LAKE TITICACA, BOLIVIA/PERU
HIGH RESOLUTION SINGLE CHANNEL SEISMIC SURVEY
CRUISE ON LAKE TITICACA ON THE R/V NEECHO
31 MAY - 29 JUNE 1998

Cruise participant: David A. Mucciarone from Stanford University, Matthew Grove and Co-PI Paul Baker from Duke University, and Karin D’Agostino and Co-PI Geoffrey Seltzer from Syracuse University.

The following is a technical summary for the Lake Titicaca cruise aboard the R/V Neecho with the first leg beginning on 6/5/98 ending on 6/12/98 and the second leg beginning 6/16/98 to 6/17/98 which was terminated because of accident with seismic source and the third leg beginning 6/21/98 ending on 6/25/98. The Lake Titicaca single channel high resolution survey was a joint project between the Syracuse, Duke, and Stanford Universities. The cruise involved single channel seismic using a Huntec boomer source.

Seismic acquisition was digital using the Ellics Delphx acquisition system, Huntec boomer catamaran, and Bentho streamer. Seismic data was collected in Ellics compressed format and translated into SEGY format using Ellics Delphx software. All data was stored on 2.3 GB Exabyte tapes. Navigation was GPS acquired manually every 10 minutes. Energy source was the Huntec boomer at 240J to 375J.

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Leg 1: Seismic File Statistics for single channel lines using Huntec boomer source:

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### Leg 1: Seismic File Statistics for single channel lines using Huntec boomer source:

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### Leg 1: Seismic Statistics:

- **Shots:** 138,625  
- **Elics formatted data collected:** 344.6 MB  
- **Time:** 46 hrs. 39 min.  
- **SEGY formatted data translated:** 2.01 GB  
- **Leg 1 duration:** 8 days  
- **Lines collected:** NE981SL - NE9845SL (17 lines in 45 segments)

### Leg 2: Seismic File Statistics for single channel lines using Huntec boomer source:

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- **Shots:** 17,700  
- **Elics formatted data collected:** 41.97 MB  
- **Time:** 6 hrs. 8 min.  
- **SEGY formatted data translated:** 245 MB  
- **Leg 2 duration:** 2 days  
- **Lines collected:** NE9846SL - NE9850SL (2 lines in 5 segments)

### Leg 3: Seismic File Statistics for single channel lines using Huntec boomer source:

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### Leg 3: Seismic Statistics:

- **Shots:** 84,800
- **Elics formatted data collected:** 200.19 MB
- **Time:** 29 hrs. 21 min.
- **SEGY formatted data translated:** 1.17 GB
- **Leg 3 duration:** 5 days
- **Lines collected:** NE9851SL - NE9877SL (13 lines in 27 segments)

### Total Seismic Statistics (Leg 1 - 3):

- **Shots:** 241,125
- **Elics formatted data collected:** 586.79 MB
- **Time:** 82 hrs. 8 min.
- **SEGY formatted data translated:** 3.42 GB
- **Leg 3 duration:** 15 days
- **Lines collected:** NE981SL - NE9877SL (32 lines in 77 segments)

### Lake Titicaca Trip Outline 31 May to 29 June 1998

- **31 May 1998**
  1) Departed SFO at 1255 on American Airlines Flt. 442 to MIA (Miami) arrived at 2150. Departed MIA at 2305 on AA Flt. 923 arrived in La Paz, Bolivia (LPB) at 0630 on 6/1/98.

- **01 June 1998**
  1) Met with Harry Rowe at airport in La Paz
  2) Stayed at apartment near downtown La Paz.
  3) Picked up some cruise supplies.

- **02 June 1998**
  1) Stayed at apartment near downtown La Paz
  2) Harry and Kevin depart for the field.
  3) Pick up some more supplies for cruise
03 June 1998
1) Stayed at apartment near downtown La Paz
2) Measured magnetic susceptibility on core to be shipped to the Duke University.
3) Pick up some more supplies for cruise
4) Packed up gear for cruise

04 June 1998
1) Departed for Lake Titicaca at 1300.
2) Seismic gear arrived at Crillion dock at 1810.
3) Unpack some seismic gear and stow remainder on fantail.
4) Stay at Inca Utama Hotel in Huatajata (Crillion).

05 June 1998
1) **Departed for cruise Leg 1 at 1300.**
2) The group will be Geoff, Matt, Karin, and Dave. Harry for 2 days.
3) Load personal gear, supplies, etc in preparation for cruise Leg 1.
4) Store crates and containers in Huatajata.
5) Problems with TSS trigger control, switched to Geopulse 5210A receiver.
6) Problems with Alden thermal plotter.
7) Setup GPS, no input in Elics possible.
8) Deploy and begin seismic acquisition at 1515 with NE981SL.
9) Pulled gear at 1700. End with NE981SL.
10) Stayed on R/V Neecho at Isla de la Luna.

06 June 1998
1) Departed Isla de la Luna at 1000.
2) Deploy and start seismic acquisition with NE982SL.
3) Problems with electrical noise in data.
4) Problems with Alden thermal plotter.
5) Lost NE985SL due to power outage on R/V Neecho.
6) Pulled gear and ended with NE986SL.
7) Spend night in Hotel at Copacabana.

07 June 1998
1) Departed Copacabana at 0850. Harry departs vessel and joins up with Kevin.
2) Deploy gear at 0944 and start seismic acquisition with NE987SL.
3) Filter water for POC and PON and collect water for DIC.
4) Pulled gear at 1700 and ended with NE9813SL.
5) Translate Elics data to SEGY (NE981SL) on Tape 1.
6) Back up Elics formatted data (NE982SL to NE9813SL to Index 1 on Tape 2).
7) Spend night on R/V Neecho at Isla del Sol.

08 June 1998
1) Departed Isla del Sol at 0939.
2) Deploy gear at 0950 and start seismic acquisition with NE9814SL.
3) Filter water for POC and PON and collect water for DIC.
4) Pulled gear at 1700 and ended with NE9820SL.
5) Translate Elics data to SEGY (NE982SL to NE986SL) on Tape 3.
6) Back up Elics formatted data (NE9814SL to NE9820SL to Index 2 on Tape 1).
7) Spend night on R/V Neecho at Taquile.

09 June 1998
1) Departed Taquile at 0825.
2) Deploy gear at 0840 and start seismic acquisition with NE9821SL.
3) Filter water for POC and PON and collect water for DIC.
4) Pulled gear at 1545 and ended with NE9827SL.
5) Translate Elics data to SEGY (NE987SL to NE9813SL) on Tape 4.
6) Back up Elics formatted data (NE9820SL to NE9827SL to Index 3 on Tape 1).
7) Spend night on R/V Neecho at Isla Soto.

10 June 1998
1) Departed Isla Soto at 1215. Strong winds all night delayed start because of rough sea state.
2) Deploy gear at 1250 and start seismic acquisition with NE9828SL
3) Filter water for POC and PON and collect water for DIC.
4) Pulled gear at 1830 and ended with NE9834SL.
5) Translate Elics data to SEGY (NE9814SL to NE9820SL) on Tape 5.
6) Back up Elics formatted data (NE9828SL to NE9834SL to Index 1 on Tape 2).
7) Spend night on R/V Neecho at Isla del Sol Crillion dock.

11 June 1998
1) Departed Isla del Sol at 0830.
2) Deploy gear at 0900 and start seismic acquisition with NE9835SL.
3) Filter water for POC and PON and collect water for DIC.
4) Pulled gear at 1500 and ended with NE9843SL.
5) Back up Elics formatted data (NE9843SL to NE9845SL to Index 2 on Tape 2).
7) Stayed at apartment near downtown La Paz.

12 June 1998
1) Departed Isla del Sol at 0900.
2) Deploy gear at 0920 and start seismic acquisition with NE9843SL.
3) Filter water for POC and PON and collect water for DIC.
4) Pulled gear at 1500 and ended with NE9843SL.
5) Back up Elics formatted data (NE9843SL to NE9845SL to Index 3 on Tape 2).
7) Stayed at apartment near downtown La Paz.

13 June 1998
1) Attempted to purchase a SCSI terminator for Alden thermal plotter, none available.
2) Translate Elics data to SEGY (NE9828SL to NE9829SL) on Tape 6.
3) Make archive tape of Elics formatted data. NE981SL to NE9827SL to Tape 1A and NE9828SL to NE9845SL to Tape 2A.

14 June 1998
1) Attempted to purchase a SCSI terminator for Alden thermal plotter, none available.
2) Translate Elics data to SEGY (NE9830SL to NE9844SL) on Tape 6.
3) Give Geoff all of the SEGY data tapes. Geoff departs La Paz for Syracuse.
4) Shop for provisions.
5) Pack for trip to lake.
6) Stayed at apartment near downtown La Paz.

15 June 1998
1) Visit Exprinter to set up air cargo shipment to VIMS and pick up in Huatajata at Crillion dock on 6/26/98 at 1300.
2) Clean up computer hard disk, make boot disk, etc.
3) Paul Baker joins us and will replace Geoff on Leg 2. The group in now Karin, Matt, Paul and Dave.
4) Load up personal gear, computer, and provisions. Depart for Huatajata at 1300.
5) Load gear on R/V Neecho.
6) Fuel vessel.
7) Stay at Inca Utama Hotel in Huatajata (Crillion).

16 June 1998
1) Depart Crillion dock at 0830 to Huatajata dock.
2) **Depart Huatajata for cruise Leg 2 at 0945.**
3) Deploy seismic gear at 1120. Begin with NE9846SL.
4) Filter water for POC and PON and collect water for DIC.
5) End with line NE9850SL at 1738.
6) Problem when pulling seismic gear. Captain put vessel into reverse when boomer was almost directly astern. Tow and source cable along with catamaran became tangled into port screw and rudder. I made two attempts to free the port screw, one with help from Matt, but to no avail. All I was able to do was prevent the starboard rigging from getting tangled.
7) Stayed on vessel at Crillion dock on Isla del Sol.

17 June 1998
1) Morning was spent getting the catamaran and cables out of the port rigging. Matt, Paul and I took many turns to free the rigging. By 1200 we were unable to completely free the rigging of the source cable, close but not complete enough to use the port screw. All battling hypothermia we decided to head back to the Crillion dock in Huatajata on the starboard screw. At least with the catamaran removed from the rigging we had complete control of the rudders.
2) Depart Isla del Sol at 1230 and arrived at Crillion dock at 1700. End of Leg 2.
3) Made arrangements to have the stern of the R/V Neecho hauled out of the water so we could remove the remainder of the cable.
4) Gave pontoons from catamaran and source cover to Nico to have them repaired.
5) Stayed at Inca Utama Hotel in Huatajata (Crillion).

18 June 1998
1) Raised R/V Neecho out of water and removed cable.
2) Depart hotel and dock at 1115 for La Paz arrive at 1445.
3) Gave catamaran frame to Consalo to have it repaired in El Alto.
4) Went into the city to find some adhesive/sealant for the cable termination.
5) Stayed at apartment near downtown La Paz

19 June 1998
1) Go into city to have cable soldered and purchase tape.
2) Make cable repair at apartment. Wait for other parts of the catamaran to be repaired.
3) Stayed at apartment near downtown La Paz

20 June 1998
1) Remainder of catamaran repaired. Make arrangements to return to Huatajata and complete survey.
2) Pack once again for the lake. Paul and Karin will not be able to make the remainder of the cruise. Matt and Dave will finish the survey on Leg 3.
3) Stayed at apartment near downtown La Paz

21 June 1998
1) Depart La Paz for Huatajata at 0610.
2) Make preparations for cruise. Assemble catamaran and test seismic source.
3) **Depart Huatajata at 1100 and begin cruise Leg 3.**
4) Filter water for POC and PON and collect water for DIC.
5) Deploy gear at 1348 and begin with NE9851SL.
6) Pull gear at 1632 and end with NE9852SL.
7) Translate Elics data to SEGY (NE9846SL to NE9852SL) on Tape 8.
8) Stayed on vessel at north end of Isla del Sol.

22 June 1998
1) Depart Isla del Sol at 0745.
2) Rain today from 0900 to 1000.
3) Filter water for POC and PON and collect water for DIC.
4) Deploy gear at 0800 and begin with NE9853SL.
5) Pull gear at 1730 and end with NE9860SL. Head for Tiquile. Arrive at 1820.
6) Translate Elics data to SEGY (NE9853SL to NE9860SL) on Tape 8.
8) Stayed on vessel at Tiquile.

23 June 1998
1) Depart Taquile at 0730.
2) Filter water for POC and PON and collect water for DIC.
3) Deploy gear at 0832 and begin with NE9861SL.
4) Pull gear at 1736 and end with NE9868SL. Head for Isla Soto.
5) Translate Elics data to SEGY (NE9853SL to NE9860SL) on Tape 8.
6) Back up Elics formatted data (NE9846SL to NE9868SL to Index 1 on Tape 3)
7) Stayed on vessel at Isla Soto.
8) Rained most of the night.
24 June 1998
1) Depart Isla Soto at 0740.
2) Filter water for POC and PON and collect water for DIC.
3) Deploy gear at 0817 and begin with NE9869SL.
4) Pull gear at 1700 and end with NE9876SL. Head for Isla Soto.
5) Rained off and on all day.
7) Stayed on vessel at Isla Soto.

25 June 1998
1) Depart Isla Soto at 0725.
2) Filter water for POC and PON and collect water for DIC.
3) Deploy gear at 0747 and begin with NE9877SL.
4) Pull gear at 0805 and end with NE9877SL. Lake too rough to shoot seismic. Secure
gear on deck and head for Huatajata.
5) Translate Elics data to SEGY (NE9869SL to NE9872SL) on Tape 8.
6) Back up Elics formatted data (NE9853SL to NE9877SL to Index 2 on Tape 3)
7) Disassemble boomer catamaran. Have Nico repair some cracks in the pontoons. 6)
8) Dock at Nico's. **End of cruise Leg 3.**
9) Stayed at Inca Utama Hotel in Huatajata (Crillion).

26 June 1998
1) Arrange for van to pick up crates at Nico's and for trip to La Paz.
2) Clean up the R/V Neecho for storage.
3) Translate Elics data to SEGY (NE9873SL to NE9877SL) on Tape 8.
4) Make Archive back up Elics formatted data (NE9846SL to NE9877SL to Index 1
   on Tape 4).
5) Pick up crates at Nico's and bring to Crillion dock. Pack up seismic gear for
   shipment to VIMS via Exprinter, pick up at 1300.
6) Depart Huatajata for La Paz at 1400
7) Stayed at apartment near downtown La Paz

27 June 1998
1) Confirm American airlines flights to SFO.
2) Pack personal gear.
3) Pack, inventory, and store gear at apartment for next season.
4) Clean up apartment.
5) Reserve cab for airport.
6) Help Harry and Kevin ship gear back to Stanford University via FedEx
7) Stayed at apartment near downtown La Paz

28 June 1998
1) Depart for airport at 0415 with Harry. Arrive at 0445 and check in at 0500 at
   American airlines. Pay for excess baggage (4 pieces at $332.00). Pay departure tax.
   Flight delayed over 5 hours. Unable to make connections in MIA for SFO. AA put me
   up in hotel for the evening.

29 June 1998
1) Depart MIA at 0710 on Flt 431 and arrive SFO at 0954.
2) Drop off core and excess bags at Stanford University.
3) End of trip.