HAWAI'I UNDERSEA RESEARCH LABORATORY
QUICK LOOK REPORT

DIVE: P5-626

Location: Brothers Volcano, NW caldera wall

Latitude: Begin 34° 51.778'S **Longitude: 179° 3.548'E**

Mission Date: May , 2005 **Duration:** **4 hrs 45 minutes** (Bottom Time)

Maximum Depth (m): 1774

Project Title: New Zealand American Submarine Ring of Fire Leg II
KoK-O5-06

Principal Investigator: Bob Embley

Address: NOAA/PMEL, 2115 SE O.S.U. Dr., Newport Oregon, 97365-5258

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Observer 1: Bob Embley **Observer 2: None (Co-Pilot)**
Address: **Same as above** **Address: --**

Pilot 1: Terry Kerby **Pilot 2:** Max Cremer

Scientific Data Acquired: Digital video, digital still images, samples of rock, minerals, hydrothermal effluent, microbial mats, CTD

Objectives:

(1) Explore and map the northwest wall of the Brothers volcano wall high temperature hyrothermal systemand collect biology, microbiology, chemical and geologic samples

Observations, findings, etc: (Also see Appended Dive Log)

Note: the CTD depth was reading up to 25 m shallower than the PISCES depth gauge throughout the dive. This was using the "corrected" CTD depth used on previous dives (by adding 10 m to the CTD).
The dive began on the lower part of the caldera wall at 1774 m. The talus included many pieces of white, highly altered volcanic rock. Several samples of this were used as ballast and one was retained as a sample (PV-626-1R). PISCES proceeded up the wall towards the vents. The second rock sample (PV-626-2R) was an in-place piece of altered pillow lava from an outcrop of altered volcanics at a depth of 1729 m. The first active hydrothermal activity was noted at 11:00 with the first occurrence of yellow-orange low temperature patches and small chimneys at a depth of 1691 m. A suction sample of the

oxide chimney was taken (PV-626_3SS). After traversing a zone of active Fe venting the zone of high temperature sulfide chimneys was reached. The chimneys appeared to line up along an approximate E-W trend going directly upslope. PISCES descended to the maximum depth of the sulfide chimneys at about 1680 m. A small inactive chimney (PV-626_4Min) was taken here. The large chimney adjacent to the one sampled had a Shinkai 6500 marker 4 next to its base. PISCES again ascended the slope and took water samples at two sites. The lower site was near the top of a chimney (PV-626_5MS (Blue) at 1644 m). The maximum temperature recorded was 260 C. The upper site easier to sample and both a major (PV-626_6MS_yellow) and a gas tight were taken (PV-626_7GT_Black). PISCES headed east to explore the eastern extent of the active area and came across another small chimney field at 13:45L in a water depth of 1647 m. Samples of true crabs were taken here (PV-626_8B and PV-626_9SS). A traverse to the east encountered extensive areas of oxide venting between depths of 620 and 632 m. A thruster problem limited the ability to maneuver in the rough terrain so the dive was terminated at 15:05.

Species List:

Don't know all of species found. True crabs (several specimens)

MISSION EVALUATION:

A. Limitations, failures, or operational problems noted:

- None

B. Recommendations for corrective action or improvement:

- Gyrocompass would be a good improvement
- New navigation system needs to be looked at carefully to determine what is best solution for drifting of fixes during ship turns.

C. In your opinion, did the mission essentially achieve its purpose? Yes

D. Compare actual work accomplished with the work that was expected to be accomplished.

- Same

E. List specimens or samples collected on the mission. (See Sample List Below):

E. Sample List

Sample Number	Time (L)	Latitude 34°	Longitude 179°	Depth(m)	Comments
PV-626-1R	10:26	51.78'	3.59	1779	White altered talus (3 pieces were initiall put into biobox but for ballast, but only one retained by end of dive
PV-626-2R	10:50	51.79	3.50	1728	Wedge of altered basalt taken from intact pillow
PV-626-3SS	11:06	51.77	3.52	1715	Suction of yellow chimney (Jar #1)
PV-626--4Min	12:17	51.39	3.49	1679	Small inactive chimney from near base of large active one marked by Shinka Marker #4
PV-626-5MS	12:46	51.75	3.47	1644	Blue Major water sampler top of large chimney 260 deg C; difficult to tell how good sampler was in position. No GT because fear of dropping it
PV626-6MS	13:13	51:75	3.43	1616	Yellow Major Water Sampler 290 deg C
PV-626-7GT	13:20	51.75	3.43	1616	Black Gas Tight sampler in 290 deg C fluid
PV-626					Marker 17 deployed at the water sampler site
PV-626-8B	13:46	51.70	3.58	1647	Crab put into biobox, slightly crushed
PV-626-9SS	13:47	51.70	3.58	1647	Crabs sucked into hose and held in holder Small gastropods in Jars 2 and 3

Dive 626 Dive Log

2-May-05

Pilot - Terry Kerby
Co-Pilot - Max Cremer
Scientist - Bob Embley
Note: Time
Zone = +12

Time (L)	Z (m) *from Pisces Depth	Lat. 34S	Long. 179E	Observations
10:20:00	1781*	51.778	3.548	Landed on bottm; stirred up sediment cloud small outcrops and many large talus blocks Many white altered rocks; get 3 of them for ballast, so they don't have topump water out.
10:22:30				
10:26:00				Near landing site
10:33:00	1766			Picking up altered rocks for ballast
	1774*			**P5-626_1R** Picked up three white rocks for ballast (only kept one by end of the dive
10:36:00	1753			Start upslope; steep - lots of mass-wasting, altered rocks
10:36;30	1774			Hdg. 270; huge slab of white altered rocks
10:37:00	1750			slope steepens, lots of broken white altered rocks
10:37:30				
10:38:10	1764*			CTD (corrected with +10m) reads 1745 m!
3:35:00	1755*			CTD (Corr+10m) reads 1735!
10:38:00				Huge blocks of white altered rocks; mostly sand and gravel now; Steep slope, white rocks, pillows, talus, gravel streams , some outcrop
10:40:20	1755*			See feeding tentacles sticking out of sediment. CTD depth is 1726 m!
10:40:40	1749*			Coming to vertical wall - 1728 is CTD depth (20 m
10:40:50	1728			Going up more vertical wall
10:42:00	1749*			1723 CTD depth
10:42:30	1642			Stockwork?
10:42:50	1712			Stopping to look at alteration zone shallower than sub!) Could be stockwork. 45 deg slope
10:43:30	1736			198 deg heading Some bateria mat on rocks (probably not hydrothermal)
10:45:00				Seeing lotw
10:43:50				Moving up over stockwork zone
10:45:30				Looking for sample site
10:46:00				Stopping to look at sample site - spotted apparently

Time (L)	Z (m) *from Pisces Depth	Lat. 34S	Long. 179E	Observations
				in-place altered pillows
10:46:45	17			At sample site. CTD depth is 1708 m
10:48:10	1729*			**At sample site PV-626-2R; CTD depth is 1708 m**
				Nice video of "buggered" pillow
10:52:05				Putting sample into biobox
10:55:00	1728			Sinking down slope a few meters
10:55:25				Going up slope past sample location
10:57:00				See in place outcrop sticking out from slope, hesitating to look more closely
				Could be hydrothermally cemented breccia
10:58:15	1690			Looking at large structure, possibly cemented breccia
10:59:00				Passed ridge of breccia sticking out, going right (north) along slope.
10:59:45				Stopping at active Oxide chimneys; nice video
11:01:05	1691			Moving up slope- seeing active oxide chimneys; some
11:02:15	1715*			1687 m CTD depth
11:03:45				Stopped to take a temperature at oxide chimney; 38.5 deg C coated with Mn
11:04:45				Taking oxide slurp sample
11:07:45	1715*	51.778	3.52	**PV-626-3SS** of oxide chimney in Jar #1; 1792 m CTD **depth (corr. =10m)** Moving off sample site; Mn coating oxide/silica
11:09:15				Moving off sample site; Mn coating oxide/silica
11:10:00				Still at sample spot (within a few m's); 1700 m
				NICE VIDEO OF SOME OF THESE OXIDE CHIMNEYS
11:12:00				Going up slope over lots of large nontronite chimneys poking through talus
				These are actively venting diffuse fluids
11:13:15				Hdg. 289 going upslope
11:13:20	1679 CTD			Large nontronite chimney growing out of outcrop
11:13:30				**Big basalt pillar**
11:13:47				Nice video of large basalt pillar
11:14:30				Looks like band nontronite chimneys in band about 276 deg
11:14:30				Stopping to Look at band of active oxide chimneys in band abot E-W . See pillow wall ahead up ahead
11:15:00	1673 CTD			Going up along band of chimneys
				Chimneys growing right of talus and out of pillow outcrop.

Time (L)	Z (m) *from	Lat. 36S	Longitude 177E	Observations
11:15:30	1674			Looking for place to sample water in these active chimneys
				NICE VIDEO OF CHIMNEYS
				Wall looks basaltic and nto very altered; perhaps some sort of boundary
				between altered and unaltered rocks
11:00:00				manuvering around looking at oxide field
11:16:20	1696*			At vertical outcrop of unaltered pillows; 1671 m CTD
11:16:50				Looks like outcrops of dikes in vertical wall
				Ridge has a westerly orientation. ~270
				Really nice sequence of dikes dipping about 15 deg N
11:18:30	**1657** CTD			Going over wall
11:19:20	1656			beatiful exposure of dike complex (see cooling cracks perpendicular to
	CTD			dike's sides
11:19:50				See beautiful spider-like creature go across video!
11:20:00	1646			**Now seeing more rubble and more alteration again**
11:21:00	1668*			Going up steep wall; 1650 CTD Depth
11:21:45				near-vertical wall
11:22:00	1639			Wall with dikes exposed
11:23:00				Vertical wall - appeards to be large spur, possibly dike
11:23:30				looks like two intersecting ridges; one E-W, other more N-S -NEAT
				nice video of geology here
11:24:15				More nontronite in between rocks
11:24:15				Seeing nontronite growing from spaces between rocks
				Solid massive wall now
11:25:00				Seeing smoke drifting around now
11:25:45	1629*			Very foggy, stopped to get a fix; 1616 m CTD
11:27:00		51.77	3.445	Getting fix, very foggy; range and bearing to WP 2
11:30:30				**Moving ahead again to look for sulfide chimneys; looking into space**
				depth to look at
11:34:25				**1643 m CTD; dropped down off scarp to get to better** the sulfide chimneys
11:37:10	1632 CTD			Heading (south?) alongwall seen beautiful draped nontronite chimneys
11:37:45	1666*			Contouring westerly; 1642 m (CTD) on wall, now turning to east
11:38:30	1658			Have come off wall going west; lots of nontronite
11:39:10	1658*			Turnign to head back east? 1334 m CTD
11:39:45	1659			Seeing large field of nontronite chimneys
11:40:30				Looking at nontronite chimneys; much of it active looks l ike it was E-W. Nice video

Time (L)	Z (m) *from Pisces Depth	Lat. 34S	Long. 179E	Observations
11:42:00				lots of active nontronite chimneys on spur
11:43:00				
11:43:30				out in space, can't see bottom
11:44:15				Come across huge block standing up to form a spur
11:46:30				More nontronite on steep wall
11:47:20				Out in space
11:48:05				Chimneys ahead
				Going upslope in distinct band; the are lined up upslope
				Stopped to get orientation
11:49:30				1648 m; Stopped
				Nice video of chimney
11:48:30				Chimneys appear out of murk
				Chimneys appear to be lined up in upslope direction (E-W?)
11:50:05	1662*			Looking at chimney, stopped.
11:51:30		51.275	3.494	
11:52:30				See diffuse venting on sides of the chimney
11:53:00				Seeing smokers below us as well; turning to go downslope
11:53:30				Going downslope to get to base of chimneys; looking into space
11:54:05				Still into space, but Terry sees Shinkai marker, has "0" on it
				but can't read the number very wellnumber
11:54:45				Starting to see more chimneys farther downslope
11:55:20				Seeing chimney field; Some good video through here
11:57:00				Backing downslope; 1634 CTD depth
11:57:30				Coming around to starboard, not much to see right now
11:59:30	16			Hdg. 270 - looking right up line
11:59:45	1663*			Seeing band going to west; 1639 m CTD (may not be good
				depth comparison
12:01:15				Going downslope to the east to try and reach bottom of field
12:02:00				Coming around to starboard to face west
12:02:00	1666*			See marker # 4 (Shinkai); can't see much on video
12:03:25	1669*			Still can't see much on video. 1645 m CTD
12:04:10				Saw another spider-like floater
12:04:20	1672*			
12:05:00				Seeing chimneys now; begin nice video
				These are oxide chimneys; facing south,so do nontronite
				chimneys go N-S?
12:05:50				Looking at bottom. Big slab of altered rock just right of
				nontronite chimneys
12:06:20				On bottom to get position at nontronite chimneys
	1680*			At base of chimney field but sitting at nontronite area.
				Chimneys covered with manganese 1656 m CTD (24 m different
12:09:45		51.786	3.492	still sitting in same spot
12:11:05				Nice video going up chimney; see other chimneys in background

Time (L)	Z (m) *from Pisces Depth	Lat. 34S	Long. 179E	Observations
12:11:25				Nice view on video showing nontronite chimneys in foreground and sulfide chimneys in background (one has marker on it).
12:12:10				Seeing chimneys, one with marker 4 ; Beautiful video
12:12:45				NICE VIDEO
12:14:15				
12:15:10				**PV-626 4-Min** Small sulfide chimney at deepest end of **chimney line** Just east of large chimney Shinkai sampled - Shinkai Mkr. #4
12:19:45				Just finishing taking chimney sample END TAPE 1 of 3
12:21:26				Still at chimney sample site
12:22:00				Still at chimney sample site, discussing what to do

Time (L)	Z (m) *from	Lat. 36S	Longitude 177E	Observations
12:23:20				Nice view of top of chimney with beehive structure
4:25:00				Going up different chimney to get height Bottom is at 1668, top is about 1663 (sub depth reading
12:27:00				NICE VIDEO OF TOP, NOW MOVING OFF TO PORT 10 m off bottom
11:20:00	1661*			Multi vent chimney, several meters up Moving up chimney line
12:30:00				See another one up ahead with beehive on it. Above it looking down
12:30:15	1657*			Top of chimney; venting on top, looking for a sample spot; 1633 CTD So CTD reads 24 meters shallower than the submarine depth
12:32:00				Accidentlally knocked over top of chimney. Don't see anything else right here See barnacles down below and ahead
12:33:20				Seeing barnacles below, now enveloped in a silt cloud
12:34:00	1655			Hdg. 281 deg
12:34:30				In open space, not seeing bottom now
12:38:20				See another chimney, turning; seeing lot of smoke in water
12:39:00				Seeing chimney complex in video NICE VIDEO
12:39:25				Beautiful reddish-orange coloration on side of these chimneys! anything else NICE VIDEO
12:40:00				Coming up onto top of chimney; try to get sample Lots of shrimp swarming around the chimney
12:40:20				Manuvering around chimney to get into sampling position
12:43:20				In sampling position on top of chimney, can see black smoke pouring out of top of chimney
12:44:00				Taking temperature of vent; highest temperature was 265 deg C
12:46:30				Going to take a water sample. 1621 m CTD Depth
12:47:45	1644*	51.749	3.472	1621 m
12:49:30				Nice video of top - water sampling
12:54:40				nice view with main camera looking down on to chimney with water streaming up the side of it
13:00:00				Swung off the chimney, now looking at another chimney; squt lobster
13:02:00				Stopped on seafloor stowing major sampler. See some barnacles1629 m CTD depth
13:03:30				Looking at barnacle colony
13:04:10				Start moving again, to waypoint 3?
13:05:05				Barnacles on lower part of chimney; start moving to WP3
13:05:40				Extensive barnacle colonies on wall, boulders or sulfides?
13:07:00				Old chimney stumps and seeing extensive barnacle colonies
13:07:15				Moving upslope
13:08:00	1615*			1592 CTD Depth

13:09:00				Manuver to find spot to sample water on another smoker 1593 CTD depth
13:11:00	1616*			Up on chimney sampling smoker; Taking temperatures; . 290 deg C Max
13:29:30				**PV-626_5MS; PV-626-6GT** **Put out Mkr 17**
13:31:30				
13:45:00				Another group of chimneys perched on steep wall
13:45:10	1647*			Looking at chimneys, going to get a fix. 1635 m CTD depth
13:47:00		51.699	3.582	Getting nice video of chimney with large scale worms on it
13:48:00				Really nice VIDEO without the time on it
13:58:00				Rising up
13:59:00				Lookng at large vertical wall. 16:09 CTD depth
14:00:00				wall covered with orange mat
14:01:00				in plume. Can't see bottom anymore
14:02:00	1620			On talus slope with orange mat
14:03:00				Nontronitepatches. Looks like giant grooves extending downslope
14:04:00				
14:05:31				WP 5, 170 m; Bearing 076 deg., in midwater
14:06:30				Seeing wall now, seeing nontronite, some of it is active, small chimneys. 1609 m CTD depth;
14:08:40				In thick plume now, went over ridge with nontronite, seeing more now on the slope; heading generally E-SE
14:09:17				See big blocky structure on wall to left, could be old sulfide now going into box canyon
14:12:30				wall to right, see big columns about ready to fall
14:12:30	1628*			1607 CTD depth; see big overhanging block
14:14:00				Moving up the wall of blocky lava, doesn't look altered
14:14:30				See patches of nontronite on this steep slope; lots of them appear to be actively venting; 1596 CTD depth
14:15:20				See lots of patches of nontronite on a bench growing through sediment
14:15:25	1612*			1593 m
14:15:50				lots of patches of nontronite
14:16:20				132 m at Bearing 078 deg
14:17:00				Going back into mid-water
14:18:00				in midwater
14:19:00				
14:23:30				Begin Tape 3 of 3. In mid-water
14:26:00				See bottom again, getting fix. On 35 deg slope
14:26:25				1592 CTD Depth; Bottom is sedimented old talusk; small nontronite chimneys?
14:26:30				Range 140 m; 093 deg Bearing; Going to contour follow now
14:30:50				See bottom again, getting fix. On 35 deg slope
14:31:00				See botto- m again, lots of small nontronite chims; looks like same slope as 14:26. 1603 m CTD Depth
14:31:45				Going upslope; in midwater
14:34:40				Lots of nontronite chimneys again on seafloor, pretty dense

				1595m CTD Depth;
14:35:45				See headwall of very recent slide of sediments from this area; very sharp contrast between exposed deeper stuff and overlying darker stuff.
14:36:00				going upslope - can see bottom but pretty dark
14:37:30				Looking at sedimented slope
14:40:00				Lots of sediment, maybe some nontronite, but pretty far away Have been moving S-SSE
14:40:30				looking at sedimented slope
10:30:00	1565*			Trying to settle down for position, near gnarly outcrop
14:54:45				Have backing down slope, thruster stuck so can't point all the way up
14:59:00	1632*	51.637	3.634	approaching cliff with nontronite on it, getting position 1621m CTD depth
15:01:45				Leaving ledge to go back downslope
Time (L)	**Z (m)**	**Lat.**	**Longitude**	**Observations**
	***from**	**36S**	**177E**	
15:04:00				Going downslope backward (thruster can't rotate fully
15:05:00				Have left bottom; END DIVE PV-626

DATA RELEASE

Data may be retained by the project leader for up to 2 years after the mission date with the following exception. NOAA may request to use photos for publication or publicity purposes at any time.

Fill in the appropriate statement below and sign this form.

I hereby release the data archived by HURL for public consumption following mission held on in the following way:

a. CTD data by (date) - May, 2007

b. video and images by (date) – May, 2007

c. other (date) – May, 2007

d. I will give my written consent to individuals wishing to use these data prior to the above dates depending on the nature of the request(s).

Principal Investigator