deviation	Rotor Hall witch
10	Current direction	0° ~360°	±10°	potentiometer magnetic compass
11	Buoy position	0° ~360°	±10°	potentiometer magnetic compass
12	Anchor pulling force	0~3 t	±5%	Strain gauge

4). “Kefu 2” marine hydrology meteorology remote control telemetering buoy

Sequence number	Item	Range	Accuracy	Sensor
01	Average wind speed	0~50m/s	±(1+5%V)m/s	Cup anemometer
02	Maximum wind speed	0~50m/s maximum		
03	Wind direction	32 directions	±1	Two-impeller
04	Air temperature	0℃~40℃	±0.2℃	Temperature measurement crystal
05	Air pressure	840~1，070hPa	±1hPa	aneroid barometer
06	Relative humidity	%10~%85	±5%	Thermistor
07	Water temperature	-2℃~+35℃	±0.1℃	Platinum Resistance, orthogonal oscillator
08	Salinity	27~35	±0.1	Induce acceleration meter
09	Wave height	0.5~20m	±10% full scale m	Vibrating string acceleration meter
10	Wave cycle	4~20s	±0.5s	
11	Current speed	0.05~2.5m/s	±2% standard deviation	Rotor Holl switch
12	Current direction	0° ~360°	±10°	potentiometer magnetic compass
13	Buoy position	0° ~360°	±10°	potentiometer magnetic compass

5). Ⅱ-marine data buoy

Sequence number	Item	Range	Accuracy	Sensor
01	Average wind speed	0~50m/s	±(1+5%V)m/s	Rotary vibration type proximity switch
02	Maximum wind speed			
03	Average wind direction	0° ~360°	±10°	Two-impeller
04	Air temperature	-15℃~+40℃	±0.5℃	AD590
05	Air pressure	840~1，050hPa	±1hPa	aneroid barometer
06	Water temperature	-3℃~+35℃	±0.5℃	AD590
07	Effective wave height	0.5~20 m	±10°	Induce acceleration meter
08	Maximum wave height			
09	Effective wave cycle	3~25s	When 3~20s：±10%	
10	Maximum wave cycle			
11	Spectrum	0.02~0.5Hz	Sampling interval 0.5 s, tape records	
12	Current speed	0.05~2 m/s	±0.05° m/s	Self-contained current meter
13	Current direction	0° ~360°	±10°	
14	Buoy position	0° ~360°	±3°	clinometer
15	Buoy incline	0° ~45°	±1.5°	

6). Minitype marine data buoy

Sequence number	Item	Range	Accuracy	Sensor
01	Average wind speed	0~60m/s	±(1+5%V)m/s	Cup anemometer
02	Maximum wind speed			
03	Average wind direction	0° ~360°	±10°	Vane
04	Maximum wind direction			
05	Air temperature	-15℃~+40℃	±0.5℃	Platinum wire resistance
06	Air pressure	840~1，050hPa	±1hPa	Vibration barometer
07	Water temperature	-3℃~+35℃	±0.5℃	Platinum wire resistance, DC voltage
08	Effective wave height	0.5~20 m	±10%	Acceleration meter
09	Maximum wave height			
10	Effective wave cycle	3~25s	When 3~20s ： ±10%	
11	Maximum wave cycle			
12	Spectrum	0.02~0.5Hz	Sampling interval 0.5 s, tape records	
13	Current speed	0.05~2 m/s	±0.05m/s	Acoustics current meter
14	Current direction	0° ~360°	±8°	
15	Buoy position	0° ~360°	±3°	Magnetic compass

7). Deep marine data buoy

Sequence number	Item	Range	Accuracy	Sensor
01	Average wind speed	0~60 m/s	（1+5%V） m/s	Cup anemometer
02	Maximum wind speed			
03	Average wind direction	0° ~360°	±5	Empennage, Potentiometer
04	Air temperature	-5℃~+45℃	±0.5℃	AD590
05	Air pressure	850~1,050 hPa	±1 hPa	Vibration barometer
06	Water temperature	-5℃~+45℃	±0.5℃	AD590
07	Wave height	0.5 m	±10%	differential capacitance gravity acceleration meter
08	wave cycle	3~25 s	≤±0.5 s	
09	Spectrum	0.01~0.5 Hz	Sampling interval 0.5 s, tape records	
10	Current speed	0.05~2.5 m/s	±3% full scale m/s	Rotor Holl switch
11	Current direction	0° ~360°	±10°	potentiometer magnetic compass
12	Buoy position	0° ~360°	±3.5°	Magnetic Fluxgate compass
13	Buoy incline	0° ~45°	±2% full scale	differential capacitance inclination

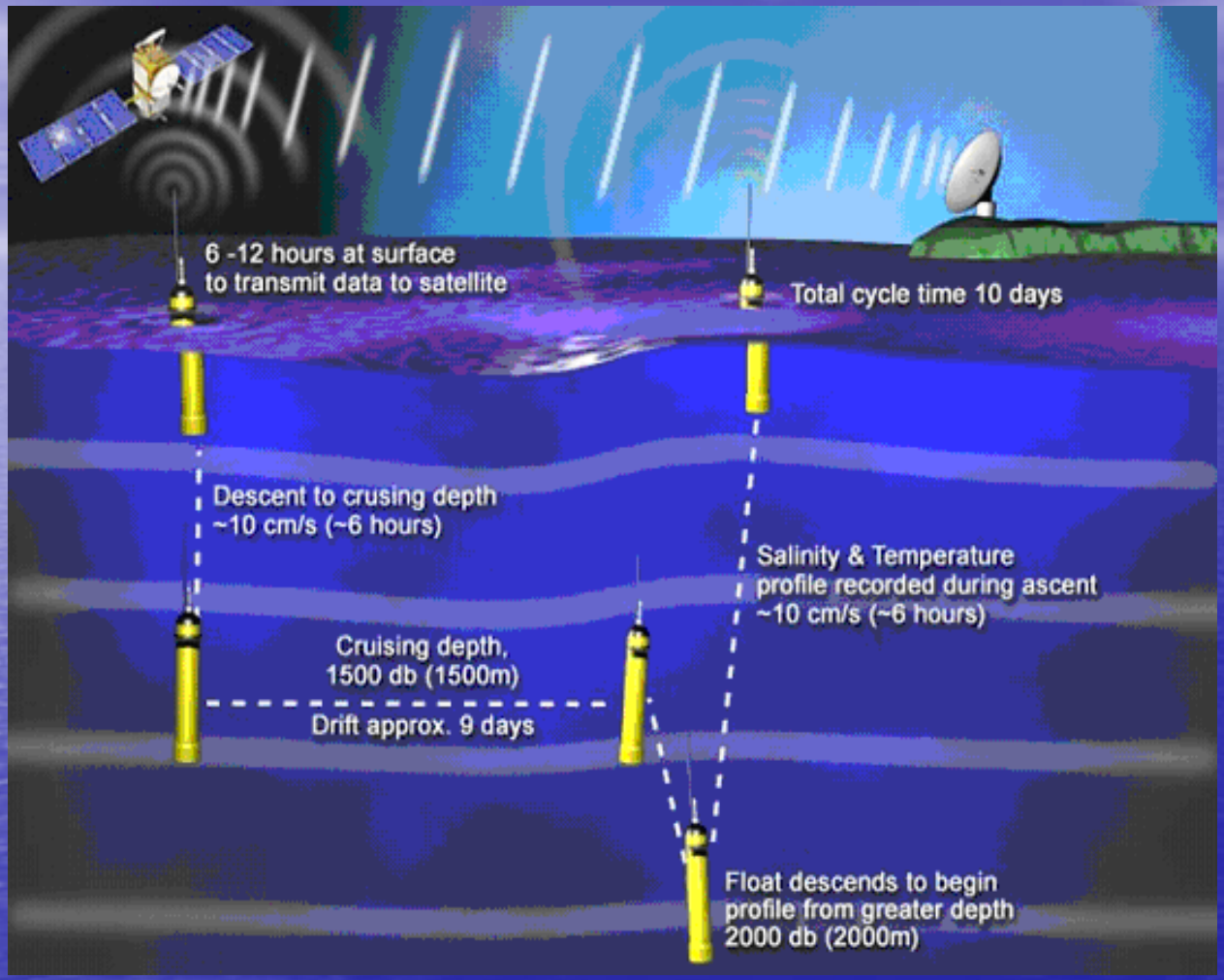


Figure 2-1 Movement of Argo

China Argo Project has deployed 46 floats in the Western Pacific and Eastern Indian Marines. Now there are 20 floats still active.

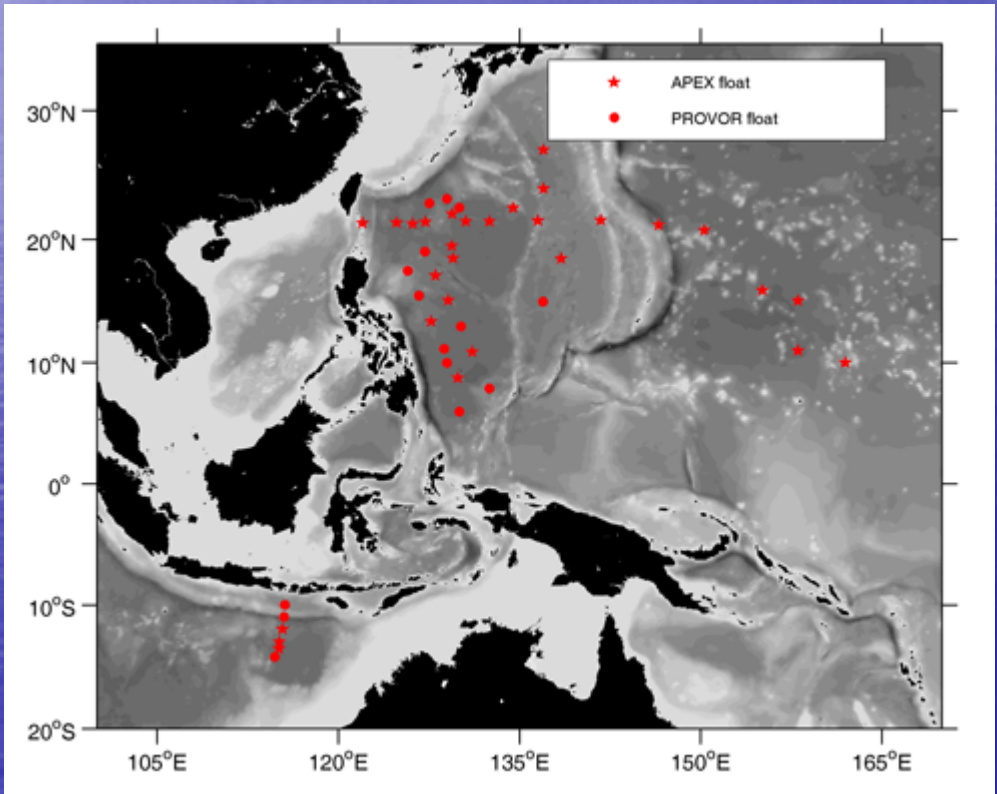


Figure 2-2 China Argo buoy release location

NUMBER	PTT	WMO	FLOAT TYPE	DEPLOY			STATUS	META	DATA
				DATE	LONGITUDE	LATITUDE			
0001	08173	5900019	APEX	2002-10-20	129.45	22.02	Active	>>	>>
0002	08509	5900020	APEX	2002-10-21	129.52	18.50	Inactive	>>	>>
0003	14905	5900198	PROVOR	2002-03-21	114.72	-14.21	Inactive	>>	>>
0004	21299	5900222	APEX	2003-01-09	126.18	21.22	Inactive	>>	>>
0005	21300	5900223	APEX	2003-01-08	128.07	17.12	Inactive	>>	>>
0006	21301	5900224	APEX	2003-01-03	129.92	8.76	Inactive	>>	>>
0007	21302	5900225	APEX	2003-01-02	126.67	15.50	Inactive	>>	>>
0008	21335	5900226	APEX	2003-01-08	129.10	15.12	Inactive	>>	>>
0009	21371	5900227	APEX	2003-01-05	131.12	10.89	Inactive	>>	>>
0010	21289	5900228	PROVOR	2003-01-08	127.17	19.03	Inactive	>>	>>
0011	21294	5900315	PROVOR	2003-01-07	130.16	13.00	Inactive	>>	>>
0012	21295	5900316	PROVOR	2003-01-05	132.50	7.92	Inactive	>>	>>
0013	21296	5900317	PROVOR	2003-01-04	130.00	6.00	Inactive	>>	>>
0014	21297	5900318	PROVOR	2003-01-03	128.74	11.16	Inactive	>>	>>
0015	24077	2900242	PROVOR	2002-11-26	128.97	10.00	No_Transmission	>>	>>
0017	23582	5900220	PROVOR	2003-08-11	130.02	22.54	Inactive	>>	>>
0018	23578	5900219	PROVOR	2003-08-11	129.00	23.22	Inactive	>>	>>
0019	23754	2900313	PROVOR	2003-08-04	127.53	22.88	Inactive	>>	>>
0020	26608	5900462	APEX	2004-11-08	115.08	-13.19	Active	>>	>>
0021	26609	5900463	APEX	2004-01-17	134.50	22.50	Inactive	>>	>>
0022	26618	5900464	APEX	2004-01-09	137.00	23.99	Inactive	>>	>>
0023	26619	5900465	APEX	2004-01-10	137.00	27.01	Inactive	>>	>>

0024	26596	2900322	APEX	2004-11-08	115.38	-11.97	Active	>>	>>
0025	26607	2900323	APEX	2004-11-08	115.14	-13.01	Active	>>	>>
0026	28201	2900457	PROVOR	2004-11-08	115.49	-10.95	Inactive	>>	>>
0027	28202	2900458	PROVOR	2004-11-08	115.57	-9.99	Inactive	>>	>>
0028	28203	5901603	APEX	2006-05-16	129.43	19.47	Active	>>	>>
0029	28204	5901604	APEX	2006-05-19	138.48	18.45	Active	>>	>>
0040	28205	5901605	APEX	2006-06-16	158.10	15.06	Active	>>	>>
0041	28206	5901606	APEX	2006-06-17	158.10	11.00	Active	>>	>>
0042	28207	5901607	APEX	2006-06-06	155.15	15.93	Inactive	>>	>>
0043	28208	5901608	APEX	2006-07-04	162.00	10.00	Active	>>	>>
0045	40947	2901154	APEX	2008-05-24	122.01	21.31	Active	>>	>>
0046	80052	2901155	APEX	2008-05-24	124.85	21.33	Active	>>	>>
0047	80053	2901156	APEX	2008-05-25	127.24	21.38	Active	>>	>>
0048	80054	2901157	APEX	2008-05-26	130.59	21.43	Active	>>	>>
0049	80055	2901158	APEX	2008-05-26	132.52	21.43	Active	>>	>>
0050	80056	2901159	APEX	2008-05-27	136.53	21.49	Active	>>	>>
0051	40948	2901160	APEX	2008-05-28	141.75	21.51	Active	>>	>>
0052	40949	2901161	APEX	2008-05-29	146.54	21.14	Active	>>	>>
0053	40950	2901162	APEX	2008-05-29	150.32	20.73	Active	>>	>>
0054	40951	2901163	APEX	2008-06-03	159.03	20.48	Active	>>	>>
0055	40953	2901164	APEX	2008-06-12	156.06	16.96	Active	>>	>>

Table 2-1 Specific Information about 46 Argo floats
Total number, location and time of buoys China released

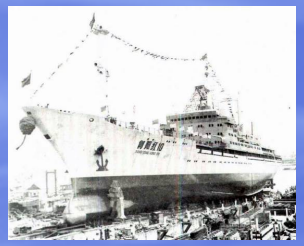
Under the support of Ministry Of Science and Technology (MOST) and State Oceanic Administration (SOA), the China Argo project has now fulfilled the tasks of Argo floats deploying, real-time data receiving, processing and data application.

3. Marine Survey Ship

China has already established a large-scale, full range survey ship team, to meet the basic needs of the survey, including multi-purpose survey ship, professional survey ship and special survey ship.

Multi-purpose Survey Ship

Name	Tonnage	Instrument	Ascription
“Shijian” 	2，955t	electric driving shallow water winch, electric driving geological winch, fluid drive hydrographic winch, deep water net winch, analyzer, transmitter, azimuth mirror, seismograph, distiller, thermostat	the Bureau of East China Sea, SOA
“Xiangyanghong 5” 	13，650 t	hydrology motor-winch, hydrology hydraulically-powered winch, geological motor-winch, conventional sea investigation instrument, radar, gravimeter, drying oven, electric heating constant temperature incubator	the State Bureau of Oceanic Administration South China Sea Substation.
“Xiangyanghong 7”	1，178.9 t	shallow water motor-winch, hydrology motor-winch, exchange motor-winch, ocean current meter, CTD, acoustic meter, photoelectric colorimeter, radio transceiver, gravimeter	the State Bureau of Oceanic Administration North Sea Substation
“Xiangyanghong 8”	1，178.9 t	shallow water motor-winch, hydrology motor-winch, exchange motor-winch, ocean current meter, CTD, acoustic meter, photoelectric colorimeter, radio transceiver, gravimeter	the State Bureau of Oceanic Administration North China sea Substation
“Xiangyanghong 9” 	4，435 t	deep water drag net fluid drive winch, deep water hydrology hydraulically-powered winch, geological motor-winch, shallow water motor-winch, ships meteorograph, 10,0000m sounder, fish finder, sounder,gravimeter, magnetometer, CTD, guidance anemoscope, incubator and aquarium minority box	the State Bureau of Oceanic Administration North China Sea Substation

“Xiangyanghong 10” 	**12,467 .9 t**	hydrology hydraulically-powered winch, geological motor-winch, electric cable motor-winch, altogether 12, 675 acquisition radars, 711 measured that the rain radar, 843 typhoon radar, 704 radars, Doppler high LF receiver, satellite cloud picture receiver, 69-Ⅲ fish finder, gravimeter, physiognomy meter, magnetometer, 5KW transmitter, 30KW transmitter, radar wave meter and converter	the State Bureau of Oceanic Administration East China Sea Substation
“Xiangyanghong 14” 	**4, 440 t**	deep water demersal drag net hydraulically-powered winch, geological motor-winch, shallow water motor-winch, electric cable motor-winch, ships meteorograph, repeater gyro-compass, full wave receiver, cloud chart receiver, 10,000m Echo Sounder, fish finder, gravimeter, Echo Sounder	the State Bureau of Oceanic Administration East China Sea Substation
“Xiangyanghong 16”	**4, 440 t**	deep water demersal drag net hydraulically-powered winch, geological motor-winch, shallow water motor-winch, electric cable motor-winch, ships meteorograph, repeater gyro-compass, full wave receiver, cloud chart receiver, 10,000m Echo Sounder, fish finder, gravimeter, Echo Sounder	the State Bureau of Oceanic Administration East China Sea Substation
“Shiyan 3”	**2，571 t**	each kind of specialized winch of 8, rain measurement radar, satellite nephogram receiver, facsimile meteorology receiver, meteorograph, magnetometer, 10,0000m sounder, submarine telecommunication, CTD, towed vehicle	Chinese Academy of Sciencer South China Sea Institute of Marineography
“Dongfanghong”	**2，345 t**	hydrographic winch, physical winch, geological winch, hydraulic pressure hydrographic winch, electrically operated geological winch, crane	Ocean university of china
“Dongfanghong 2” 	**3，235 t**	6, 000 m bottom sampling motor-winch, 6,000 m hydrological hydraulic winch, 2,500 m temperature and salinity, depth measurement system (CTD) with a cable winch, 1 , 300 m hydrological hydraulic winch of 2, 2 tons of gantry crane, 6 tons of gantry crane	Ocean university of china

Special Survey Ship

Name	Tonnage	Instrument	Ascription
“Jidi” 	**12，904 t**	6,000 m geological winch, 3,000 m hydrological winch, gravimeter, azimuth mirror, sounder, daily production 24~30 t fresh water desalination system, airplane platform and hangar, “Dolphin” helicopter, sewage processor which may supply 80 people to use	the State Bureau of Oceanic Administration North Sea Substation
“Xuelong” 	**21，025 t**	6,000 m and 3,000 m winch used for investigations, each kind of marine inspect laboratory altogether sum to approximately 200 m^2, low-resolution satellite nephogram receiving equipment and conventional automatic meteorological observation equipment, CTD, Acoustic Doppler Current Profiler (ADCP)	the State Bureau of Oceanic Administration East China Sea Substation
“Dayang 1” 	**5，660 t**	10,000m fluid drive geological winch, deep water townet winch, hydrographic winch, "A" type rack, crane, deep water towed acoustic systems and optical systems, Sea Beam2100-type multi-beam system, XBT system, ZQC1-2 oceanography automatic data sampling and processing system, such as GPS and Depth Sounder.	the State Bureau of Oceanic Administration North Sea Substation

4. Voluntary Observing Ships (VOS) Observing System

China choose 120 merchants ships to equip the automatic observation equipment, carried on the voluntary ship measuring and reporting work. And it has equipped the maritime satellite communication facility on mainly 30 voluntary ships which have the high rate of navigation, good performance and navigated in the domestic service.

China only have 35 voluntary ships which take part in shipping assistant measuring and reporting work, South China Sea have 9,East China Sea have 15, North China Sea have 11, mainly distributes in some fixed line merchant ships.

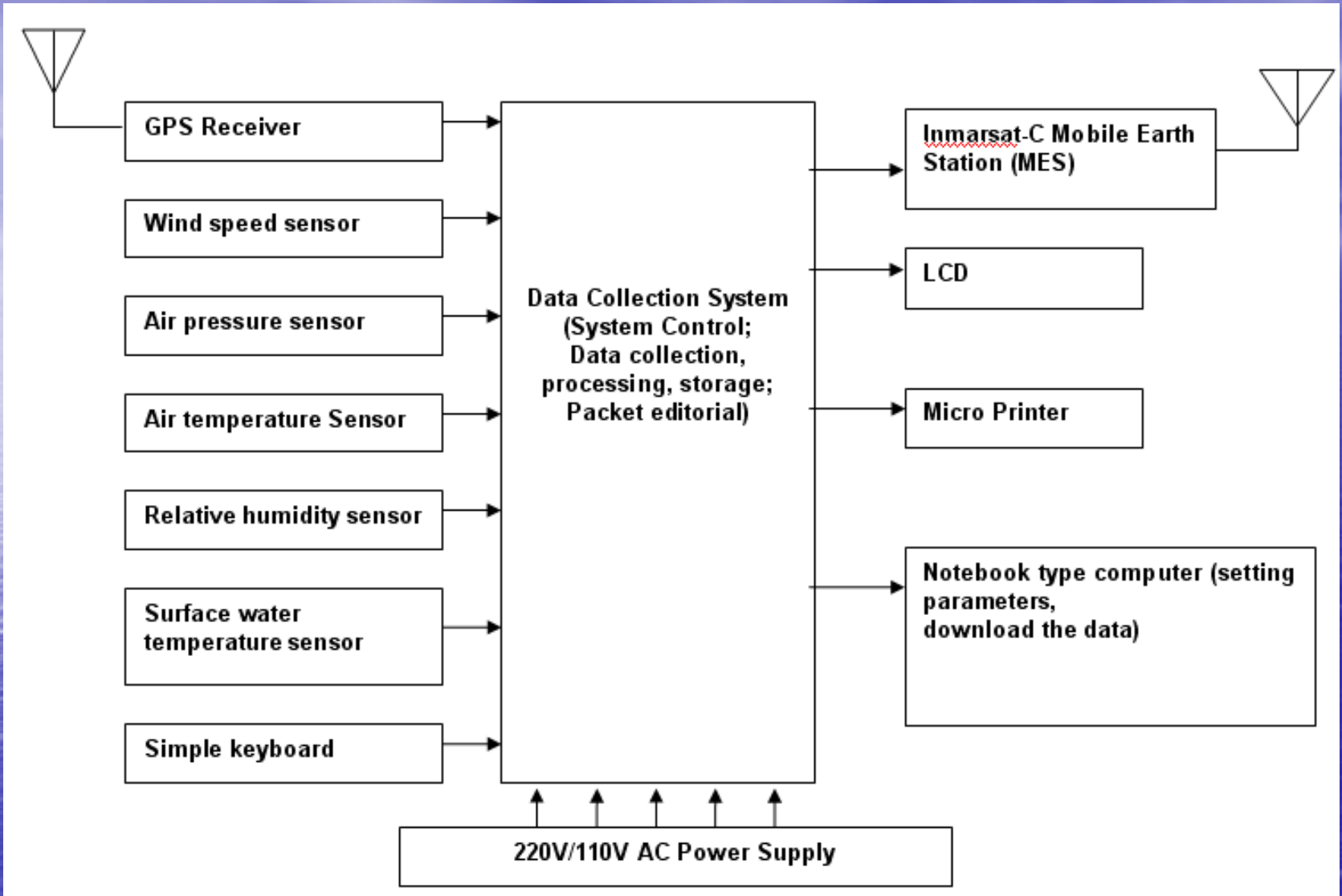


Figure 4-1 VOS automatic observation and prediction system

Fig 4-2 Voluntary ship automatic observation and prediction instrument

Element	Range	Precision
Wind speed	0～ 75 m/s	when ≤ 5 m/s：±0.5m/s when V>5 m/s：±10% ×reading
Wind direction	0～360°	±10°
Air pressure	150～1050hpa	±1hpa
Air temperature	—25～ +45℃	±0.2℃
Relative humidity	0～100%	when ≤5O%： ±5% when > 50%:±2%
Surface water temperature	—4～+ 35℃	± 0.5℃

Table 4-1 Range and precision of parameters of VOS measurements

DRAGON in support of harmonizing European and Chinese marine monitoring for Environment and Security System.

WP1 Review of In-situ Observing System-II
Activity Report 09/02/2008

IAP contribution to Dragoness Project WP1
NZC Contribution to Dragoness Project WP1

Edited by
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Thanks a lot!