국립해양조사원 KHOA
Korea Hydrographic and Oceanographic Administration

Korea Ocean Gate Array

Korea Hydrographic & Oceanographic Administration

Ministry of Land, Transport and Maritime Affairs

Contents

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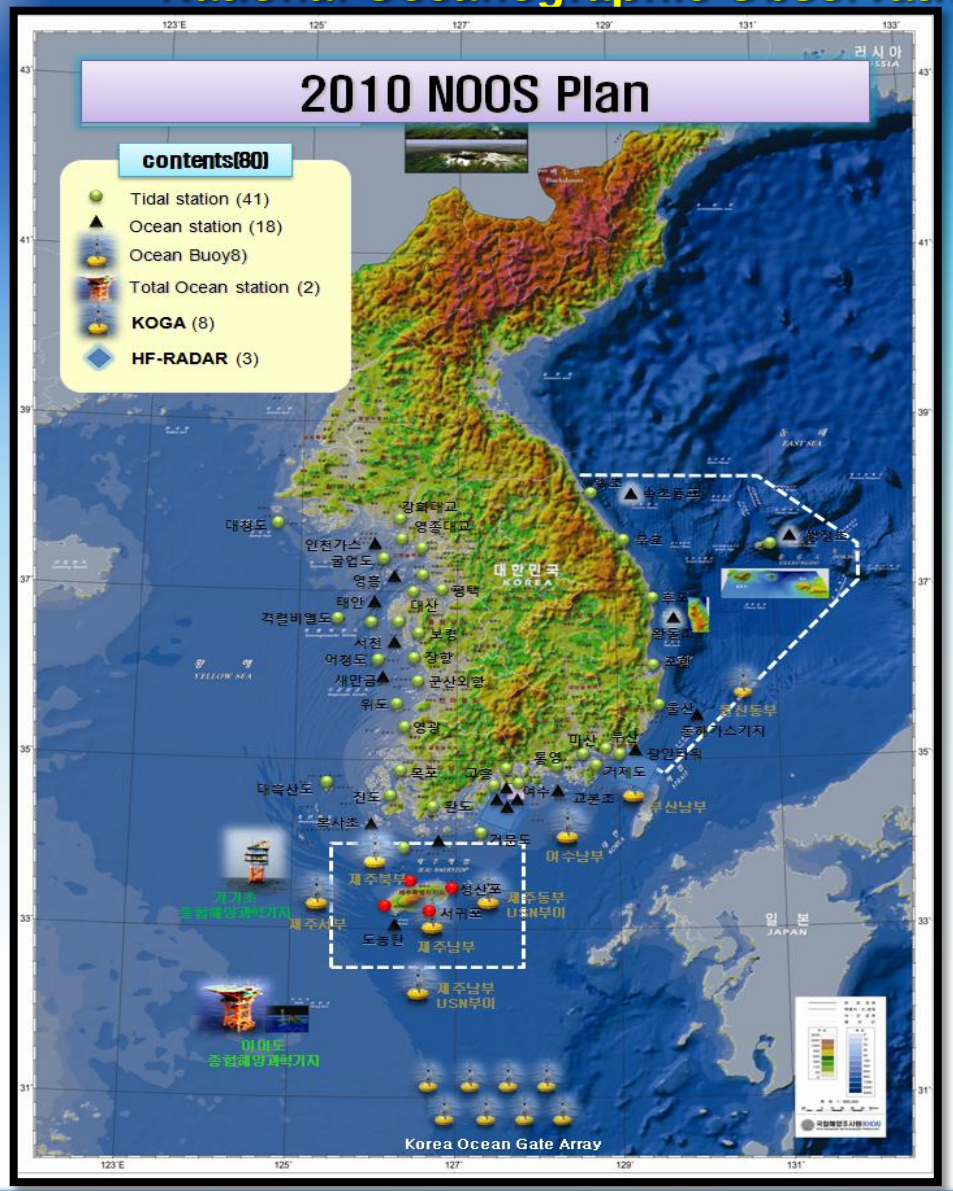
1. KOGA Project Concept

National Oceanographic Observation Network



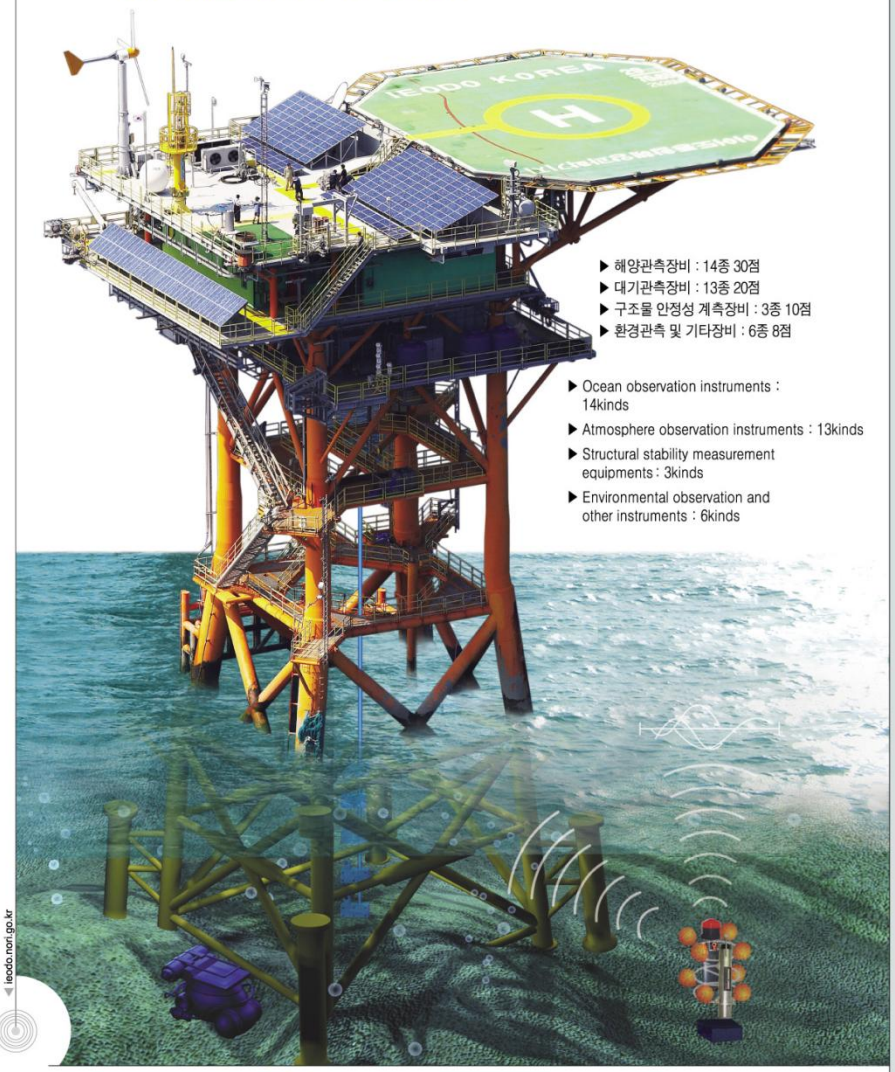
○ 91 observing stations will be established by 2010 (80 stations, 2010)

- Ocean observation base : 2
- Lighthouse observatory : 14
- Dolphin observatory : 4
- Ocean buoy : 8
- Tidal station : 41
- HF-RADAR : 3

○ Ocean phenomenon such as tide, wave, water temperature, current and weather, etc. Systematically is observed and provided in real-time

Ieodo Ocean Research Station

✱ 이어도해양과학기지 관측장비 (Equipment of IORS)



- ▶ 해양관측장비 : 14종 30점
- ▶ 대기관측장비 : 13종 20점
- ▶ 구조물 안정성 계측장비 : 3종 10점
- ▶ 환경관측 및 기타장비 : 6종 8점

- ▶ Ocean observation instruments : 14kinds
- ▶ Atmosphere observation instruments : 13kinds
- ▶ Structural stability measurement equipments : 3kinds
- ▶ Environmental observation and other instruments : 6kinds

ieodo.nori.go.kr

OBSERVATION
Equipment & Planning

01
가속도계
Accelerometer
가속도, 속도, 변위

02
경사계
Inclinometer
구조물경사도

03
풍향 · 풍속계
Wind Monitor
풍향, 풍속

04
온도 · 습도계
Humidity & Temperature Gauge
기온, 습도

05
기압계
Digital barometric sensor
기압

06
일사계
Pyronometer
일사량

07
일조계
Sunshine Duration Meter
일조시간

08
자외일사계
UV-B Radiometer
자외선

09
강우량계
Rain Gauge
강우량

10
정밀증발계
Vaporimeter
증발량

11
시정계
Present Weather Detector
가시거리,강우강도

12
스펙트로레디오메터
Ocean Colour Radiometer System
대기 및 해양 분광량

13
IR온도계
IR Thermometer
원격 해표면온도

14
WAVE RADAR
Directional Wave & Surface Current Radar System
파고,주기,파향,스펙트럼,표층유속

15
운고계
Ceilometer
구름높이,구름양

16
Sea Level Monitor
Wave & Sea Level Sensor
조위, 파고

17
ARGOS
Drifter Buoy
표층수온,기압,해류

18
ROSSET SAMPLER&CTD
Water sampler & Conductivity Temperature Depth
채수,수온,염분

19

AEROSOL 채취기
PM2.5 Sequential filter sampler system
무기이온,금속,유기산

20
CO_2측정계
CO_2 Gas Analyzer brochure
대기중 CO_2량

21
FLUX측정계
3D Sonic Anemometer
3차원풍향,풍속

22
RDCP
Recording Doppler Current Profiler
층별 유속,유향

23
SMART Release
Acoustic Release & Underwater Modem
수중통신,장비회수

24
CTR7
Conductivity & Temperature Sensor
층별 수온,염분

25
차세대조위계
High Quality Sea Level Monitor
조위

26
태양력발전기
Solar Power Generator
전원공급

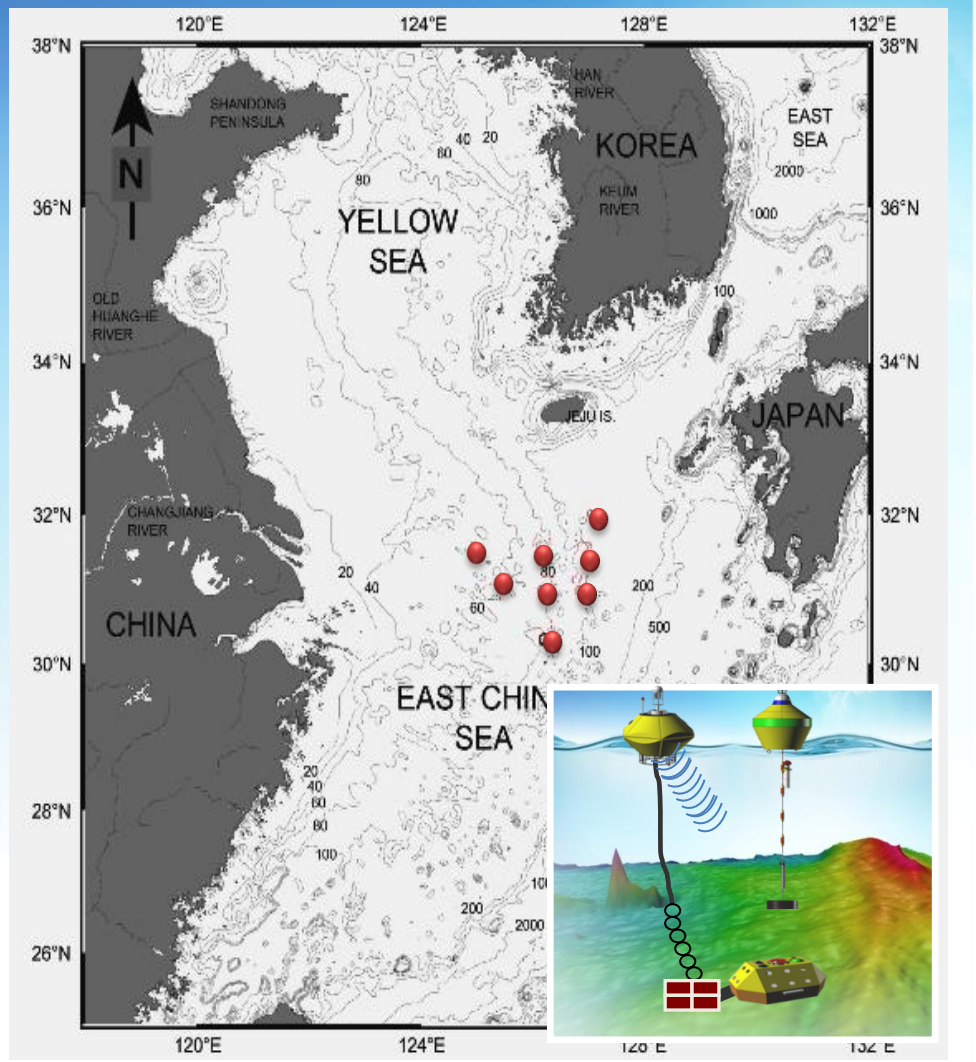
27
풍력발전기
Wind Power Generator
전원공급

28
디젤발전기
Diesel Generator
보조전원공급

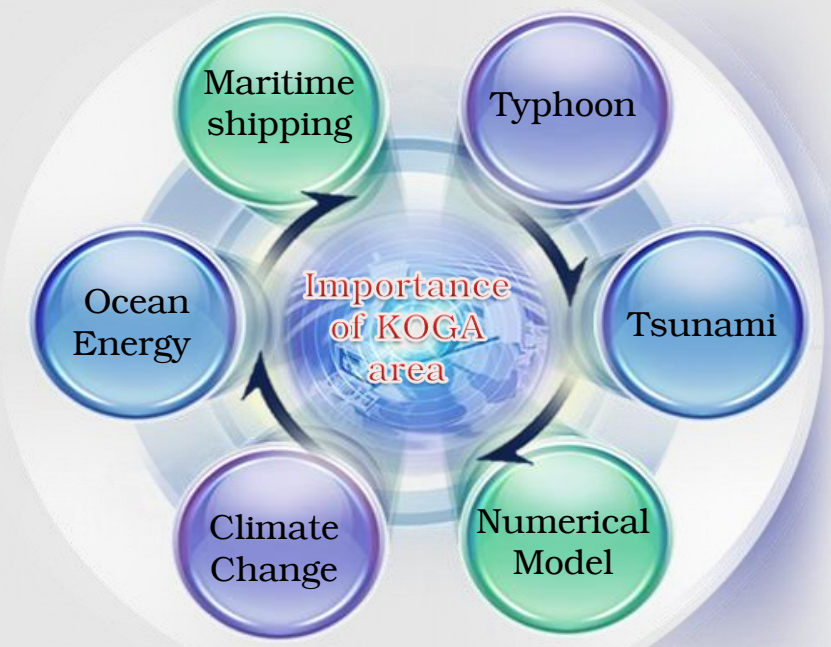
29
자동사다리
Auto Ladder
침입방지

30
등대
Light House
항해안전

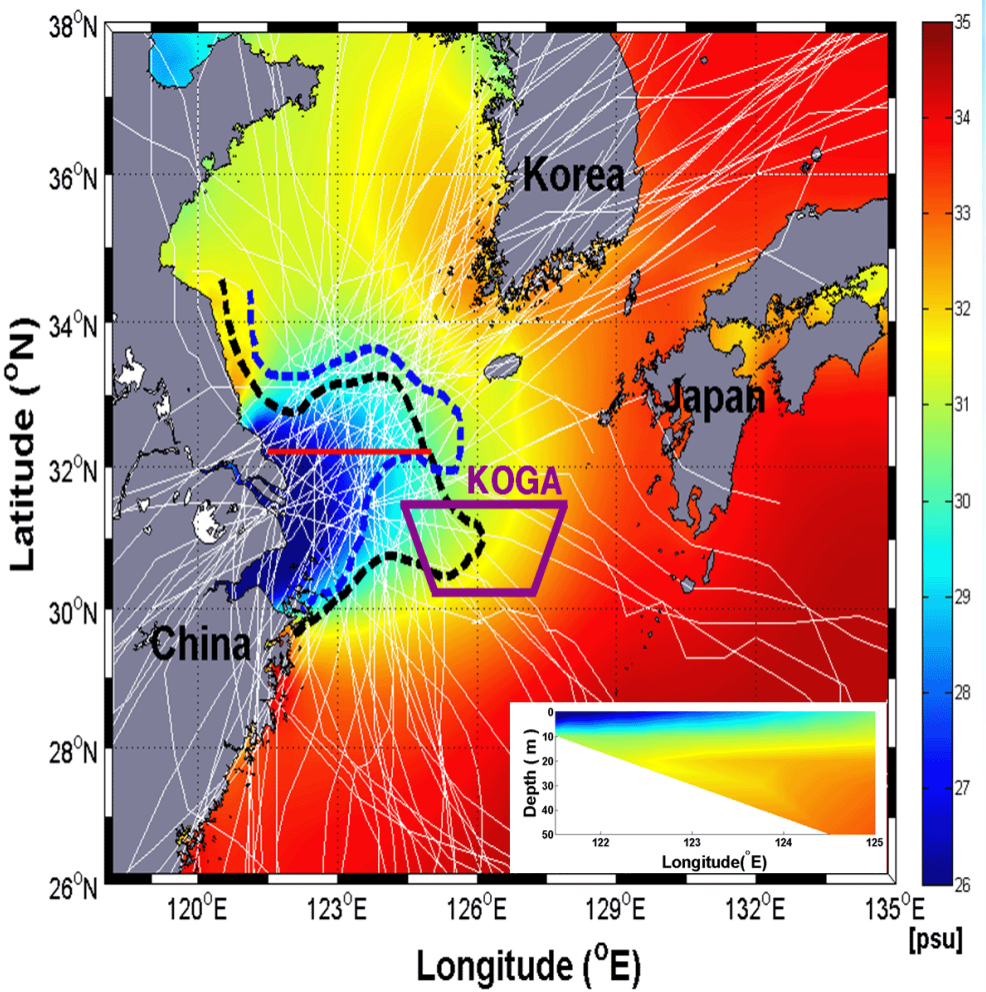
1. KOGA Project Concept

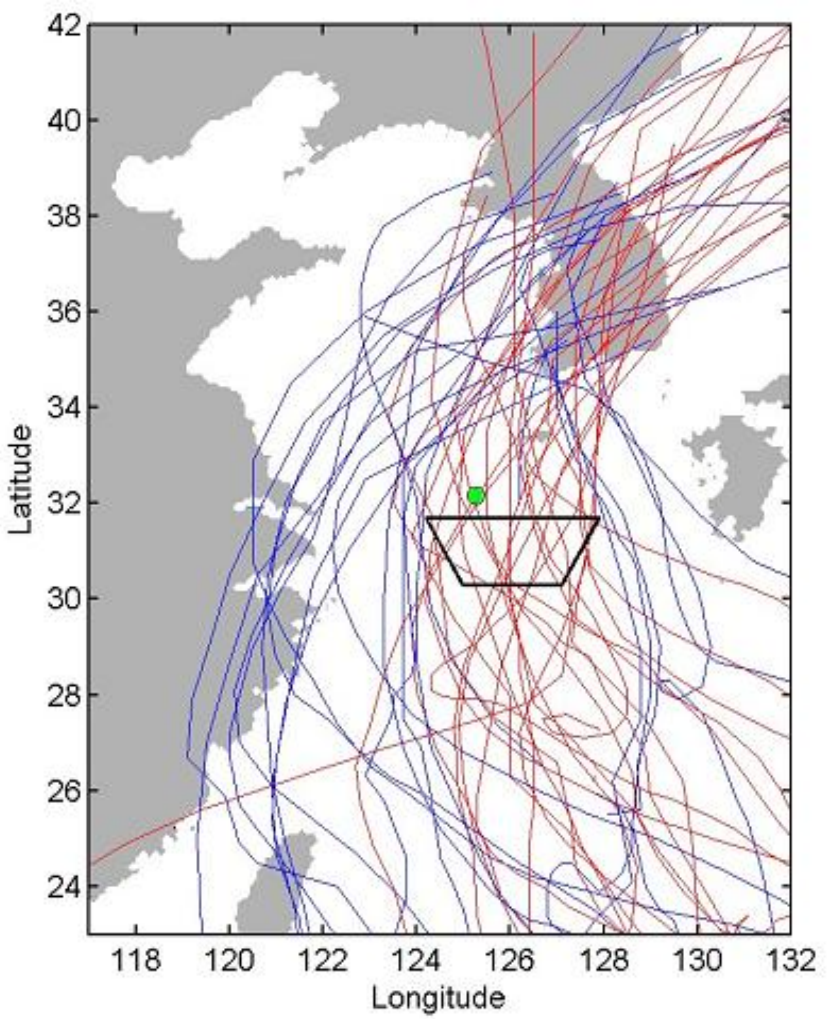


- Main path of the typhoon affecting Korea
- The branching area of the Tsushima Current from Kuroshio Current
- Sea of detectable Earthquake occurred along Ryukyu Trench
- Boundary Condition area of oceanography and meteorology Numerical Modeling
- Entering Gateway of ship out to the Ocean



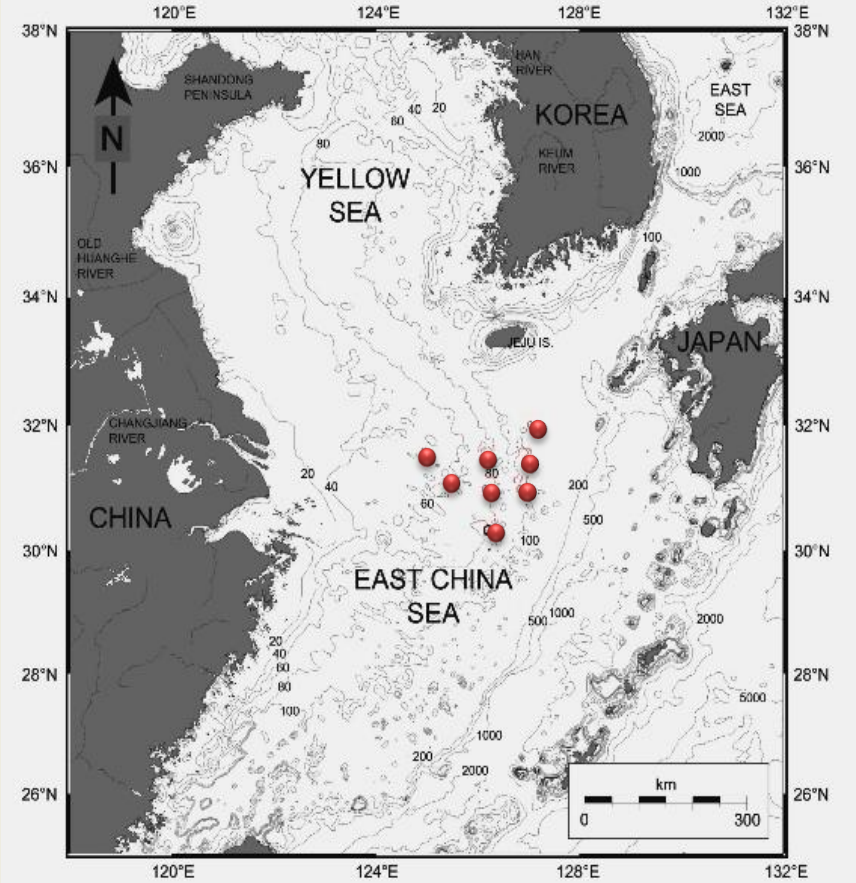
1. KOGA Project Concept





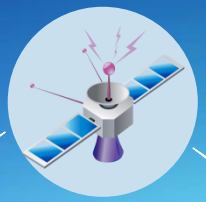
2. KOGA System_Location

Installation Area of KOGA



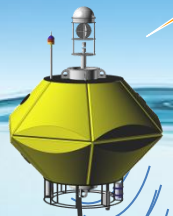
Site	Lat.	Long	Depth(m)	Sediment	Slope
koga06	32-00-04.115	127-02-40.528	118	sM	Gentle
koga07	31-27-47.600	126-57-53.195	106	M	Gentle
koga05	31-27-47.600	126-10-14.762	75	sM	Gentle
koga01	31-27-47.600	125-01-49.757	55	sM	Gentle
koga04	30-59-14.518	126-49-33.178	97	sM	Gentle
koga08	30-59-14.518	126-09-10.731	86	sM	Gentle
koga02	30-59-14.518	125-28-15.101	63	M	Gentle
koga03	30-19-49.682	126-12-07.460	83	sM	Gentle

3. KOGA System_Hardware



Remote Control Sys.(Data Communication: two-way Iridium)

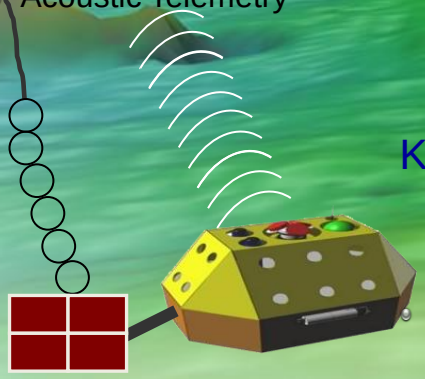
Iridium
(Satellite communication)



KOGA_buoy

- Wind direction, Wind speed, Temp., Air pressure
- Water Temp., Conductivity, Wave height, Wave direction, Wave period
- CO_2, Hydrophone

Acoustic Telemetry



KOGA_bottom(Trawl Resistant Bottom Mount)

- Current profiler, Conductivity, Water Temp., Tide, Wave..

KOGA_scripps

- Wind, Temp., Air pressure
- Water Temp., pressure, current, Wave

Functions

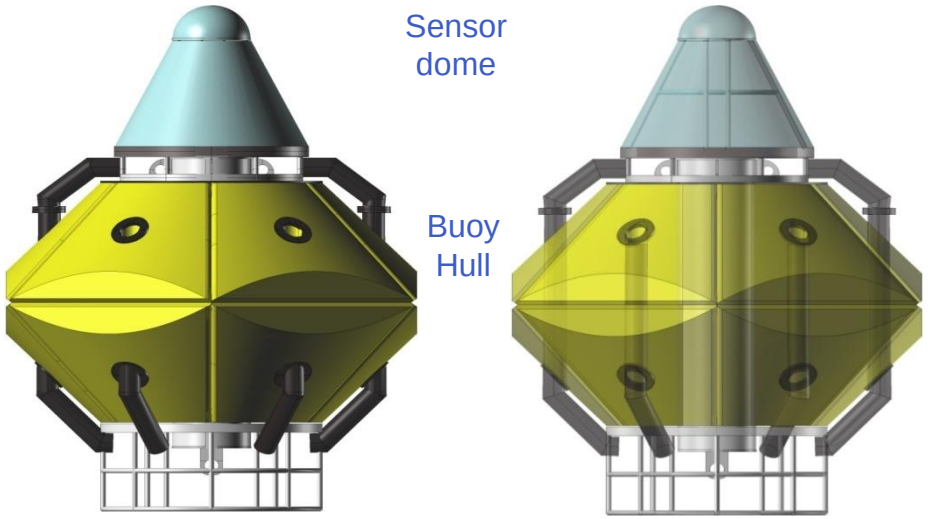
	Functions
Specification	◦ Auto reset function in case of System halt ◦ Dual operating by Standby and Normal Mode ◦ Data input of a variety of sensor data (analog, digital and so on) ◦ Time synchronization of Internal controller using the GPS time ◦ The image data acquisition using camera sensor and transmission ◦ Checking the power supply system ◦ Remote control
system control	◦ Setting and data transmission using serial and wireless connection ◦ Change of Communication method ◦ Mark and adjustment of time ◦ Controller check or Reset function ◦ Select ion of Data transmission interval
Data acquisition and transmission	◦ Logging and transmission of observed data ◦ Logging System error message ◦ Emergency data ◦ Transmission using Dual satellite system

	Functions
Watching mode	◦ Watching of work condition of the Controller, power supply and output ◦ Automatic reset function : Obstacle to communication system ◦ Creating of Monitoring, logging and saving log data and transmission
Remote control mode (close range RF)	◦ Direct Mode ▪ Connect collecting part to data processing part directly that watch a work status by remote command ▪ Data Transmission of RESET and watching about work condition ▪ Display the result on the Remote control part ◦ Bypass Mode ▪ Checking status of main controller, modem, etc. and transmission of check result in the data logger system ▪ Transfer the checked data ▪ Setting the parameters

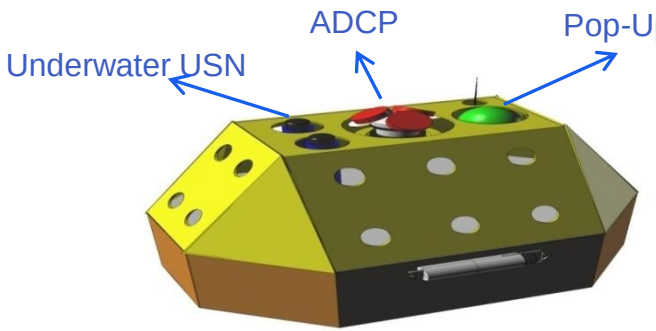
3. KOGA System_Hardware

KOGA Hardware Configuration

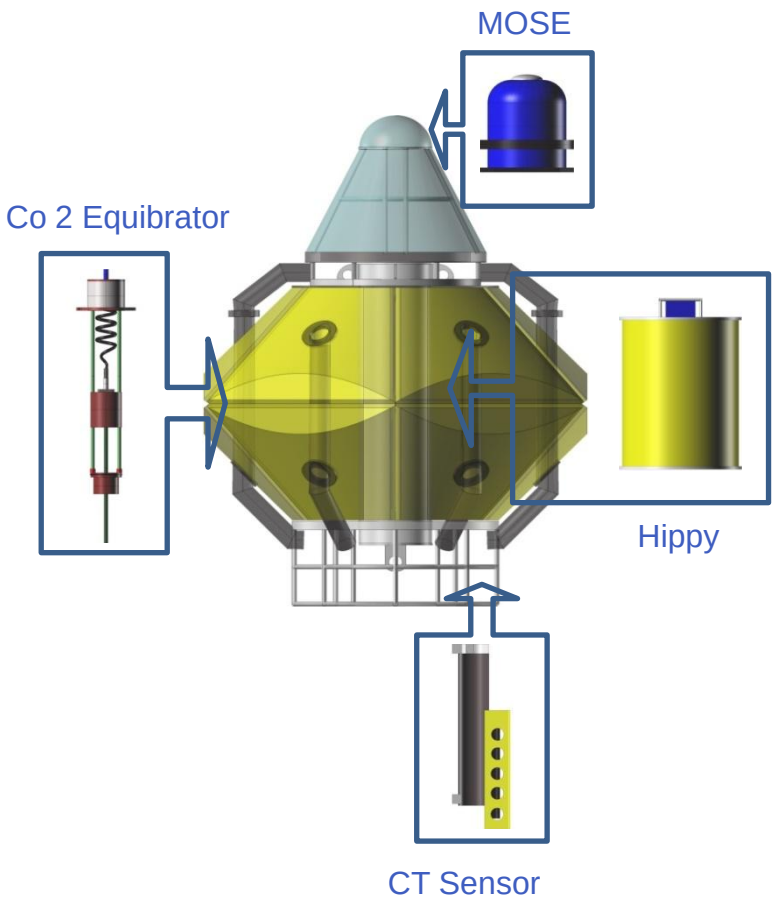
KOGA_Buoy configuration



KOGA_bottom(Underwater System)

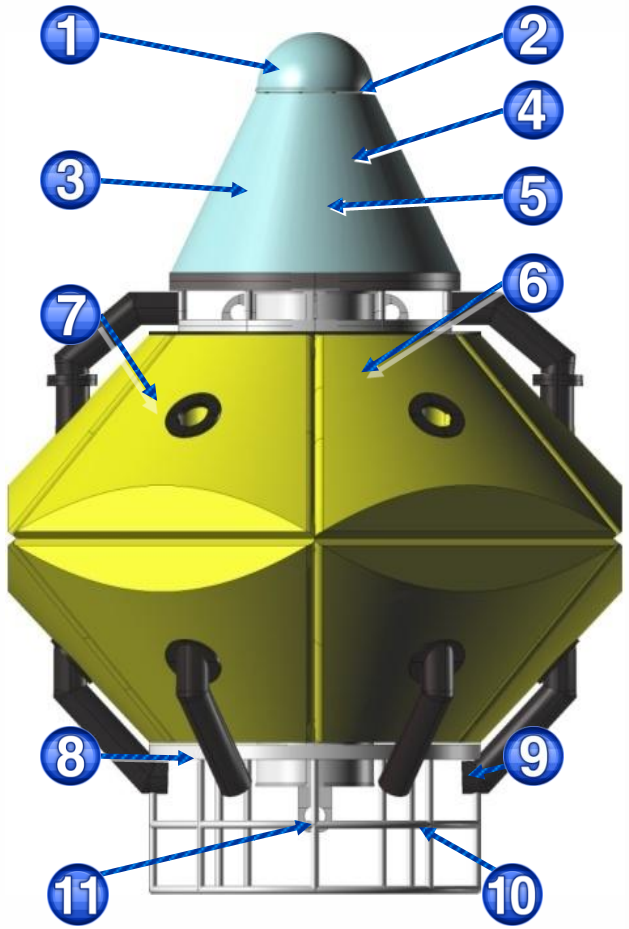


KOGA_Buoy(Oversized)



3. KOGA System_Hardware

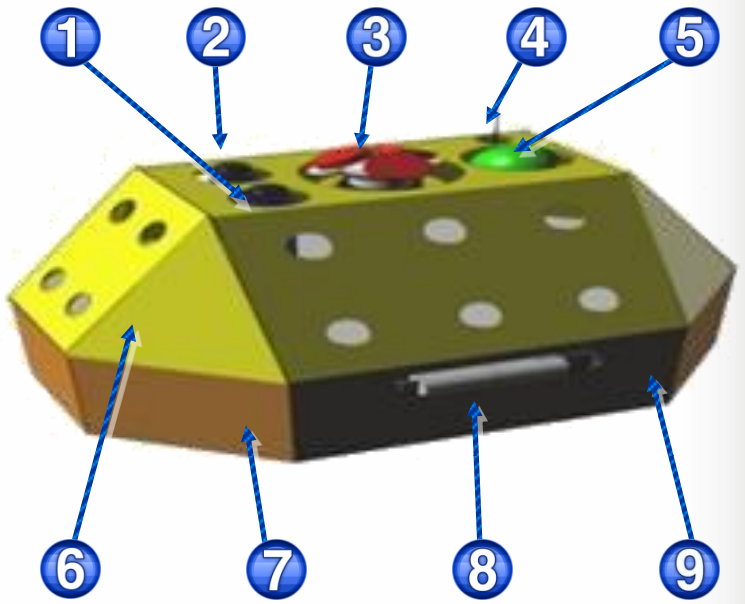
Buoy system(oversized)



Specifications and Features

NO.	item	Specification	Features
1	Antenna	Installation of satellite communication antenna	Prevention of external force
2	Wave sensor	Wave high, wave direction, wave periods	Measurement of long and short wave at the same time with GPS
3	LED Light	In accordance with IALA Recommendations	Charges the battery during daylight hours
4	Radar reflector	In accordance with Recommendations	active Radar Reflector
5	Weather sensor	Measurement of Wind speed, wind direction, temperature, pressure	Integrated seismometer wind sensor
6	Buoy internal	Data logger/control	Acquirement and control of data, transport of data though iridium communication
		Power supply system	1year
		Black Box	Storage of all of data
7	Buoy form	Dia. 4.3m, PE form	Made from strong and durable Excellent buoyancy and stability
8	C/T sensor	Measurement of Conductivity, water temperature	Defense system for a long term observation Real time integrated calculations(salinity, density, speed of sound)
9	CO_2 sensor	Measurement of CO2	No need calibration
10	surface USN node	Acoustic telemetry modems	Low frequency acoustic telemetry confidence modem
11	Mooring system	Depth of 1.5times	Durable material

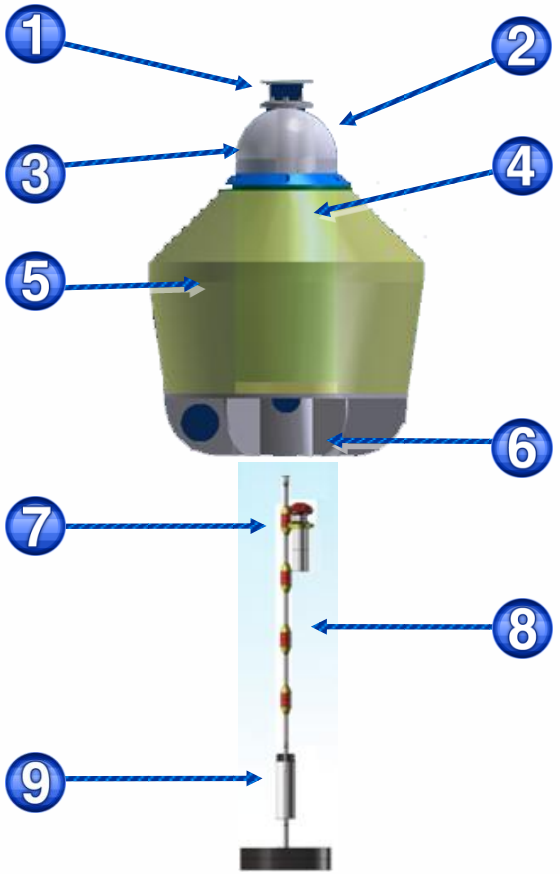
Underwater system



Specification sand Features

NO.	Item	Specification	Features
1	Emergency Transponder	Underwater acoustic transponder	To accommodate more batteries, and functions identically Providing three times the operational life
2	Under water USN node	Acoustic telemetry modems	Low frequency acoustic telemetry confidence modem
3	Acoustic Doppler current profiler (ADCP, RDCP)	Measurement of the water direction, water speed, pressure, conductivity and temperature for each layers	Broadband signal processing delivers very low-noise data, resulting in unparalleled data resolution and minimal power consumption
4	Submersible Argos Beacon	Satellite tracking and alerting system	Transmit the signal through satellite communication To minimize corrosion never mount the pressure case to metal.
5	Pop up Buoy & A.R. Integration system	Underwater acoustic release system	Integrated marking buoy and A.R. system
6	TRBM	Trawl resistant bottom mounts	With Gimbals for ADCP, RDCP
7	Buoyancy form	High density buoyancy	High density buoyancy form for recovering TRBM
8	A.R. System	Acoustic Releasing system	Released between TRBM and anchor by acoustic signal
9	External Battery Pack	Power supply system	High performance battery (Low electric discharge rate)

Buoy system(small)



Specifications and Features

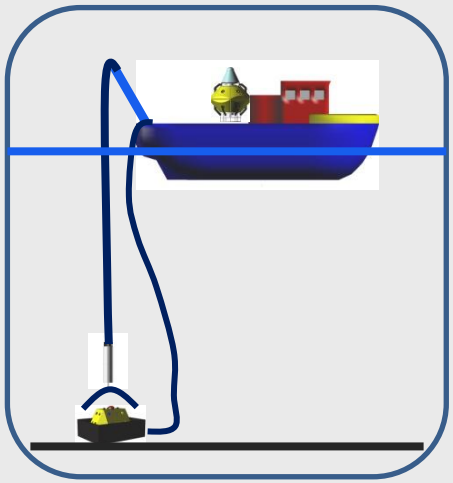
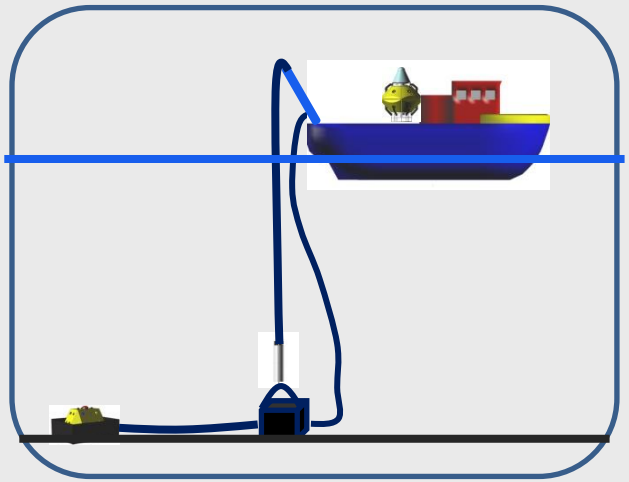
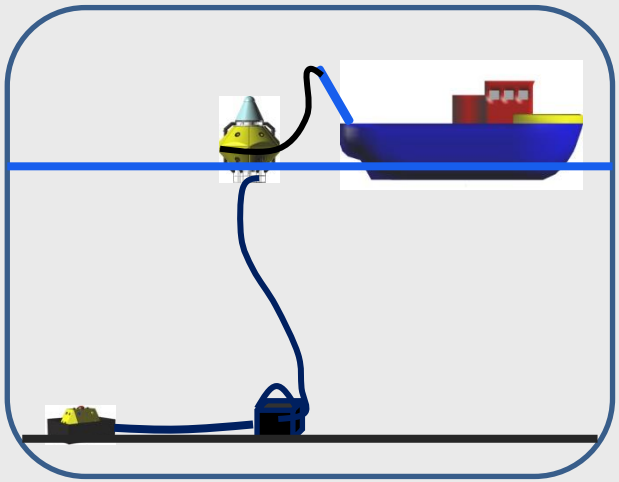
NO.	Item	Specification	Features
1	Weather sensor	Measurement of Wind speed, wind direction, temperature, pressure	Integrated seismometer wind sensor
2	Antenna	Installation of satellite communication antenna	Prevention of external force
3	Wave sensor	Wave high, wave direction, wave periods	Measurement of long and short wave at the same time with GPS
4	Buoy internal	Community/controller	Transmit the signal through satellite communication To minimize corrosion never mount the pressure case to metal.
		barometer	Waterproof
		Power supply system	1year
5	Buoy form	Dia. 0.73m, PE form	Minimum of exposal Prevent of damage
6	Mooring system	Automatic mooring system	Integrated buoy-sensor-mooring system
7	ADCP	Measurement of water direction, water speed	High accuracy
8	P/T sensor	Measurement of temperature and pressure	Data transmit by Inductive modem
9	Underwater releasing system	Acoustic Release	Released by acoustic signal

Plan of construction and test

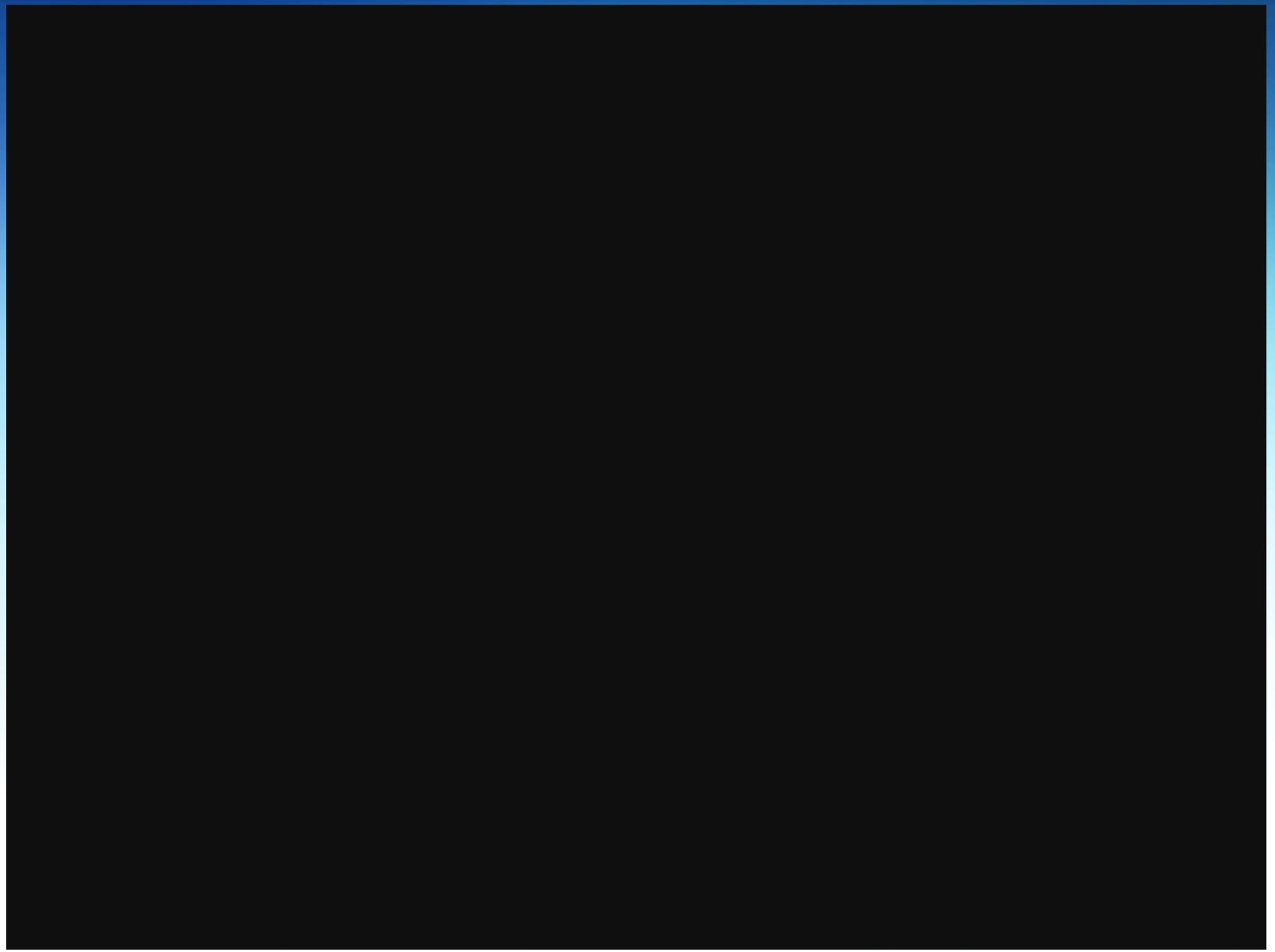
Item	Content
Construction schedule	◦ Cooperation : production of the buoy topside, trail construction and review of the construction propriety and then taking to pieces ◦ Reconstruction after moving around the embargo ◦ Land test and check the function realization ◦ Move the installation ship
Test schedule	◦ Select the test site on the south sea (depth : 80 -100) ◦ Mooring and installation test using the ship ◦ Realization of the observation system function ◦ Test of the power consumption ◦ Recovery test
Example of the Buoy construction (July 2010)	

4. KOGA System_Installation

Process of installation

1. TRBM installation	2. Sinker installation	3. Buoy installation
• Using the self-mooring system • Connect the mooring system to the TRBM using the A.R. • Balance themselves, safe arrival down to sub-bottom • Recovery the A.R	• Using the self-mooring system • Connect the mooring system to the sinker using the A.R. • Balance themselves, safe arrival down to sub-bottom • Recovery the A.R	• Connect the buoy to mooring system • Buoy installation using a crane • Recovery of the Installing mooring line using the vessel • Final test • The KOGA_small buoy installation
		

5. Participate in PP-WET



Thank you!