



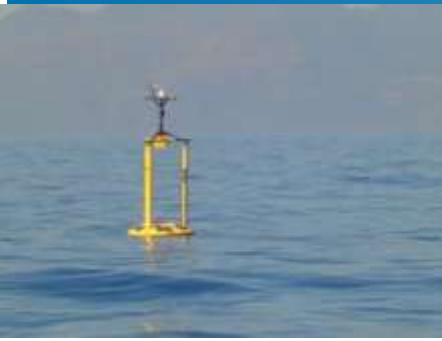
JOINT EUROPEAN RESEARCH INFRASTRUCTURE NETWORK FOR COASTAL OBSERVATORIES

HCMR FIXED PLATFORMS

Best practices



FIXED PLATFORM NETWORK – POSEIDON BUOYS



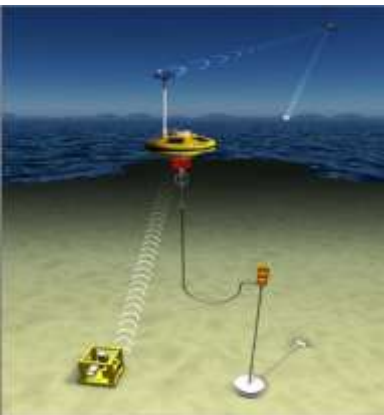
SeaWatch buoys

Limited number of parameters



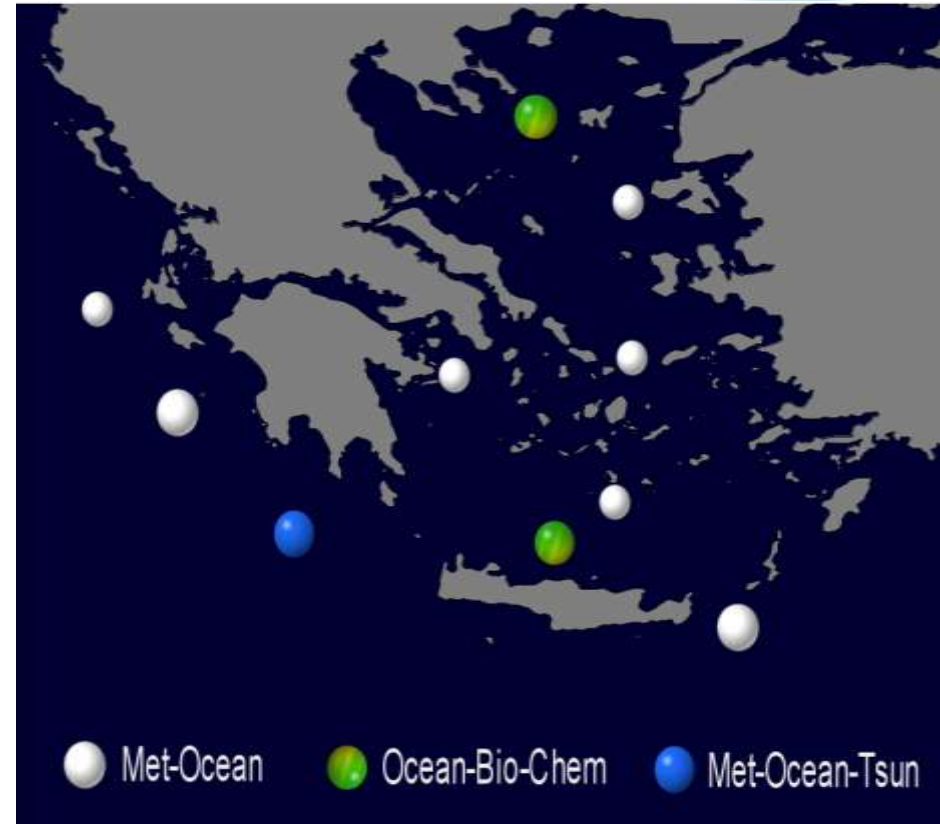
Wavescan buoys

Supporting deep sea monitoring including ecosystem variables



Deep Sea platform

Tsunami detection with acoustic link to surface buoy

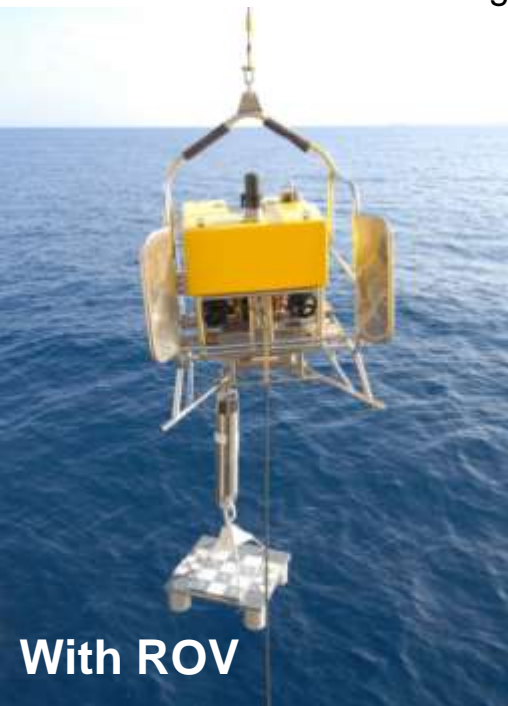


www.poseidon.gr

NETWORK OPERATION - SUPPORT MEANS



- buoy replacement
- sensor replacement
- sensor maintenance and field validation
- emergency visits with inflatable



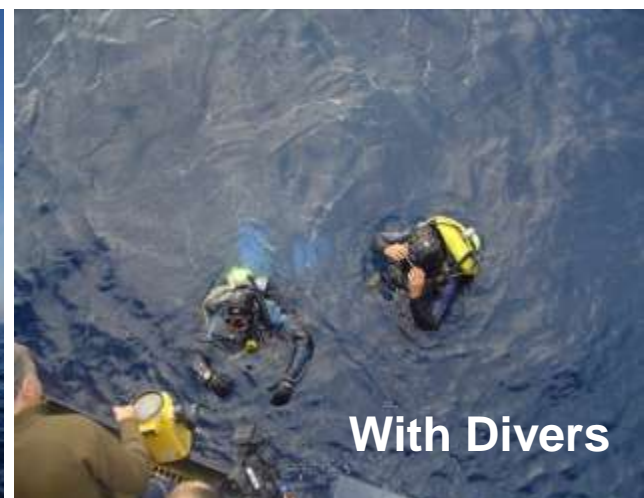
With ROV



With Rib

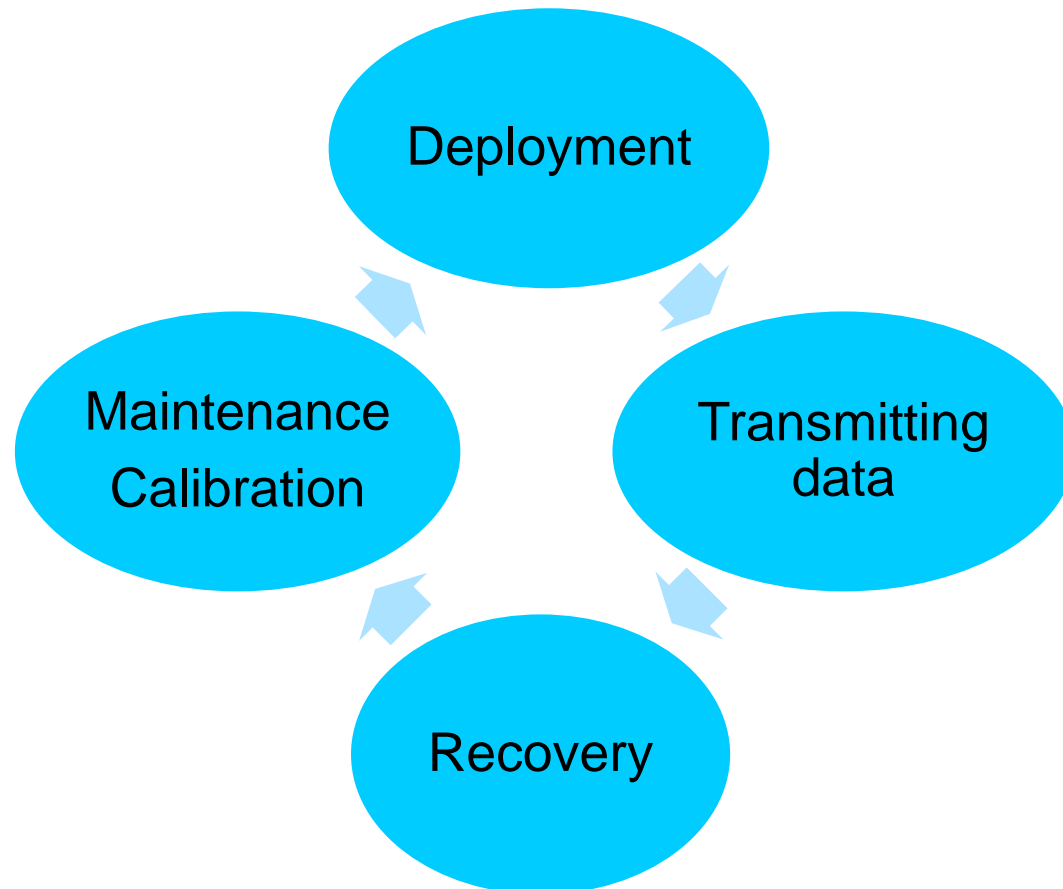


With R/V Aegeao

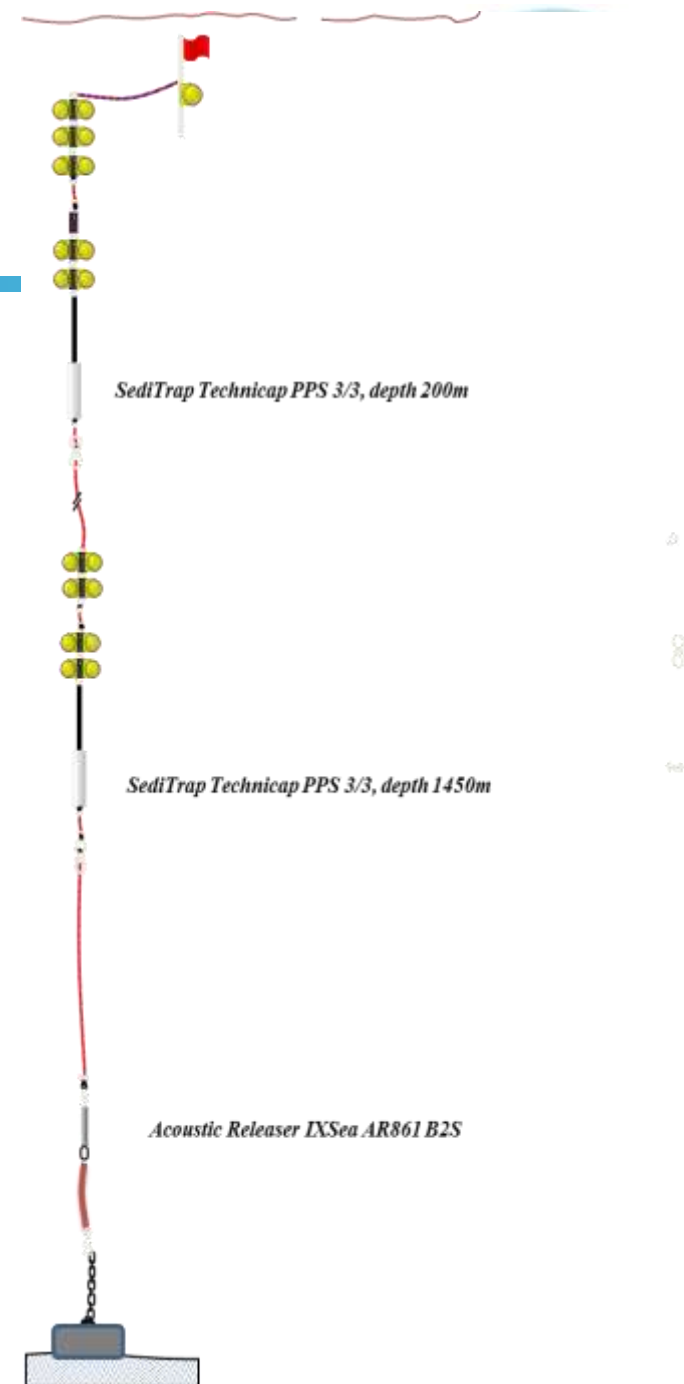
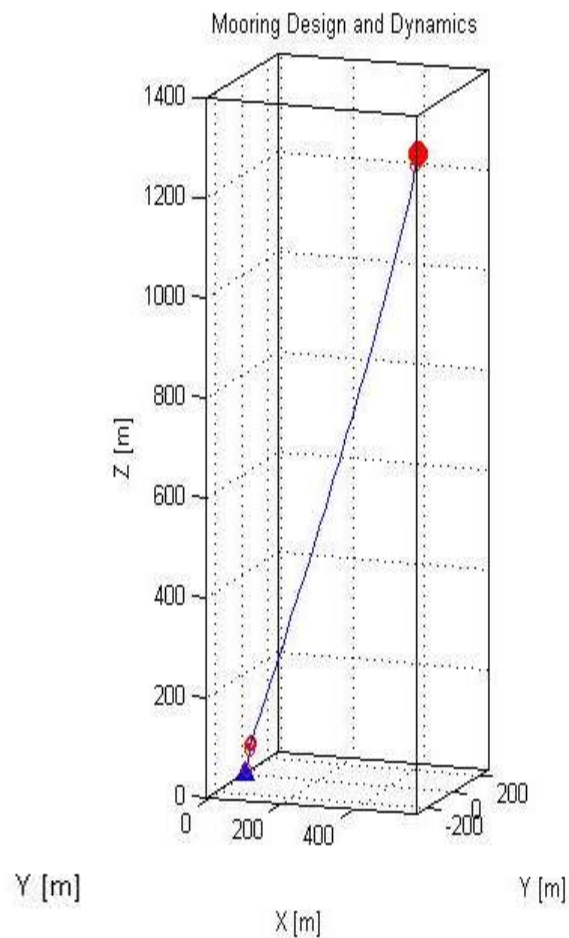
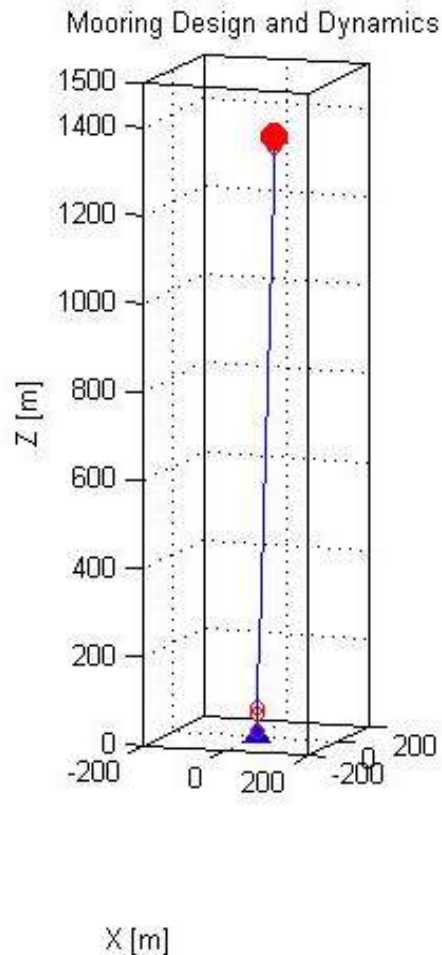


With Divers

FIXED PLATFORM (BUOY) OPERATIONAL CYCLE

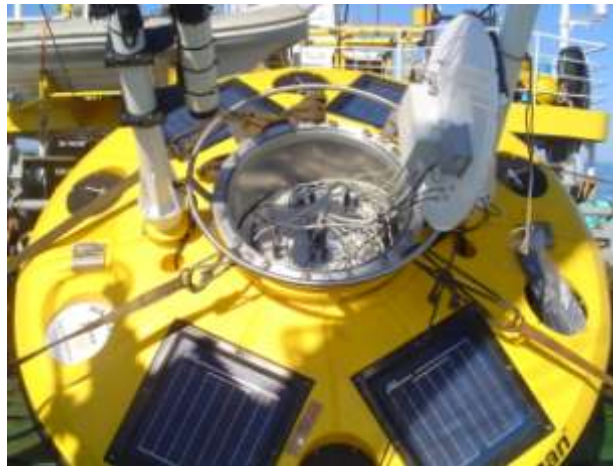


MOORING DESIGN USING MOORING DYNAMICS (MATLAB)





DEPLOYMENT PROCEDURE



Check and test everything (buoy, sensors, mooring line components, releaser) just before deployment.

A successful data transmission ON BOARD the R/V is required.



DEPLOYMENT ISSUES – SOME ECONOMICS



Mooring anchor

- Weld steel plates: (density 7600 kg/m^3)
- Reinforced concrete: (density 2300 kg/m^3)

Although the steel is the most convenient solution (less volume on board) the cost is very high.

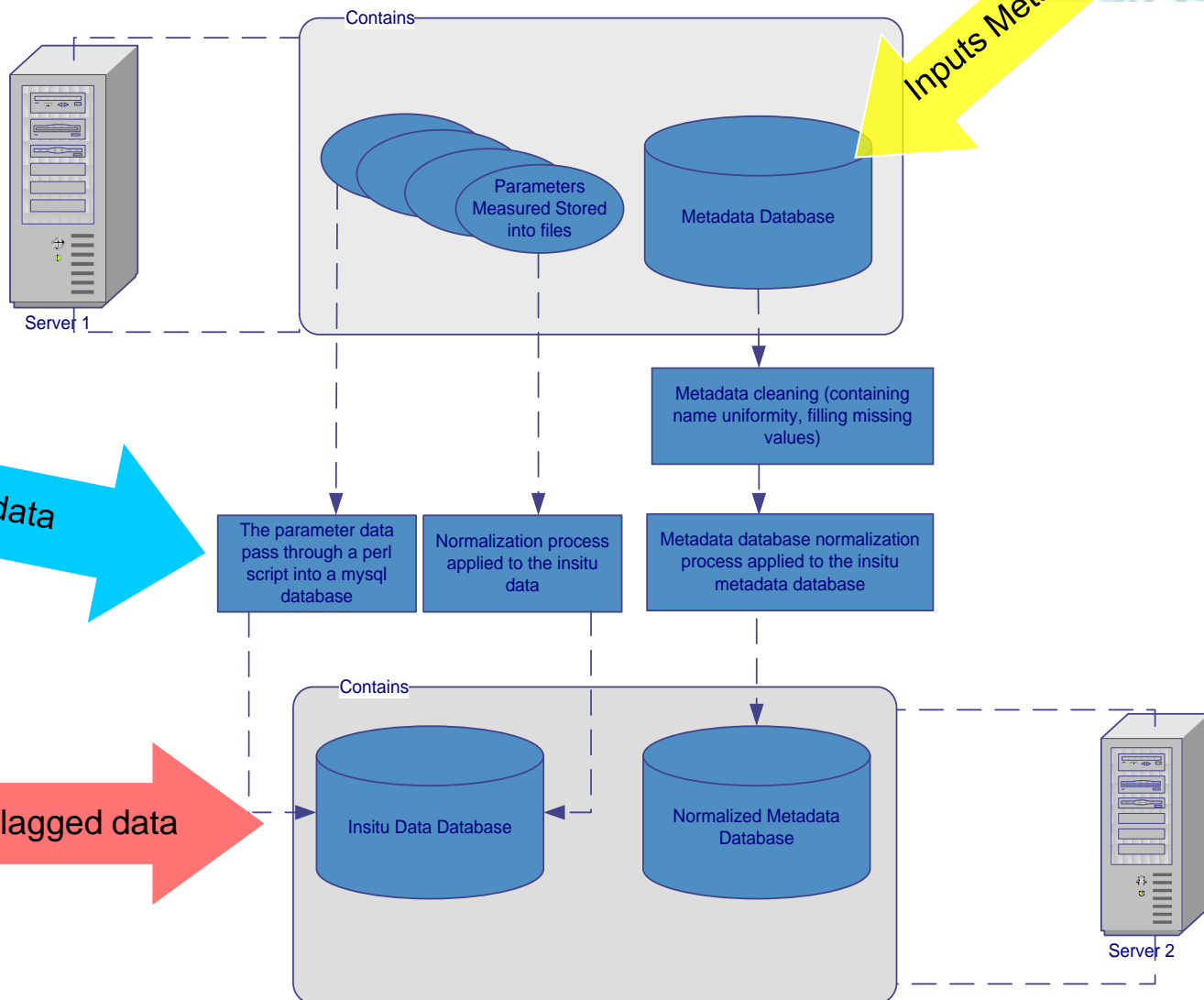
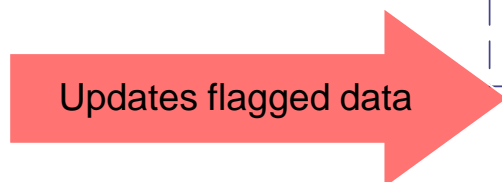
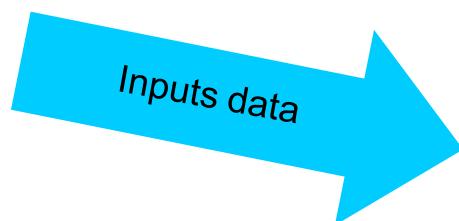
- 1000 kg of welded steel \approx 1000 euros
- 2300 kg of reinforced concrete \approx 60 euros



DATA TRANSMISSION

Data are transmitted to the Operational Center of POSEIDON using 3 telecommunications systems:

- -INMARSAT-C satellite
- - GPRS
- - Iridium



Quality control procedures

Check 1: Instrument Range test

The values are tested against thresholds assigned regarding the measuring range of the sensor measuring. The values fail this check are flagged as "bad" values (flag 4)

Fail: flag 4

Check 2: Physical Range test

The values are tested against thresholds reflecting the physical range within every measured parameter may vary regarding the regional climatology, the seasonal variations, the measuring depth etc. Values fail this test are flagged either as "probably bad" or "probably good" (flags 3 & 2)

pass

Fail: flag 3

Check 3: Rate of Change (spike) test

The fluctuation of the values upon time should be within specific limits which are defined by taking into account the climatological status and depth. This limits may change with time ($\text{Const} \times \text{STD}$) or be prefixed thresholds. Every value is tested with its previous and its following one. Values fail this test are considered as "bad" or "probably bad" (flag 3 & 4)

pass

pass
Flag 2

Fail: flag 3, 4

Check 4: Stuck Value (stationarity) test

The recorded values should vary in time and present a minimum expected fluctuation depending the physical processes are involved in. This test checks whether values remain constant in a number of sequential time steps. This number may vary regarding the parameter, the depth and the characteristics of the sensor (resolution, AD conversion etc). Values fail this test are considered as "bad" or "probably bad" (flags 4 & 3)

pass

pass
Flag 2

Fail: flag 3, 4

pass

Flag 1

pass

Flag 2

Exit
From
The QC
Procedure

Update Data Base and Generate file with QC flags

FIELD SURVEY - M3A EXAMPLE



M3A buoy

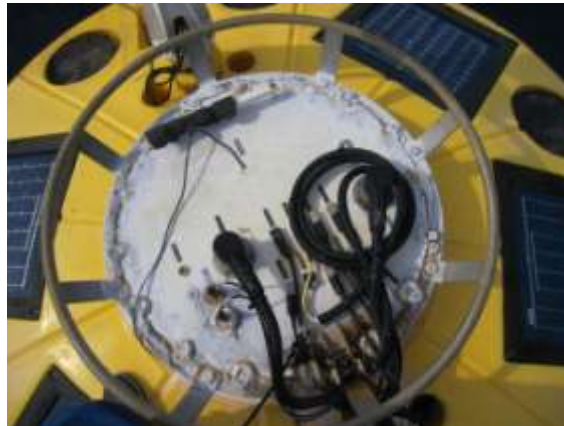
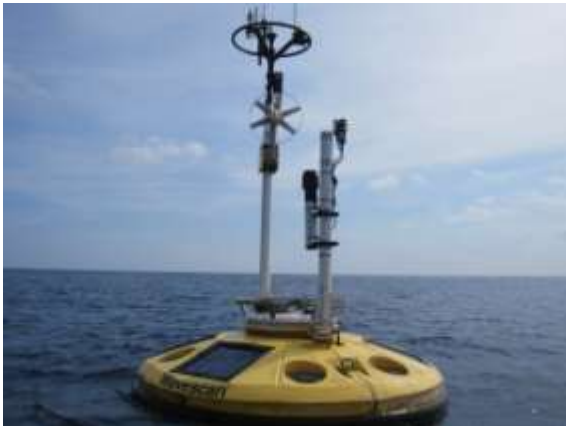
M3A monthly sampling

- CTD casting
- Water sampling
- Zooplankton sampling

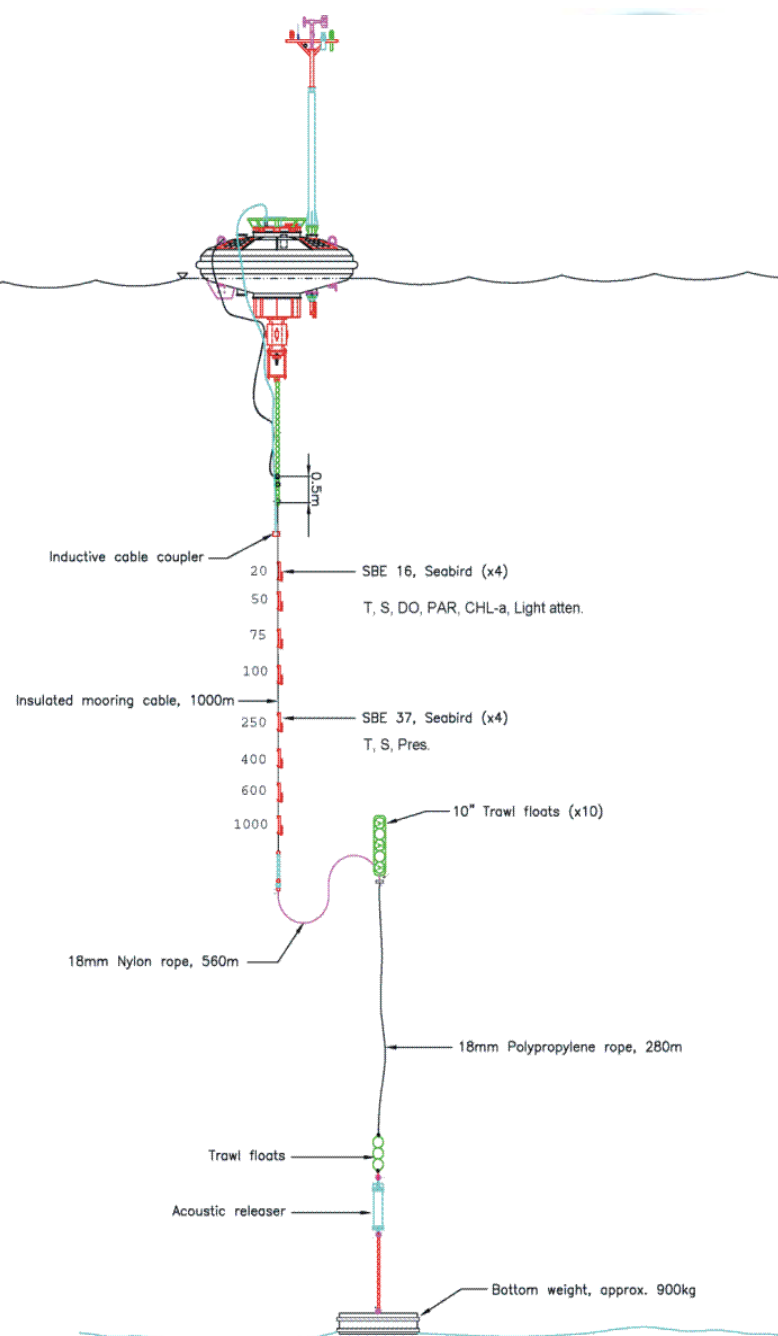
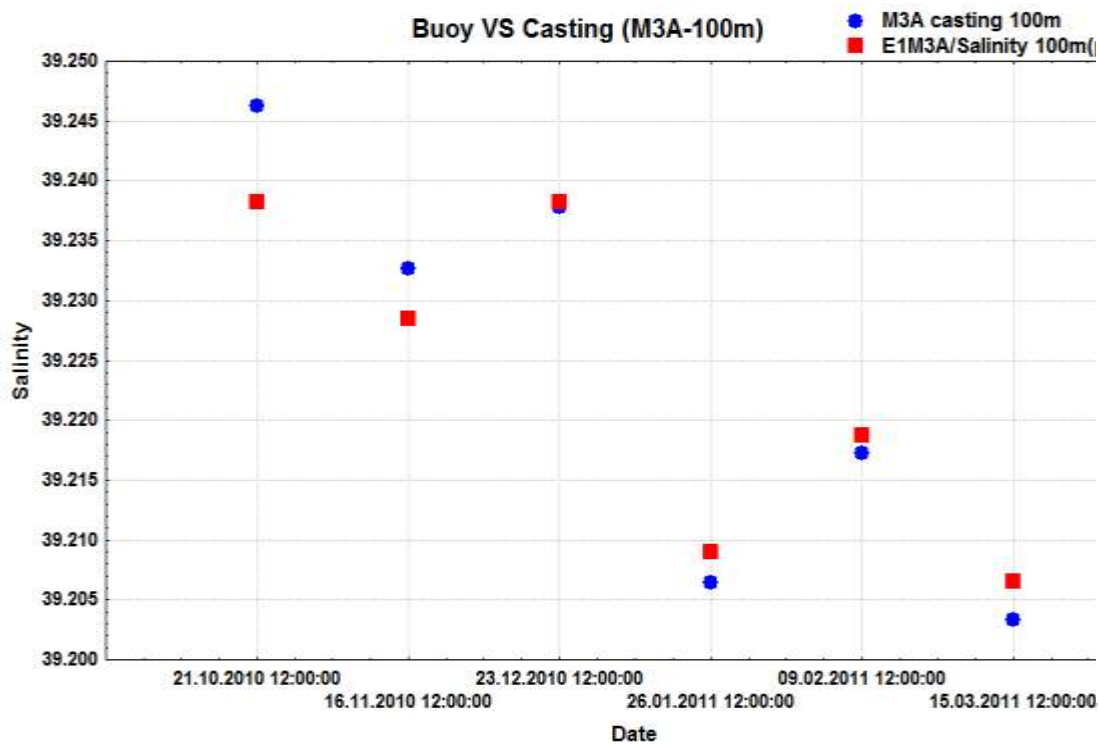
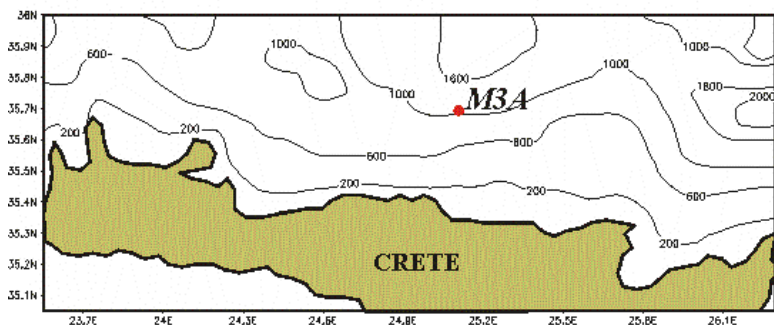
Advantages

- Monitoring sensor behavior on the field
- Performing data corrections

And emergency visits in case of malfunction



FIELD SURVEY - M3A EXAMPLE



SENSORS RECOVERY



On board maintenance

- Cleaning all the equipment with fresh water.
- Download data
- Conductivity cells and optical sensors immersed in deionized water
- Seabird electrochemical sensors sealed with tubes.



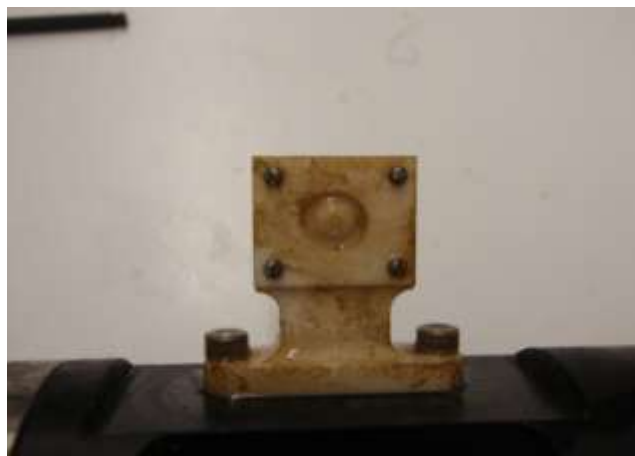
SENSORS MAINTENANCE



Lab maintenance

- Deep cleaning of the conductivity cells and the rest of the sensors.
- Batteries and spare parts replacement
- Functionality test

Usually the sensor manual cover all this procedure. Some companies provide even more – SEABIRD video tutorials at SBE webpage.





SENSORS CALIBRATION



Calibration procedure

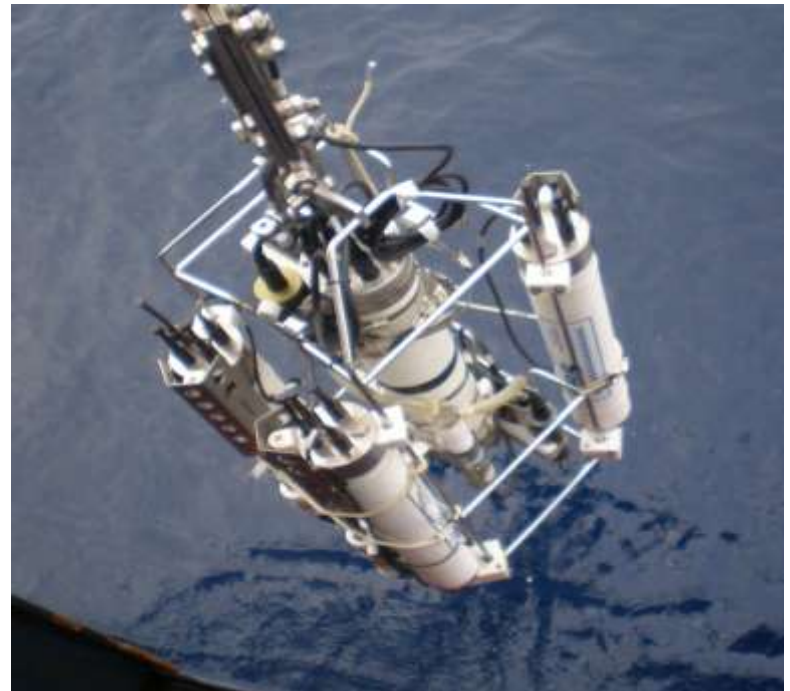
- First define the acceptable residual thresholds in order to change calibration coefficients and then perform the calibration as described to the calibration manuals. ***** JERICO webpage hosts some calibration manuals, we NEED even more.
- Generally we try to use the same sets of sensors in each spot and calibrate them according to the spot climatology .

Validation before next deployment.

- On the lab, in one of the tanks with fresh sea water and 2-3 calibration steps.
- On the field, CTD casting and water sampling

Final product: Calibration report containing

- serial number and date
- previous cal coefficients
- new coefficients
- table with measurement of calibration steps
- graph and table with previous and new residuals
- graph and table with validation test with new residuals



SENSORS RECOVERY - BIOFOULING



Main body of the buoy,
fouling doesn't affect the
data.



Current Meter



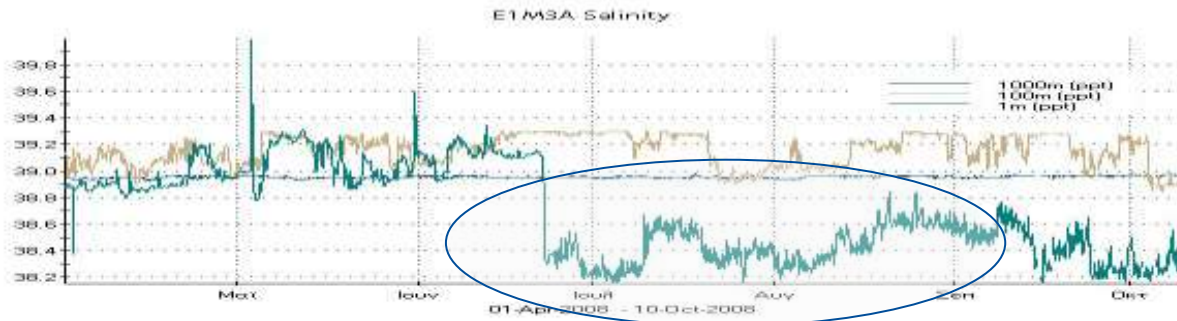
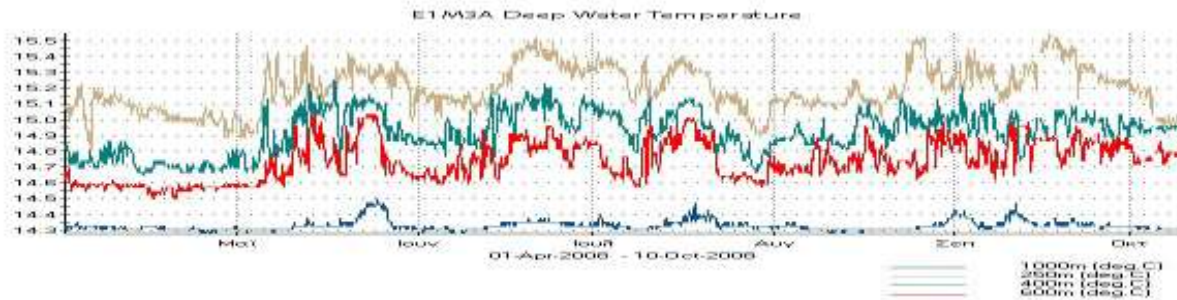
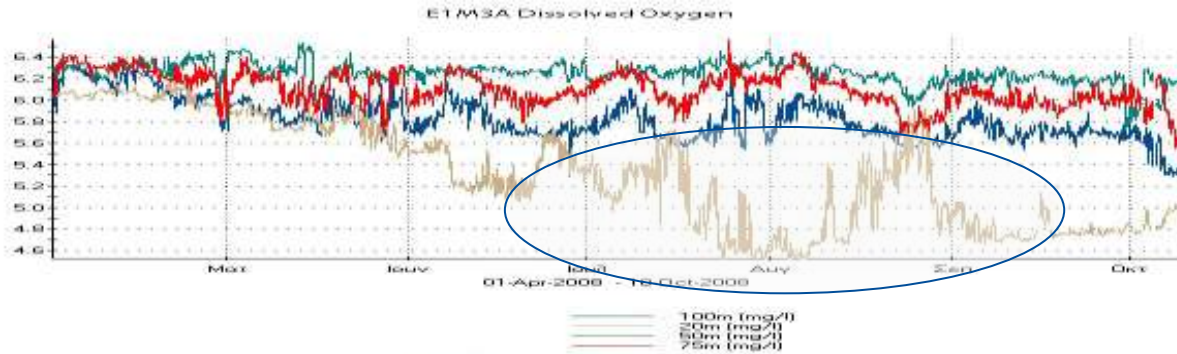
Conductivity sensor

Sensor fouling – data
affected



DO sensor

BIOFOULING AFFECT TO DATA



SENSORS RECOVERY - SOME BAD EXPERIENCES.....



Inductive cable destroyed



Seabird CTD 16plus as recovered

RECOVERY - SOME BAD EXPERIENCES.....



**Buoyancy sphere explode at
2500 meters**



What if the releaser doesn't respond, but you have a ROV

