

INSTANT Retrieval Cruise Report

Timor and Lombok Moorings and SPGA, Leg 3.

KR Baruna Jaya 1

Leg 3: Kupang – Bali

December 10 – December 19, 2006

1. Introduction:

INSTANT Scientific Objectives

The aim of INSTANT is to directly measure the leakage of warm and fresh waters from the western equatorial Pacific into the South Indian Ocean via the Indonesian passages. The size and depth distribution of this Indonesian Throughflow (ITF) has not been well determined, and this has led to ambiguity of the mean and variability of the ITF. The INSTANT project consisted of a 3-year deployment of *in situ* velocity, temperature and salinity data from the sea-floor to the surface in the major inflow and outflow straits that make up the Indonesian choke point. The array is designed to measure the mass, heat and freshwater transports that flow into and out of the Indonesian Seas. Five nations participate in INSTANT: Indonesia, France, the Netherlands, the USA and Australia. The Indonesian Ministry of Marine and Fisheries is sponsoring the Indonesian involvement.

Cruise Objectives

Specific objectives of the INSTANT Leg 3 cruise are:-

- To recover of the INSTANT moorings in Timor Passage and Lombok Strait that were redeployed in June 2005.
- To recover the INSTANT shallow pressure gauges (SPGA): one on either side of Lombok Strait at Bali and Lombok.
- To collect property profiles in the Straits via CTD measurements.
- To provide training for young Indonesian scientists on ocean mooring technology, the oceanography of the Indonesian Throughflow and other topics.

Itinerary

Leg 3

Depart Kupang: 1700 Sunday 10 December 2006.

Arrive Pandang Bai: 0800 Tuesday 19 December, 2006.

Science Personnel:

Robert Molcard (LODYC, France, Chief Scientist for Foreign Party)

Janet Sprintall (SIO, USA, Co-chief Scientist)

Susan Wijffels (CSIRO, Australia, Co-chief Scientist)

Dwi Susanto (LDEO, USA, Chief Scientist for Indonesian Party)

II Cruise Summary

A brief narrative of the daily events of the cruise is given in Section III. The cruise track and location of the mooring and pressure gauge recoveries are shown in Figure

1. The positions and times of the mooring recovery are given in Table 1; the pressure sensors in Table 2; and the CTD casts are in Table 3.

All times are Bitung WITA Time (GMT+0800)

December 10, 2006: After personnel changes, the ship left Kupang at 5pm for Timor Passage.

December 11, 2006: 700am on site for the recovery of Timor 4. Sounded on the moorings in light winds. Got a range and signal from only one release. We released mooring and got confirmation, but it never appeared at the surface. Conditions were very clear and visibility was very good. We tried many different positions from which to contact the mooring releases and tried both the SIO and CSIRO deck boxes. We successfully ranged on the mooring twice, and geometry indicated it was still on the anchor, but the signals were weak and noisy. After these two faint ranges, further attempts to ping the releases totally failed and we were longer sure the mooring was at the anchor. The lookouts above the bridge were at work all day and did not site the mooring in very calm clear conditions. To ensure we had not missed the mooring, we spent rest of day in a visual sweep for the mooring from 8nm down current back to the anchor. We then did a nighttime visual 24nm sweep of the region – taking shifts to sit out front of the bridge to look for the beacon flasher. It was a warm evening – the Milky Way as spectacular, with many shooting stars and distant thunderstorms providing a light show. Unfortunately no mooring appeared. In the early morning, a light was seen and approached – but it turned out to be a small fishing vessel. A frustrating and fruitless day!

Via CSIRO we checked the SIO Service Argos program account to see if the T4 beacon had been picked up by Service Argos. No fixes for this beacon had been found. However, we found out that the Lombok West mooring beacon had returned a single fix on November 18, 2006 just south and west of Lombok.

December 12, 2006: We set up for Timor 3 retrieval around 0700. Started a drift to measure the currents. Overall currents were 1.34knts at 196°T. We steamed into a sounding position 200m away from anchor with the sun behind us. Successfully contacted releases and ranged on them. Released at 0820 and the mooring was spotted. Retrieval went smoothly and safely in hot clear weather. Proceeded to retrieve the Timor 2 mooring and started sounding at 12:30. The release and retrieval went smoothly with Robert Molcard and the bridge doing a terrific job in getting the ship close to the mooring.

13h:50 Argo hull 1921 deployed at 11° 16' 42.83"S, 122° 51' 7"E: part of Indonesian-Australian cooperation for Argo.

After the mooring retrievals, we spent a long evening power-washing the floatation, cleaning instruments and calibrating the clamp-on instruments.

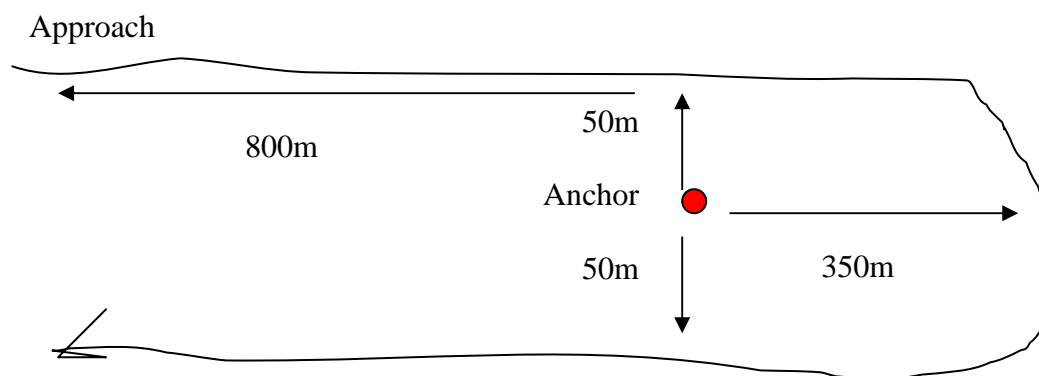
CTD Station 18 undertaken at 1800. CTD Station 19 completed at 1933.

December 13, 2006: 0700 set up at Timor 1 Roti for retrieval. Successfully sounded and released the mooring, and was spotted shortly afterward. It came on board in great shape – but very fouled with naked barnacles, hydroids, crabs and starfish. Finished Timor 1 retrieval by 1000.

Proceeded to Timor 4 to attempt to grapple for the mooring. Spent a very busy 3 hours pulling apart floatation, cleaning and stowing gear, so that the back deck could be rearranged so that the port winch with the thick trawling cable could be used. A huge effort was put in by Phil, Lindsay, Paul Harvey and Paul Durack, and the BJ1 deck crew (Jack) to get ready for the grapple– thanks. The CSIRO grapple hook was attached to main cable with weak-link 3T shackle. Lindsay measured the diameter of the main winch and wire thickness to help us figure out how much wire was out as the ship has no wire-out meter.

We started a ship drift at 1222 local by following a coke bottle as a drifter for 35 minutes. Currents were 0.7 knots at 228°T- almost due west.

We spooled out 1100 m of wire (300 turns) in 908m depth of water. Wire angle was about 45° which means that the anchor was about 770m behind the ship. Lindsay worked with Jack the bosun to ensure that the winch had adequate stopping power and that there was a mechanical backup for the air break. Lindsay and Jack stopped the winch several times during the pay-out of the wire to check the break and the winch power to recover the wire. All went well and Lindsay was satisfied that it was safe to proceed. During payout, we steamed towards the anchor from the west, going up current at 2 knots.



By 1447, we had 1100m of wire out and were 400m from anchor. All personnel evacuated the back deck as we neared the mooring anchor. Lookouts were posted above the bridge. At 1500 we were due north of the anchor position. By 1520, we had swung south and past the anchor position. The lookouts spotted glass balls on the starboard aft of the ship- the beacon, ADCP float and top clamp-ons. A happy moment. Once trawl cable was on board we chased down the mooring and proceeded to recover as usual. All went very smoothly. The mooring cable was cut about 50 m below the VMCM under the beacon. We deemed that it was not worth trawling for the rest of the mooring – as it was too small a target. Paul Harvey had one more attempt to acoustically contact the releases, but confusing signals were returned.

Completed CTD 20 at 1810 and then underway to Lombok.

December 14, 2006: Steaming toward Lombok through the Savu Sea – quiet and sunny conditions. Deck and mooring crew cleaning, stowing, downloading data and doing calibrations. Data returns generally look good.

We get an indication that the ship is running short of freshwater. Later that day, we hear the Security Officer is sick and needs to go ashore and the Captain would also want to take on board freshwater. We docked in Waingapu on East Sumba at 1700 alongside some local island trader vessels. Several folks went ashore on the ferry dock which was a few kms from town. Selvi and Dwi took the Security Officer to the doctor and then hotel and contacted the local Navy personnel to take care of him. We left for Lombok around 2330 local time. Route is south of the Nusa Tenggara. CTD 21 completed in the Savu Sea.

Dec 15, 2006: Flat calm sunny weather – steamed south of the Nusa Tenggara towards Lombok strait. Cleaning, inventorying gear, downloading data and calculating calibrations etc. A bit of a break for every one. Spectacular sunset south of Sumbawa with dolphin leaping.

Dec 16, 2006: Arrived at Lombok E around 0700. Set up for retrieval – Janet on the bridge. Currents weak and variable – tide must be turning. First release did not work, even though it gave a confirmation. Second release worked well and up came the mooring off the port bow! Mooring on board by 10:30 or so. Biofouling is heavy in the upper 150m or so. The back deck was then cleaned and cleared, and we proceeded to site of Lombok West mooring. Currents are strong at 2 knots to the south, indicated by several drifts with ship aft to the wind and in slight reverse to follow the water. Currents building to the south.

12:30 Drifted by mooring to sound on it from the bow– absolutely no response from releases on either deck boxes. Tried again with no response. We decided not to waste the day and so proceeded to recover the Bali pressure gauge at 1500. High tide and visibility in the surface was very low, however we quickly located and recovered the gauge once on SCUBA. Great work by Paul Harvey, Janet, Paul Durack and the crew.

CTD22 (Lombok Strait)

Dec 17, 2006: 0700 Attempted another sounding on the Lombok West releases. Tried both the CSIRO and SIO deck units to no avail. Paul Harvey tried different settings and frequencies – noisy signals returned. We sent the release commands again and got no confirmation. We drifted with the tide and looked for the mooring. We then moved to plan for trawling – the back deck was rearranged and the grapple hook attached to the heavy cable on the port winch.

12:30 Started the first trawl sweep in flat clear conditions. Bottom depths were between 940 and 910m and we put out 900m of wire (245 turns of the drum) as the topography was steep. We spent a frustrating day doing trawl sweeps – a total of 6 sweeps were made over the course of the afternoon. The weather remained clear and calm. Sweeps were performed both upslope and downslope of the anchor. Nothing

came up or was spotted. Visibility was extremely good and we were diligent about keeping a watch above the bridge. It is doubtful the mooring is at the anchor, or only the very bottom part remains there. The top part of the mooring likely parted in early November and is now in the South East Indian Ocean.

Sent an email to Peter Jackson and Ann Thresher at CSIRO to ask to put out a shipping alert for the mooring and to contact the Royal Australian Navy. Dwi Susanto and Selvi Makarim also contacted Bali and Lombok local officials with a description of the mooring.

CTD 23-25 taken in Lombok Strait.

Dec 18, 2006: 7000 we anchored at Gilli Trawagan to retrieve the Lombok SPGA. Janet and crew left around 0830 and Dwi Susanto and ship's crew went into village to see the Chief of Police. Rest of science team are packing, finishing post-calibrations and continuing to document the shipments. Stayed on anchor all night. Shipment documents passed to Joko and Selvi from DKP.

Dec 19, 2006: Arrived at Padang Bai, Bali. Science team left ship at 1030.

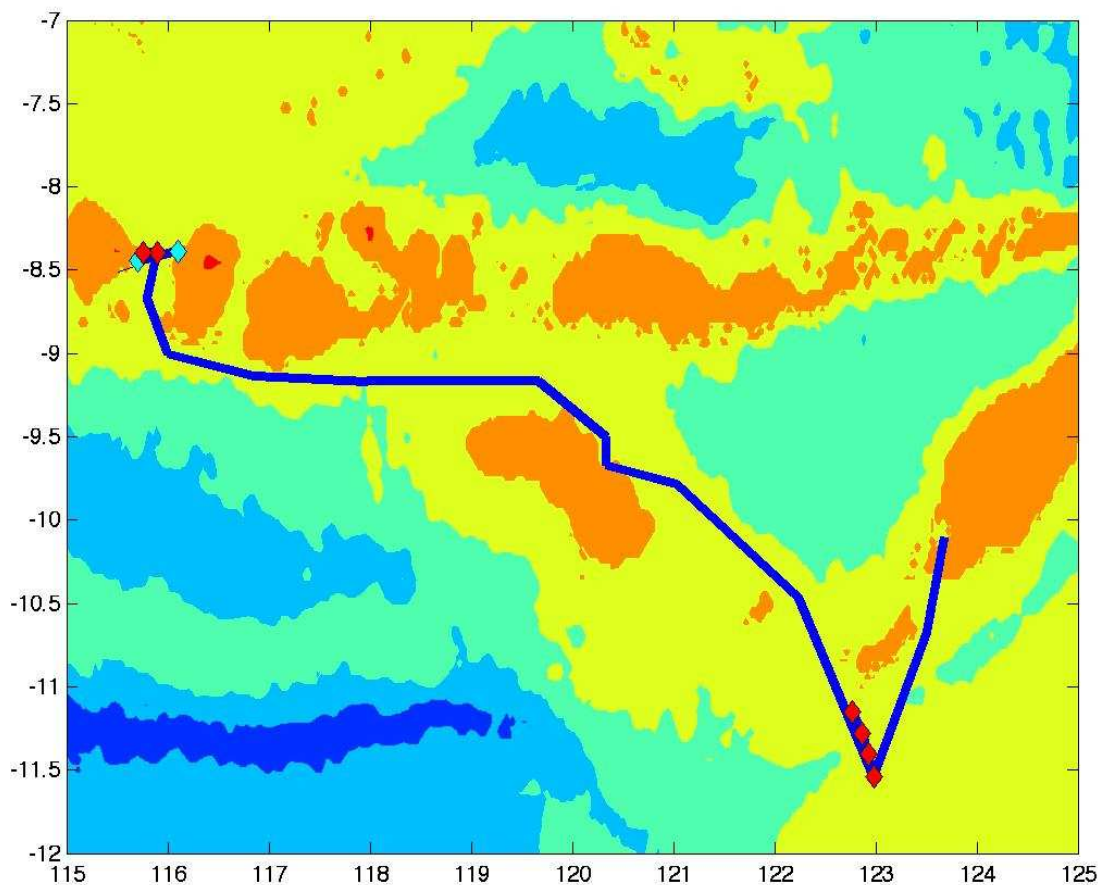


Figure 1: Ship track for INSTANT recovery leg 3 (blue line) with location of INSTANT moorings (red diamonds) and shallow pressure gauges (blue diamonds) recovered on this leg.

Mooring	Date/Time (GMT) Recovered	Position	Depth
Lombok West (1)	NOT RECOVERED	115° 45.487'E 8° 26.774'S	910 m
Lombok East (2)	16/12/2006 0130	115° 53.769'E 8° 24.566'S	1120 m
Timor 4 (Ashmore)	13/12/2006 0125	122° 58.360' E, 11° 31.766' S	902 m
Timor 3 (south-slope)	12/12/2006 0100	122° 57.404' E 11° 22.193' S	1386 m
Timor 2 (Sill)	12/12/2006 0500	11° 16.6084'S 122° 51.506'E	1874 m
Timor 1 (North)	13/12/2006 0030	122° 46.803' E 11° 9.677' S	992 m

Table 1: Mooring recovery times, anchor drop positions (from 2005 deployments) and depths.

Pressure gauge	Date/Time Recovered (GMT)	GPS Position
Bali	16/12/2006 0050	115° 42.612'E 8° 24.127'S
Lombok	18/12/2006 0200	116° 01.472'E 8° 20.874'S

Table 2: Location and dates of shallow pressure gauges recovered

Station Number	Latitude	Longitude	Location	Time
18	11°16'42''	122° 51'28''	Timor2	12/12 17:09
19	11°22'20''	122°57'35''	Timor3	12/12 19:33
20	11°31'55''	122°58'11''	Timor4	13/12 18:10
21	10°3'7''	121°25'40''	Savu Sea	14/12 07:51
22	8°26'50''	115°47'1''	Lombok Strait	16/12 17:05
23	8°27'2''	115°46'24''	Lombok Strait	17/12 17:21
24	8°27'16''	115°46'17''	Lombok Strait	17/12 17:55
25	8°27'30''	115°46'11''	Lombok Strait	17/12 18:24

Table 3: Locations and times of CTD casts completed. Most casts were to 200m.

Acknowledgements

Many thanks to the master and crew of the RV *Baruna Jaya I* for their cooperation and hard work during the voyage. Hard long days on the hot back deck were required and skilled work with the winches. The ship's deck crew were terrific in their handling and help with the mooring retrievals. Capten Nakhoda handled the ship well during recoveries. We all felt welcomed by the crew. This cruise was supported by DKP (Indonesia), the Scripps Institution of Oceanography through the National Science Foundation (USA), the French CNRS, and Australia's Common Wealth Scientific and Industrial Research Organisation.

Cruise Participants

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Mustopa, BPPT, Indonesia

Agam, BPPT, Indonesia

M Djakfar (Jack), BPPT, Indonesia

Fatkhurohman (Billy), BPPT, Indonesia

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