

LAKE TITICACA, BOLIVIA
SEDIMENT TRAP DEPLOYMENT CRUISE ON LAKE TITICACA
March 20 - 26, 2002

by

David A. Mucciarone

S-072 Cruise Participant: Robert B. Dunbar, David A. Mucciarone, and Christopher Moy all from Stanford University

Travel Logistics:

Departed Santiago (SCL) at 1340 on 3/20/02 on LAB Flt#:968 and arrived in LPB at 1945 via Santa Cruz. Upon arrival we stayed in the Hostel Naira in La Paz. At 0900 on 3/21/02 we went to Exprinter to meet with Luis Taja to arrange access to our equipment in storage. We spent the remainder of the morning and early afternoon arranging and preparing the mooring equipment for transport to the lake. In the afternoon we met with Luis Taja to set up transportation logistics for the equipment. The original plan was to use the Exprinter crane truck on a Navy ferry to deploy the mooring. We then paid for the past year of storage and delivery/crane truck rental fees. After we arranged a rental vehicle and picked it up at the El Alto airport the morning of 3/22/02. With all of our work completed on 3/21/02 we headed for Lake Titicaca and stayed in the Hostel Cupla in Copacabana on 3/22/02.

On 3/23/02 at 0900 we met the Exprinter crane truck in Tiquina to make arrangements for a ferry. It was shortly after this time when we realized that Exprinter had made not previous arrangements nor did they have any connections in Tiquina with the Navy or anyone else. We then consulted our old colleague Gonzalo who then made the connections and arrangements necessary to obtain a ferry and tender to do our work. We abandoned the original plan and placed all of the mooring equipment on the ferry with the miscellaneous supplies on the tender boat and scheduled to meet in Tiquina at 0500 on 3/25/02. To simplify our early morning departure on 3/25/02 we stayed in the Crillon Hotel in Huatajata the evening of 3/24/02. The ferry departed Tiquina at 0030 on 3/25/02 for the mooring location NW of the Straits of Tiquina (~8 nm from the port). At 0500 on 3/25/02 we took the tender boat and rendezvoused with the ferry at ~0630 to begin preparation of the mooring. By 0800 we deployed the mooring and at 0830 headed back to Tiquina. We arrived in Tiquina at 1000, off-loaded the tender boat and stored the trap pallet, cone cover, and a cooler of miscellaneous supplies in Huatajata. We departed Huatajata at 1430 and arrived in La Paz at 1730. We returned the rental vehicle and stayed in the Hostel Estrella Andina the evening of 3/25/02.

We departed LPB on LAB 811 via Cochabamba, Bolivia and arrived in SCL at 1230 on 3/26/02. Departed SCL on LA/AA Flt#:600 at 2120 and arrived in LAX via Lima, Peru at 0700 on 3/27/02. Departed LAX on AA Flt#: 1928 at 1105 and arrived at 1225 on 3/27/02.

Summary of Field Operations:

This field operation consisted of 6 days with the single objective of deploying a sediment trap mooring in Lake Titicaca. We deployed a simple static-mooring array in the northwest Straits of Tiquina approximately 8.1 nm from the port of Tiquina. The mooring is equipped with 4 triple backs of floats, 1 OSU Tracer-15 sediment trap and 1 InterOcean 1090ED acoustic release. The mooring was serviced and supervised by D. Mucciarone

Mooring Operation:

Lake Titicaca Mooring Deployment

We deployed the *Lake Titicaca* mooring at 1200 GMT on 3/25/02. At 16° 07.42'S 068° 57.18'W, water depth ~650 to 720 ft water depth. The mooring is equipped with one OSU Tracer-15 sediment trap ~32 malb, one InterOcean 1090ED acoustic release, four 3 pack Billings floats, and a 285 kg anchor. The mooring preparations went smoothly as did the deployment taking a total of 55 minutes (Round trip from Tiquina was 5 hours)

LAKE TITICACA MOORING DEPLOYMENT STATISTICS: (March 25, 2002 @ 1200 GMT)

Information on the mooring equipment deployed for *Lake Titicaca*. The mooring deployment was supervised by David Mucciarone and performed on a Tiquina ferry boat. Preparation of all equipment was a joint effort between Rob Dunbar, Chris Moy, and David Mucciarone. There were no problems preparing the mooring or the individual instruments on this array for deployment and the subsequent deployment also went well. The drop of the anchor was clean ending mooring operations at 1200 GMT (0800L) on 3/25/02 located at 16° 07.42'S 068° 57.18'W in 198 to 220 m water depth. The water depth is not accurate because the water was deeper than the penetration depth of the echo-sounder. It will be necessary to determine the actual depth upon recovery with a more precise echo-sounder. The mooring is equipped with one OSU Tracer-15 sediment trap, one InterOcean 1090ED acoustic release, and four 3 pack Billings. The mooring deployment went smoothly taking ~35 minutes.

Begin mooring deployment @	0725L/(1135 3/25/02)
Top float package, 4-3 pack Billings floats in at @	0735
OSU Tracer-15 sediment trap in water @	0749
InterOcean 1090ED acoustic release in water @	0750
Anchor released @	0800L (1200Z 3/25/02)

OSU Tracer-15 Sediment Trap Deployment Statistics:

Trap Cups Deployed:	14
Deployment Filename:	Titicaca.DEP
TattleTale Interface Serial Number:	1329 interface/1330 battery holder
Battery Condition:	9.15 VDC (1-Micro 9v alkaline) 18.50 VDC (14-Motor C-cell alkaline) 3.28 VDC (1-RAM 3v - 2032 alkaline)
Tests performed:	Motor - OK; Interface - OK
Sample cup preservative:	3% Na-borate formaline solution with 2.5ppt water
Trap History:	See below

Mooring Titicaca Sediment Trap Deployment Program which was deployed on 3/25/02 at 1200 GMT (0800L). OSU Tracer-15 Sediment Traps began with Cup #1 under funnel and is scheduled to be recovered with an open hole under funnel. The years 1985 and 1986 were used is substitution for years 2002 and 2003 because the Tattle Tale interface units are not Y2K compliant.

Duration	GMT Time	GMT Date	Event #	Cup#
31 Days, Deployed	1200	25 March 1985	Event 0	Cup 1
33 Days	0100	25 April 1985	Event 1	Cup 2
33 Days	0100	28 May 1985	Event 2	Cup 3
33 Days	0100	30 June 1985	Event 3	Cup 4
33 Days	0100	02 August 1985	Event 4	Cup 5
33 Days	0100	04 September 1985	Event 5	Cup 6
33 Days	0100	07 October 1985	Event 6	Cup 7
33 Days	0100	09 November 1985	Event 7	Cup 8
33 Days	0100	12 December 1985	Event 8	Cup 9
33 Days	0100	14 January 1986	Event 9	Cup 10
33 Days	0100	16 February 1986	Event 10	Cup 11
33 Days	0100	21 March 1986	Event 11	Cup 12
33 Days	0100	23 April 1986	Event 12	Cup 13
33 Days	0100	26 May 1986	Event 13	Cup 14
	0100	28 June 1986	Event 14	Open

INTEROCEAN ACOUSTIC RELEASES

1090ED acoustic release S/N: 0652600
 Battery condition (2-pack): 7.88 VDC
 Battery condition (4-pack): 7.88 VDC

Palmer Deep Mooring Hardware Statistics:

Four Billings 3 pack floats (+264 lbs./120 kg)	=	2.0 m
OSU Tracer-15 trap w/ pendant S/N 5 (-80 lbs./-36 kg)	=	25.0 m
-Above top of cone = 21.5 m, below top of cone = 1.0 m, 2.5m trap length		
InterOcean 1090ED acoustic release S/N 0652600 (-20 lbs/-9.1 kg)	=	0.62 m
Anchor (627 lb./285 kg)	=	1 m

All rope is: 88- Meters 12 mm single braid Duron w/ 1/2" nylon thimbles
 Hardware: 06- 1/2" stainless steel anchor shackles (floats)
 01- 5/8" stainless steel trap shackle (trap)
 03- 5/8" stainless steel anchor shackles (release, anchor)
 01- 1" stainless steel anchor shackles (release)
 01- 5/8" stainless steel eye and jaw swivel (release)

InterOcean 1090ED Acoustic Release Command Codes for *Palmer Deep Mooring*:

S/N: 0652600

Release	ABEG
Rearm	CDEH
Enable	CDE

New Mooring Location:
Water Depth:
Deployment Date/Time (GMT)

16° 07.42'S 068° 57.18'W
198 to 220 meters
3/25/02 @ 1200

Lake Titicaca Trip Outline 20 March to 27 June 2002

- 17 March 2002 1) Test and prepare OSU Tracer-15 sediment trap interface aboard the LMG in Antarctica.
- 20 March 2002 1) Departed SCL at 1340 on LAB Flt#: 968 & 932 to LPB (La Paz, Bolivia) via Santa Cruz, arrived at 1945.
2) Stayed in Hostel Naira in La Paz
- 21 March 2002 1) Met with Exprinter and organized logistics and equipment. Paid for previous year's storage and transportation to Lake Titicaca.
2) Worked on mooring equipment and prepared gear for transport at Exprinter warehouse.
3) Brought InterOcean acoustic release to hotel to service.
4) Reserved rental vehicle and scheduled pickup at airport on 3/22/02.
5) Stayed in Hostel Naira in La Paz.
- 22 March 2002 1) Changed batteries and serviced InterOcean 1090ED acoustic release in hotel room.
2) Picked up rental 4WD vehicle at airport.
3) Departed La Paz for Lake Titicaca.
4) Stayed at the Hostel Cupula in Copacabana.
- 23 March 2002 1) Met Exprinter crane truck in Tiquina at 0900. Attempted to make arrangements with the Bolivia Navy to use their ferryboat to load crane truck and mooring gear for deployment operations. This plan failed.
2) We went to Huatajata and met up with Gonzalo and returned to Tiquina to make a deal with the captains of the ferryboat and tender boat. At 1730 we finalized our arrangements and loaded our mooring gear onto the ferryboat. Ferryboat will depart Tiquina at 0030 on 3/25/02 and tender boat will depart with us on board at 0500 on 3/25/02.
3) Stayed in the Hostel Utama in Copacabana.
- 24 March 2002 1) Pick up food supplies for mooring deployment in Copacabana.
2) Return to Huatajata, stayed in Crillon Inca Utama Hotel.
- 25 March 2002 1) Picked up Gonzalo at 0430 in Huatajata and headed to Tiquina.
2) Met with tender boat captain and departed Tiquina at 0500.
3) Rendezvous with ferryboat at 0635, approximately 8.1 miles NW of the port of Tiquina.
4) Transfer supplies from tender boat to ferryboat and began to prepare mooring at 0645.
5) Used echo-sounder to locate mooring site.
6) Began mooring deployment at 0725. We used the tender boat to take the top float package away from the ferryboat to facilitate with the deployment of the mooring. Sediment trap was in the water by 0749 with the acoustic release in at 0750. Once the equipment was in the water the mooring was stretched out and the anchor was dropped in at 0800. The top float package disappeared beneath the water at 0802.
7) Mooring location is at 16° 07.42'S 068° 57.18'W in 198 to 220 meters water depth approximately 8.1 nm (~15 km) NW of Tiquina heading 315°.

- 8) Transfer supplies from ferryboat to tender boat at 0830 and return to Tiquina at 1000.
- 9) Store trap cover, trap pallet, and cooler in Huatajata at Nico Cartari's house.
- 10) Depart Huatajata at 1430, dropped of Gonzalo in El Alto and return to La Paz at 1730.
- 11) Returned rental vehicle at 1745.
- 12) Stayed in Hostel Estrella Andina in La Paz.

26 March 2002

- 1) Checked out of the hostel at 0615.
- 2) Departed LPB on LAB Flt#: 811 and 967 via Cochabamba, arrived at 1210 in SCL (Santiago, Chile).
- 3) Connected with our LA/AA flight to return to SFO on 3/27/02.