

## **Cruise Plan for QPE (R/V Revelle Sept/ 12-16, 2009)**

### **Objectives**

In this cruise we will recover six subsurface ADCP/TC moorings (Lien), five restrained ADCP (Centurioni), and perform shipboard ADCP, Revelle HDSS Sonar, and CTD in the vicinity NE of Taiwan on East China Sea and on I-lan Ridge east of Taiwan.

### **Scientific Party**

Ren-Chieh Lien (chief scientist), Andrew Cookson (engineer), Wen-Hwa Her (engineer), Barry Ma (scientist), Ming-Huei Chang (scientist), Shiang-Chih Shie (technician), Chris McCall (engineer), Jia-Wei Yan (Taiwanese Navy Observer), Drew Cole (Revelle resident technician), Keith Shadle (Revelle resident technician), and Daniel Yang (SIO computer technician)

### **Shipboard Equipment**

We have discussed the need of shipboard equipment in the pre-cruise meetings in Scripps and over the phone. Some major equipment is listed as follows.

- Internet Connection
- Standard equipment for mooring deployment and recovery, e.g. Trawl winch, tugging, capstan, ...
- Multibeam for bathymetry survey
- Shipboard ADCP
- Revelle deep sonar HDSS
- Met sensors
- Intake sea surface temperature, conductivity
- CTD
- Marine radar if available? (for detecting surface signatures of nonlinear internal waves)
- GPS position and heading

### **Subsurface Moorings**

We will recover 6 subsurface moorings (Fig. 1), two at ~900-m depth and four at ~680-m depth. On each mooring, there are 9 CTD sensors, and one RDI 75 kHz Longer Ranger. There are three flotation devices: 41" steel float at 30 m below the sea surface, 6 glass floats at 238 m below the sea surface, and one 45" Flotation at 510-m depth providing housing for Long Ranger. One ARGOS beacon is mounted on each of the steel floats, and one XEOS subsurface Iridium GPS is mounted on each of six

syntactic floats. Both ARGOS and XEOS will send email reporting their positions when they surface. The anchor is made of seven 500-lb each railroad wheels on a single stack. There are two EG&G (ORE Offshore) 8242 acoustic releases on each of six moorings. These six ADCP/TC moorings were deployed in Aug. 3-6 from Revelle (stars in Fig. 2). Four moorings were at ~680-m water depth and two at ~900-m water depth. Details of mooring positions and water depths are as follow.

#### Mooring Position

Site	Lat	Lon	Nominal Water Depth
QP1	24°41.820'N	122°26.568'E	~680 m
QP2	25°24.078'N	122°37.938'E	~680 m
QP3	25°23.496'N	122°50.394'E	~900 m
QP4	25°30.570'N	122°48.138'E	~900 m
QP5	25°33.960'N	122°41.064'E	~680 m
QP6	25°30.474'N	122°38.088'E	~680 m

#### ADCP/TC Mooring Recovery Procedures:

- (1) Fix mooring position with acoustic ranging (1hr)
- (2) Send release code to release mooring from anchor (10 min)
- (3) Recover mooring, ADCPs, and clamp-on CTD sensors (1hr)
- (4) CTD cast to ~10 m above the bottom at the mooring position (40 min)

We request to perform (2) and (3) in the daylight because our ADCP/TC moorings do not have surface expression and will be hard to be found when they surface in the dark. Each mooring recovery takes about 3 hrs.

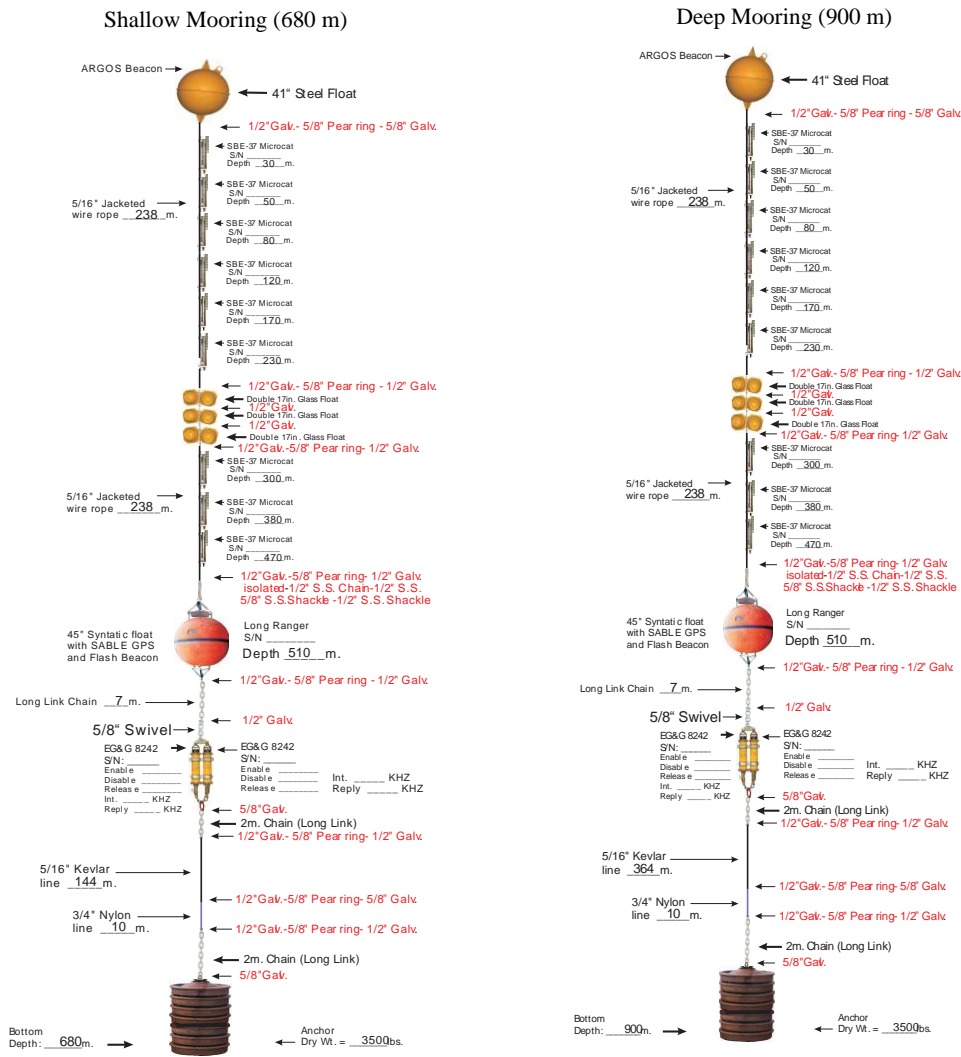


Figure 1: Schematic diagram of QPE shallow mooring (left) and deep mooring (right). The only difference between the shallow and deep moorings is the length of 5/16" Kevlar line between the acoustic releases and anchor.

### Restrained ADCP

Five restrained ADCPs were deployed on August 13-14 at the following locations (circles in Fig. 2).

Chain 9 (0780) Deployed on 13-Aug-2009 23:50:39 UTC at 25.809588 N, 122.6228007E

Chain 8 (1770) Deployed on 14-Aug-2009 01:01:13 UTC at 25.7998664N, 122.6400687E

Chain 7 (4590) Deployed on 14-Aug-2009 02:08:34 UTC at 25.8085313N, 122.5657459E

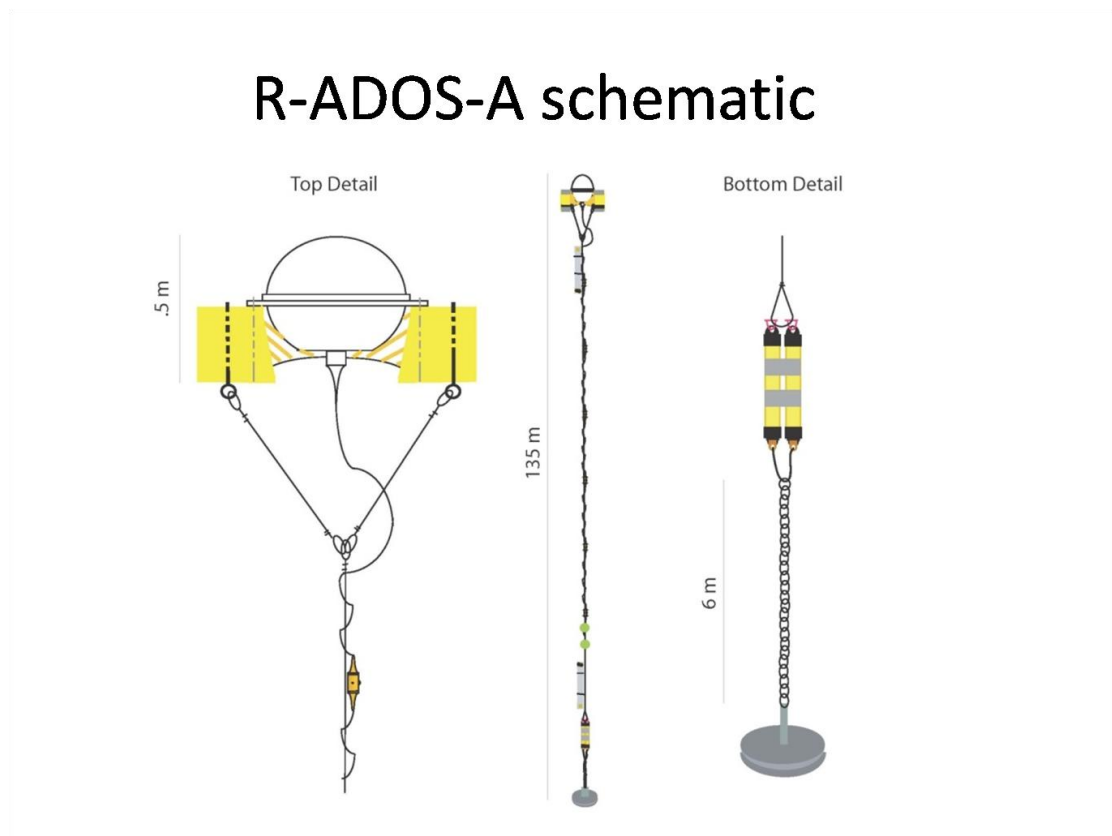
Chain 6 (8760) Deployed on 14-Aug-2009 03:14:17 UTC at 25.8347546N,  
122.6206615E

Chain 5 (0950) Deployed on 14-Aug-2009 05:23:11 UTC at 25.809303N,  
122.6785926 E

Restrained drifters recovery procedure:

- 1) Secure drifter to ship: (20 min)
- 2) Release restraining chain with acoustic release: (10 min)
- 3) Lift buoy on deck and recover chain by hand (45 min)
- 4) Wrap up cable into crate and secure crate (45 min)

Below is a schematic of the restrained drifter:



In this cruise, we will recover all six ADCP/TC moorings, QP1-6 and five restrained ADCPs.

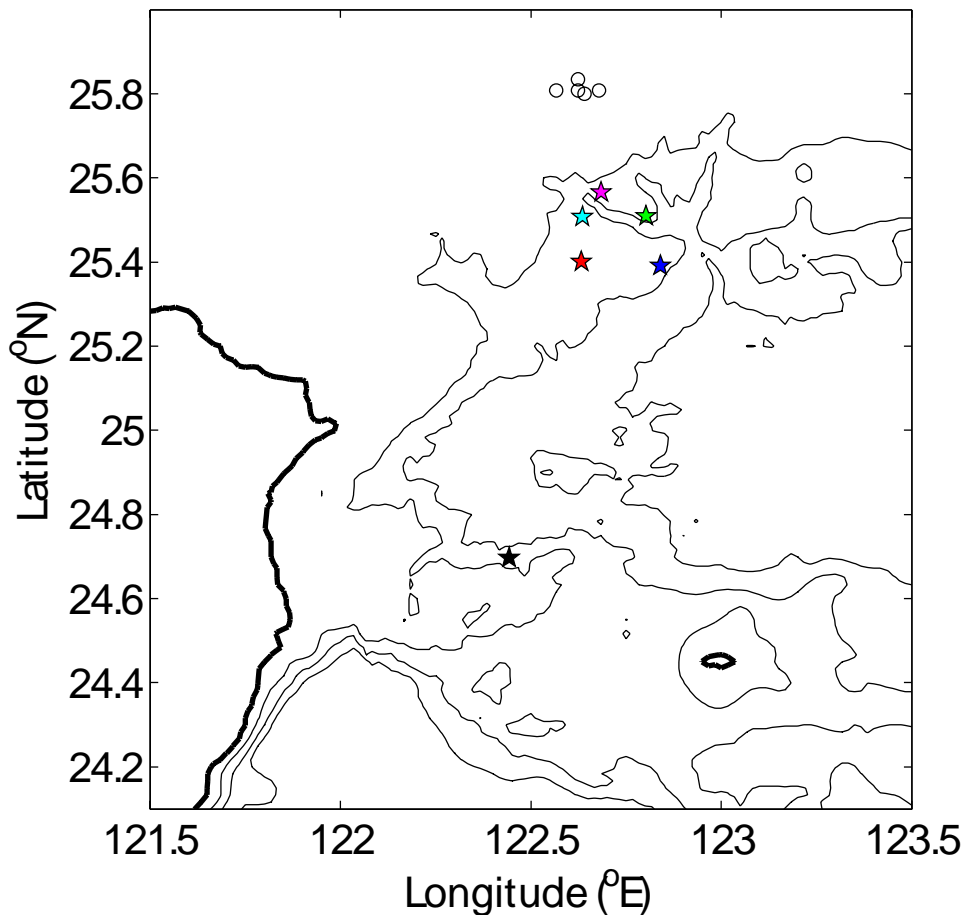


Figure 2: Positions of ADCP/TC moorings (stars) and restrained ADCPs (circles).

**Detailed Schedule:**

9/11-9/12: Loading

9/12 16:00 depart from Keelung

20:00 Arrive at QP1

20:00-21:00 fix QP1 position

21:00-06:00 ADCP and CTD

9/13 06:00-08:00 recover QP1 and CTD

08:00-12:00 QP1-QP2

12:00-15:00 fix, recover QP2 and CTD

15:00-17:00 QP2-QP3

17:00-20:00 fix, recover QP3 and CTD

20:00-06:00 fix positions for QP4-6

9/14 06:00-08:00 recover QP4 and CTD

08:00-10:00 QP4-5

10:00-12:00 recover QP5 and CTD

12:00-13:00 QP5-QP6

13:00-15:00 recover QP6 and CTD

15:00-17:00 QP6-restrained ADCPs

9/14:

17:00-19:00: Steam to restrained drifter East

19:00 -21:00 Recover restrained drifter East and CTD

21:00-24:00 Steam to restrained drifter South

9/15:

24:00-02:00 Recover restrained drifter South and CTD

02:00-04:00 Steam to restrained drifter Center

04:00-06:00 Recover restrained drifter Center and CTD

06:00-08:00 Steam to restrained drifter North

08:00-10:00 Recover restrained drifter North and CTD

10:00-12:00 Steam to restrained drifter West

12:00-14:00 Recover restrained drifter West and CTD

14:00 to 24:00 extra time allocated if Mr McCall evaluates night time recovery not practical or if uncooperative sea-state slows down operations.

9/16 08:00 return to port of Keelung

This is a crude estimate of schedule for mooring and restrained ADCP recovery. The actual schedule will vary depending on the time for mooring deployment. Weather and sea state will be the major factors.

## Equipment assignment for subsurface moorings

	Shallow water mooring				Deep water mooring	
	QP1	QP2	QP5	QP6	QP3	QP4
ARGOS Beacon	43765	58847	58865	66451	72148	92653
Steel Float						
SBE37 (30m)	7005	7011	7017	7023	7028	7033
SBE37 (50m)	7006	7012	7018	7024	2029	7034
SBE37 (80m)	7007	7013	7019	7025	7030	7035
SBE37 (120m)	7008	7014	7020	7026	7031	7036
SBE37 (170m)	7009	7015	7021	7027	7032	7037
SBE37 (230m)	7010	7016	7022	5742	5743	5744
Glass float						
SBE37 (300m)	5752	5753	5754	5755	5745	5756
SBE37 (380m)	5746	5747	5748	5749	5750	5751
SBE37 (470m)	5757	5758	5759	5760	5761	SBE39
ADCP (510m)	7754	11681	12791	12859	12860	12891
ADCP float	J4601-001	J4601-002	J4601-003	J06043-1	J06043-2	J06043-3
SABLE	2920	5560	5830	8830	6860	1920
Flasher						
Release #1	31361	31363	33639	33635	33637	31848
Release #2	31362	31364	33640	33636	33638	31851

SBE37 SMP serial number 5742-5751: Pumped Temperature, Conductivity, Pressure

*SBE37 SMP 5752-5761*: Pumped Temperature, Conductivity

SBE37 SIMP 7005-7037: Inductive SBE37, Pumped Temperature, Conductivity, and Pressure. We do not use the inductive function on this experiment.

*SBE39*: We used one SBE 39 on QP6 at 470 m. Temperature only.