

Cruise plan, R/V Revelle, 13 August 2009 - 21 August 2009

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Cruise activities

The cruise will consist of the following four activities:

- 1) Deployment of five Restrained Autonomous Drifting Ocean Station with ADCP (R-ADOS-A) (SIO);
- 2) Deploy an array of sixteen drifting buoys, with a mesh size of 5 km (SIO)
- 3) Survey of Kuroshio intrusion on the continental shelf (SIO);
- 4) Water samples collection and CTD casts in the Kuroshio (Taiwanese oceanographers).

Figure 1 shows the area of operation of R/V Revelle. The yellow box is the area in which the R/V Revelle can operate. The green circles mark the position of the five R-ADOS-A and the blue diamonds the deployment locations of the drifters. The gray line indicates the transects along which the Kuroshio intrusion, if any, will be detected with the Hydrographic Sonars.

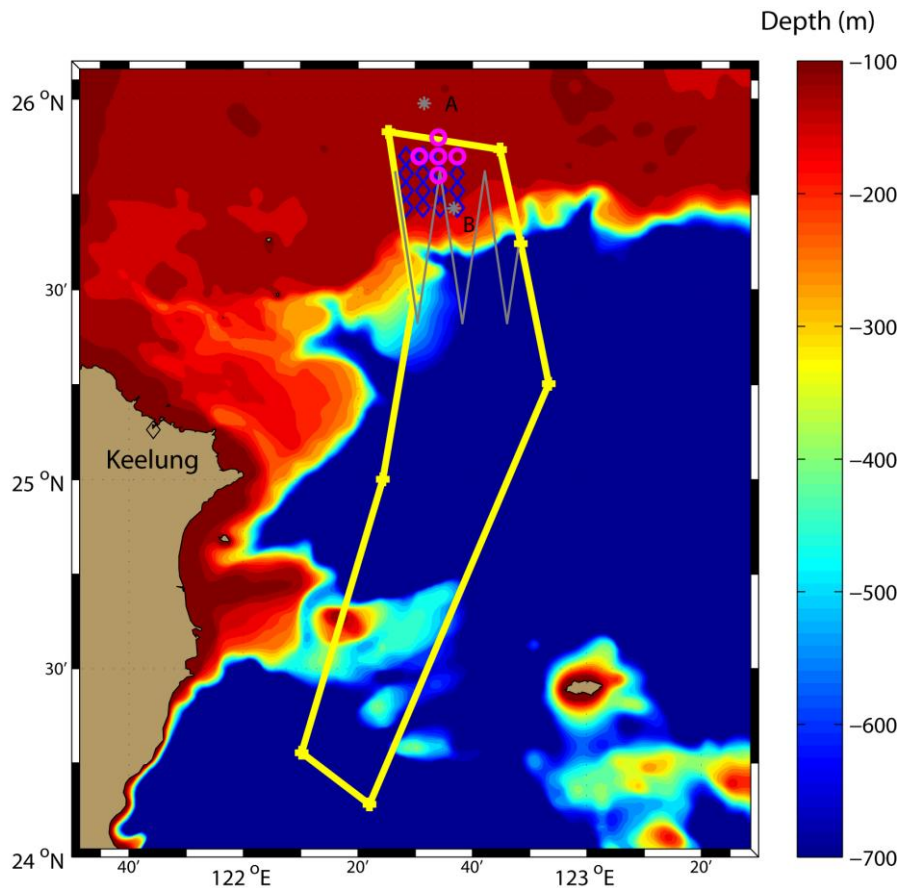


Figure 1

Activity 1: deployment of five R-ADOS-A (SIO)

The R-ADOS-A are self-deploying mooring-like devices. The deployment consists of dropping a cardboard/wood box that contains the instrument in the ocean. The box dissolves in approximately 10 minutes and the R-ADOS-A anchor quickly reaches the bottom to stabilize the instrument.

The five R-ADOS-A nominal deployment locations are indicated in figure 2 by the letters w, n, c, s and e. The locations, in the order in which the instruments will be deployed are given in table 1 and are separated by 3nm in the north/south and east/west directions:

location	Latitude (N)	Longitude (E)	Nominal depth (m)
w	25.8501	122.5117	113.1226
n	25.9001	122.5672	109.4112
c	25.8501	122.5672	108.5788
s	25.8001	122.5672	115.5121
e	25.8501	122.6227	107.6204

Table 1.

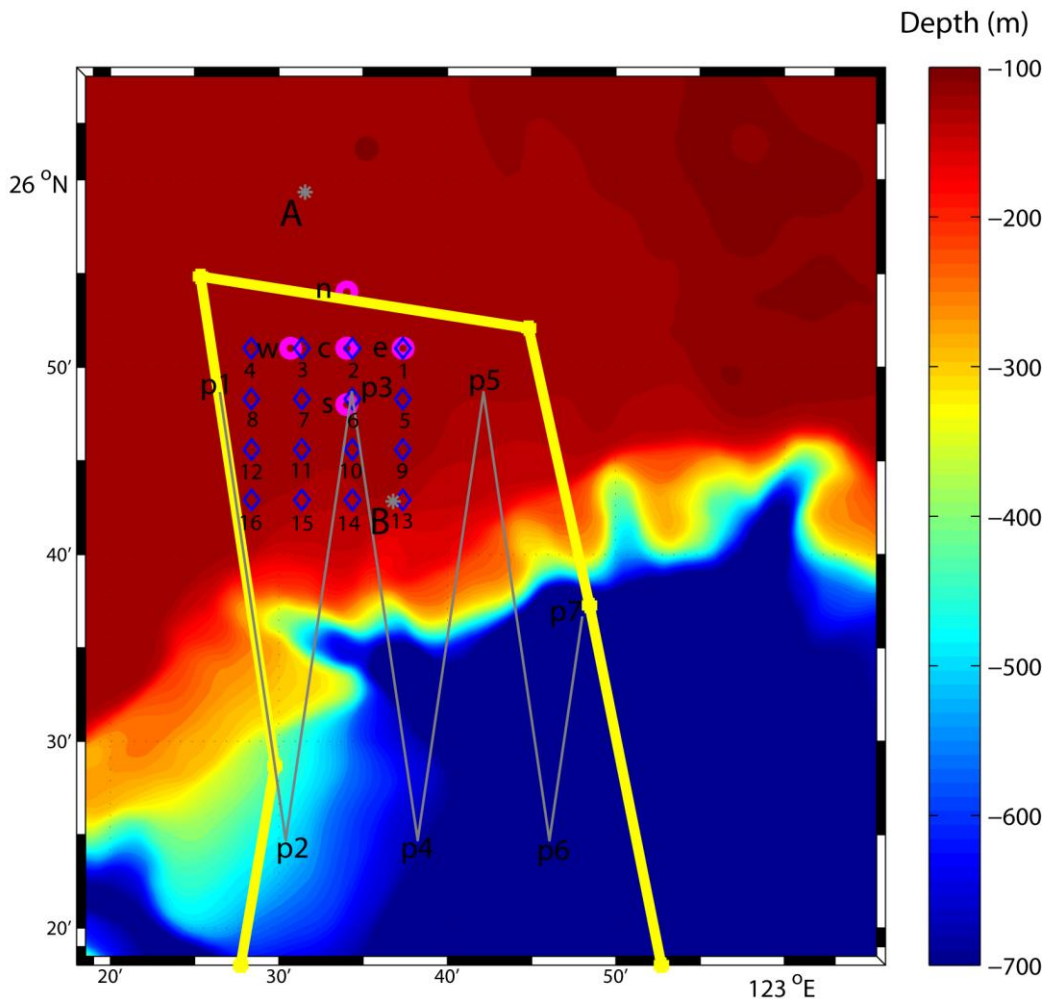


Figure 2.

The deployment operations at each R-ADOS-A station will consist of:

- 1) Small scale bathymetric survey on a 1 nm X 1 nm box centered at the five R-ADOS-A nominal deployment locations of table 1 (north-south transects 1 nm long, spaced by 0.2 nm in the east-west direction, for a total length of 8 nm). Time required (0.7 h).
- 2) Plot of the gridded bathymetry data to verify the bottom depth. Time required (0.5 h).
- 3) Identification of the optimal deployment location for the R-ADOS-A. Time required (0.3 h).
- 4) Estimate of the surface current velocity at the deployment location;
- 5) CTD cast. Time required (0.5 h).
- 6) Deployment of the R-ADOS-A box (upstream of the ocean current, if any, to compensate for the drift during the time it takes for the R-ADOS-A box to dissolve) and watch for the instrument to stabilize. Time required (1 h).
- 7) Move to the next station.

The total time needed for each deployment is estimated in 3 h. The transit time between R-ADOS-A stations is estimated in 0.5 h.

The total time to complete the five R-ADOS-A stations is therefore estimated in 17 h. A total of 5 CTD casts will be taken.

Activity 3: Deploy an array of sixteen drifting buoys, with a mesh size of 5 km (SIO)

Sixteen drifting buoys will be deployed at positions 1 through 16 (Figure 2) after completion of activity 1. The drifters will be deployed from the moving ship at a speed of 7kn. Each drifter will be deployed by hand (2 people needed) by throwing it overboard. The deployment coordinates are the following:

Station number	Latitude (N)	Longitude (E)
1	25.8501	25.8501
2	25.8501	25.8501
3	25.8051	25.8051
4	25.8051	25.8051
5	25.7602	25.7602
6	25.7602	25.7602
7	25.7152	25.7152
8	25.7152	25.7152
9	25.8501	25.8501
10	25.8501	25.8501
11	25.8051	25.8051
12	25.8051	25.8051
13	25.7602	25.7602

14	25.7602	25.7602
15	25.7152	25.7152
16	25.7152	25.7152

Table 2

The total distance run to cover the grid is about 40 nm. The deployment should take approximately 4 hrs to complete. After station 16 is occupied, the ship will move to station P1, about 11 nm away (transit time ~ 1h).

Activity 2: Survey of Kuroshio intrusion on the continental shelf (SIO);

Measurements of ocean current vertical profiles along the lines p1 through p7 in figure 2, using the 140 KHz and the 50 KHz hydrographic sonars. A shallow CTD cast (max depth 200m) shall be done at each station. The position of each station is given in table 2:

Station	Latitude (N)	Longitude (E)	Transect length (nm)	CTD cast max depth (m)
P1	25.8112	122.4416	-	200
P2	25.4117	122.5067	24.2432	200
P3	25.8112	122.5721	24.2432	200
P4	25.4117	122.6372	24.2432	200
P5	25.8111	122.7025	24.2432	200
P6	25.4116	122.7676	24.2432	200
P7	25.6114	122.8002	12.1216	200

The total distance run along the transects is about 110 nm (leg). The total time estimated to complete one survey (p1 to p7) is about 11 h @ 10 kn to which the time to do the CTD casts must be added (7 CTD casts @ 0.5 h each = 3.5 h), i.e. 14.5 h.

This survey shall be repeated six times in a sequential way, with no time interval between legs. The total time required to complete the 6 legs is estimated in 87 h (3 days, 15 h).

Activity 3: Water samples collection and CTD casts in the Kuroshio

The Taiwanese colleagues will be in charge of this activity which should last no longer than 30 h.

Time Table

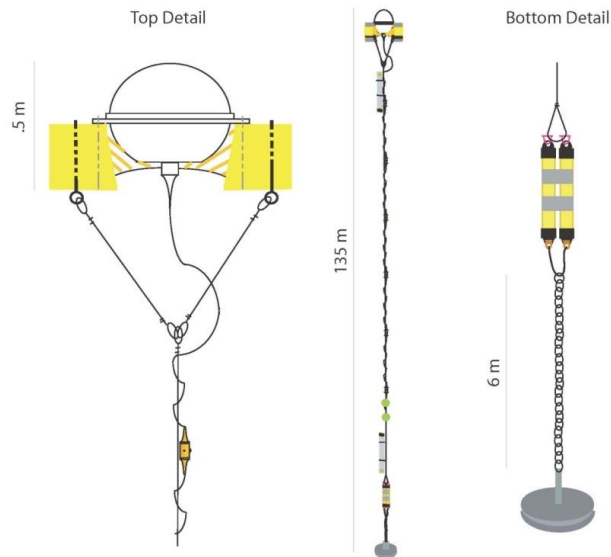
- 1) Depart Keelung (25.1313889, 121.7375) on August 13, 2009 at 1600 and reach R-ADOS-A station w. Distance ~60 nm, cruising time at 13 kn ~ 5 h. ETA August 13, 2009 @ 2100
- 2) bathymetric survey on a 1nm X1nm grid (0.2 nm east/west spacing) CTD cast and R-ADOS-A deployment at station w and repeat for the other 4 stations. ETC August 14, 2009 @ 1400;
- 3) Deployment of 16 SVP drifters at stations 1 through 16. ETC August 14, 2009 @ 1800
- 4) Transit from R-ADOS-A station 16 to beginning of leg 1 at p1. Distance ~11 nm, ~ 1h at 13 kn. ETA August 14, 2009 @1900.

- 5) Beginning of Kuroshio survey. Distance to complete each leg: ~110nm. Time required to complete leg at 10 kn and seven shallow (<200m) ctd casts: 14.5h. ETA leg1 end: August 15 @ 0930
- 6) ETA leg2 end: August 15 @ 0000
- 7) ETA leg3 end: August 16 @ 1430
- 8) ETA leg4 end: August 17 @ 0500
- 9) ETA leg5 end: August 17 @ 1930
- 10) ETA leg6 end: August 18 @ 1000
- 11) Beginning of Taiwanese scientists operations: August 18 @1000
- 12) End of Taiwanese scientists operations: August 19 @1600
- 13) Sail back on August 21 at 0200 to reach Keelung at ~ 0800

Note: a 34 h allowance is given for bad weather and for servicing the R-ADOS-A array if necessary. If not needed, this extra time will be split between an extra Kuroshio survey leg and Taiwanese colleagues research work

Appendix: R-ADOS-A schematics, specs, and pictures of previous deployments

R-ADOS-A schematic



R-ADOS-A: main specs

- Overall length: 135 m;
- Target depth: 120 m;
- Comms: Iridium modem (RUDICS);
- Dual GPS;
- Controller: Clearsat by Clearwater inc.
- Endurance: 30 days;
- Thermistor & Pressure sensor coupling: inductive;
- ADCP: Nortek Aquadopp profiler (400 kHz);
- Internal logging: Persistor CF2 data logger;
- Acoustic releases: ORE shallow water;
- Bottom weight: 200 Kgs;
- Max current withstanding: 1.5 m/s

R-ADOS-A: deployment package



R-ADOS-A: deployment

