time	x	y	depth	Alvin Dive 4606 port side observation (observer = Ken Rubin)
				(abbreviation notes: LST-SP = light sediment dusting on top, some sed in pockets; LSP = lightly sedimented pilows; traj = trajectory; ornam= ornamentation)
1449	13441		1675	approaching bottom on a slope, pillows, bulbuous, not much sed (less than we saw in other DSA - i.e., at el dragon); we are heading 025 and pillows are heading downslope beneath us.
1451	13440	8600	1679	on the bottom; Mn on the pillows
1504	13499	8603	1679	getting setup, looking for sample 1
				end vn620216.wma
1512	13439	8603		taking sample 1; 35 to 40 cm long piece of a pilow tube extruded out of larger butt-shaped pillow; Mike is going for aft center basket (2) (misspoke on tape and said X was "14339")
1515				heading off to wp2, we are 100m of wp1 because of current during descent, but we are in good position for graben traverse; HAVING DIFFICULTY SEEING OVERLAY
1520				getting underway; slope is construction, pilows flowing down hill as tubes, sed cover is light on top (age 1) but sed in pockets; high relief seafloor so pockets are deep, substantial Mn coating, no ornam., some breadcrust textures, a few lobes are interspersed
1524.5	13454	8591		heading 130, heading to wp2, can see elongated, bulbuous pillows heading downslope, downslope is off to port, this all looks constructional; young in terms of sed cover, just a little sed in pockets
1526				bottom has dropped away, we are 7m off, I can still see pillow tubes, bottom has leveled out
1528	13528	8525		more jumbled surface benaeath us, pieces of pillow talus on a sloping face, still out in distance, approaching had ridge, pillow tube across the top, talus at the bottom
1530.5	13560	8505		debris slope, larger chunk of tock, tectonized pillows, not much sed, large fallen block of multiple pillows, platy debris, high standing ridges of blocks, can see truncated pillows in faces
1532	13586	8501	1689	still seeing pillow debris but also in place pilows, slope is somewhat flatter off to port, but strong reflection on sonar at stbd; we are hugging the wall of a basin that must be part of a fault zone, picking up flatter pillows as we move forward
1535	13642	8458	1693	sheer wall on stb, dropping off steeply on port, can see pillows off in the distance, following a contour on a steep face
1537.5			1694	just came across a knife edge ridge formed by a tileted block tilted almost 90 degrees; we can see into a very thick lava flow; can see the flow top and internal portion of an inflated flow, including columnar joints; steep sided wall off to stbd; downtiled block of tectonized crust, heading along block at 108, can see light sed cover, low relief on side of block, then drop off at block edge off to port
1540	13729	8432	1693	m wide fissure parallel to the face forms a sliver of basalt on the top of the face, then constructional with pillow tubes and same light sed dusting as at wp1, somewhat squatter pillows though; heading gently upslope
1542.5				passing over small fissure heading 335 rel to sub (we are heading 149) so it it heading almost E-W
1544	13770	8368		20-30 cm wide fissure, bulbous pillows, some ornam., same sed cover going up slope, pillow talus, not much sed, stairstep slope, shows on sonar as hard reflector, now seeing a flat fault scarp face, not seeing pillows, looks like massive flow in the face [frame grabber shows that scarp height is 18m; 1691-1673m]
1546.5	13779	8337		have come over the top, can see lobates on top, not much sed, Mn coating is the same, sed dusting on surface, not much in pockets.
1549	13787	8315	1673	trolling for a sample of lobate, light sed cover, clear Mn crust on them.
1554	13790	8316		sample 2 = 25cm long lobate crust into basket 1a.
1600				off to wp2
1602	13791	8280	1672	light sed lobates, coming into saddle point near wp2, pretty flat lobates
1603	13802	8260		small, 20-30cm fissure, heading E-W (about 330 to sub heading)

1605.5				at wp2, still in small lobes, ~1m accros, light sed, going to wp3
1606.25	13849	8197	1676	heading upslope a little bit now
1607.75	13869	8215	1675	slope has gotten a little steeper, seeing pillows, no orientation, some bulb, some elongated, same sed dusting on surfaces, no ornam.
1609.5	13893	8241	1670	slope is a little steeper, we are in proper pillows now, looks like same unit as lobates, same sed cover, a few ornam., a few broken pieces too, pieces of fallen ornam, bulb pillows
1611	13926	8257	1663	same pillows
1613	13940	8274		steep dropoff, same fault face we saw on prior traverse from wp1 to 2, steep bounding wall to terrain at center or grabben
1614.5	13971	8317	1654	off bottom, 30m, gone across same fault now, expect bottom soon [fault hieight from framegrabber bottom depth = 25m, 1684-1659m]
1618	14028	8391	1656	blue water, 16m off, current pushing us to west so he is compensating to stay over the nose of the ridge we are supposed to be inbtersecting
1620	14061	8415	1662	11m off bottom, can barely see it, map may be shifted to west, mike driving to the sea floor
1622.5	14120	8441	1668	bottom is in view, 8m off, lloks like flat lieing pillows trans to lobes, som bulb pillows, too high to see sed cover but looks basically the same (light)
1625	14181	8475	1676	5m off bottom, sonar shows gentle sloipoing up all around us, flattened pilows trans to lobates, some sed inpockets, tops are dusted, not drammatically different than last sample spot, moving due north to wp3
			1679	moderately lightly dusted sed on pillow lobes, just dropped off 2m high step in platform and then crossed a 1m wide fissure, now there is a steeply sloping face in front of us, so that was a small garbben, very fissured terrain here
1628.5				truncated pillows in 1m wide fissure face, smallish pillow tubes and flattend lobes on high ground between two fissures, looks like rock at wp1
				end of vn620217.wma
				[back ground chatter: "northern half of grabben is fault bounded blocks"; then 1.5 min of silence]
1632				botom in site; lobates, same as before the edge, same fissures perpendicular to our 170 heading, 0.5 to 1m across, flattened pillow tubes transitional to lobates, flat bottom
1634	14224	8489		flatter, broader lobes; same sed cover, first true lobates we've seen on the dive
1634.5				jumbled sheet, 4-5 m wide then back into lobate, short local section of faster flow
1636	14224	8440	1680	elongated flattened pillows; just came off lobates, smooth transition, same unit. Going to go for sample 3
1643	14223	8444	1680	sample 3 = 15 cm long piece of pillow crust into basket 7b
1645	14227	8419	1679	underway to wp 4, end of tape 1
1647.5	14242	8347	1681	8m off, can see flattened pillows, sed dusting on tops
1649.5	14248	8288	1700	heading 180, we drove down over a gentle drop off and followed slope down, now slope is coming back up; pillow lobes and broken pieces of bulb pillows, then debris, then we saw some talus as we transitioned off the flow to the base of a wall = the fault, hard reflection on sonar
1650.5	14245	8259		can see lots of truncated pillows in the wall, very massive face, very tectonized (I said "8529" for x on tape, but framegrabber shows I was dislexic). N facing face of high standinding ridge in center of grabben is faulted. This feature lines up with our other two traverses accross the grabben.
1653	14243	8256	1662	still coming up the very steep wall, trunc pilows, flattened tubes in the wall, 1/2 m in x and 1/4m in y directior
1654	14244	8252	1658	starting to see top of wall on video, it is lobates. Fault comes farther east up grabben than we expected to see it from dsl120 data [from framegrabber: fault scarp is 34 m high, 1659-1693m]
1656	14247	8209	1659	LST, occasional sponge and coral, not much sed, flattend pillows, almost lobes
1658	14244	8166	1666	coming over the top of a mound as we approach wp4, same squat pillows, same sed dusting, looks like same unit all along this traverse

1700	14255	8125	1673	at wp4, same unit, a few lobes, squashed pillows, looking for a sample
1704	14255	8121		LSP, sample 4 into basket 4b
1714	14260	8133	1669	heading 030 to wp 5, LST on pillows, going to hit fault soon
1717.5	14283	8193	1661	heading to wp 5 ging up gentle slope, in LSP. Deep sea corals
1718		8231	1665	flattened pillows, almost lobes, drop off is in front of us; we will head to wp6 instead of 5
1720	14316	8272	1659	over the edge of the fault, we are 30 m off, dropping down [from framegrabber, fault throw = 32m, or 1690-1658m]
	14316	8272	1670	can see bottom, alt = 33 at back of sub; can see lobate lavas out front, lightly sedimented, true lobes in here
1721	14316	8272	1660	lightly sed pillows before fault; looks like wp 3; northern half of grabben is all same looking so far; but lets see what wp6 looks like
[1721]				lost nav and time updates, hanging out for computer reboot, heading 071
[1730]				approx time from my watch; LSP, going by gyro to wp 6
[1732]				still no nav or time; same pillows and lobes between them, LSP on platform towards wp6
1735	14450	8398	1685	mike lost hmi but it came on again; LSP and lobates
1738				picking up fissures, trending 250 to sub, we are going 067 (so orientation is 320); expecting a dropoff; same pillows here
1739.5	14543	8458	1693	another small step, 1-2m; in LSP, a few small collapsed pillows, same sed cover; flattened pillows, semi elongated, random lobe direction
1740.5				talus and pillow frags, Mike sees a wall; step up after down-dropped block; dropoff to port side; large pillow frags; we are on a highstanding knife edge ridge that drops off on other side, with more debris at base
1742.5	14590	8484	1696	going to come down to bottom, we are a bit west of wp, lots of fragmental debris, chewed up sea floor, not much point to take sample, looks like debris of same flow; broken angular pillow frags
1746.5	14590	8465	1695	heading 190; still seeing talus and frags, going up a wall - few meters high, can see truncated pilows in wall, lobes and flattened pillows on top
1748				local high of pillows, then drops into a crevice on the other side, then fissure behind that; do pillows post date? I don't think so
	14585	8431		we've crested the wall: lightly sed pillows on top; will forgoe a sample here
				still heading S as we enter "least faulted" part oh dsl120 terrane
1750	14580	8396	1692	LS-Lobates; moderate sized lobes, few m accross, loww relief to lava surface
1752	14575	8355	1692	same lobes; heading 189
1753	14571	8327	1696	picking up a few breadcrust textured pillows but primarily still mostly lobates, same sed cover
				end of vn620218.wma
1757	14575	8287	1695	mostly pilows now, we are nearing wp7 and trolling for a pillow
1800	14574	8275	1695	stopping for sample 5; scrath that, still moving around and looking for a piece to sample (coming about to get sample from other side)
1806	14572	8273	1695	sample5 into basket 4b, pillow bud, large
1812	14572	8273	1695	heading to wp 8
				end of vn620219.wma
1819.5	14629	8196		coming up on a rise, broken debris, pilow frags and larger pillow chunks; not a vertical angle, more like 45 degree slope
1820				now seeing a face, truncated pillows, going up a step, then a rise is off in the distance
1821	14620	8159	1686	slope is now a vertical face, sdteep wall, grabben bounding fault, truncated pillows, back of sub is 13m off
1822				19m off bottom, coiming up face, same x-y
1824				top of wall, going to grab sample of lobates transitional to pillows; there are corals here, shrimp are also present [from framegrabber, fault throw = 16m, or 1696-1680m]
1830	14635	8151	1679	sample 6 into basket 4a; 20cm long hunk of pillow lava
1832				underway to wp8, slope should drop away

				lobates, lower lying, plus some pillow; then we entered a curtain folded sheet on a low relief lava surface; is it a channel? and is it the
1834.75	14669	8111	1685	same material as we have been on? Yes, on the channel, there is curtainb foilds at the edge and lineated sheet in the center
1835.5	14675	8093		lobates on the other side; channel was heading off in roughly same heading as sub
				picking up local collapse in a lobate, 1/2m deep, shelly inside, debris in side, same sed cover on top; higher effusion rate lavas here;
				next we saw a big collapse, 5m x 3m oval by 1m deep in lobates; source of flow up on high standing ridge? Going to try to get a
				sample of these first "true" lobates of the dive, from a collapse rim to make sure this is the same material as the sheet we just sampled
				for sample 6
				stopping for sample 7, part of a collapsed lobate; took 2 small pieces of a lobate crust, put into basket 7a, each piece is 5-10 cm long;
1841	14695	8049	1690	tape 2 is over
				end of vn620220.wma
1850				heading to wp 9
				end of vn620221.wma
				smaller lobes here, smooth transition to small jumbled sheet flow (see framegrabber SubSea2_20100401_185136.jpg; nothing much
1851.5	14726	8062		shows on dark ext still at this stage), then transitioning back into pillows
	14734	8062		heading 100
				going up a gentle rise, seeing bulbous pillows, no obvious flow direction, but many are elongate perpendicular to the sub, pretty much
1852.5			1690	same sed dusting on flow tops as all day, but pockets look a bit fuller; perhaps this is because the relief is lower
				coming up a gentle slope can see on sonar; there were some higher standing features as we crossed the lava "plain", but just a few m
1855	14799	8056	1686	high (also, I mispoke on tape and said the time was 1655")
				flatter pillows, tranitional to small lobes; same sed dusting on top, no obvious unit transition, other than the morphology shift at the start
1859	14896	8046	1686	of this last way point transit
				bigger pillows here, bulbuous, breadcrust textures, not mch ornam., same sed cover; we are 2/3 of the way accros the grabben outlet
1902.5	14978	8032	1686	traverse
1904	15020	8026	1685	coming up a gentle rise, as expected; seeing small squat lobes
1906	15062	8021	1683	zeroing in on wp9; lots of small lobes and occasional bulb pillow, same sed cover; sonar shows a hill in front of us
				still seeing small lobes with a few pilows interspersed, same sed cover (dusting on top - accum. In pockets), going to get a sample
1908				somewhere around here
				at wp9; slope has leveled off, we are in lobes with occasional bulb. pilows; there is a small pile of high standing lava sort of like a
1910	15100	8009	1682	tumulus that Mike is going to try to sample
	15154	7999	1685	sample 8 is a piece of a lobate crust form the pushup structure, into basket 5a
				just finished sampling; power is getting low so we will bag wp 10 and head to wp11 instead - across the grabben at base of the
1919.5				seamount
1924.5				heading north; seeing small lobate pillows, same sed
1926	15140		1680	went over a drop off, we had been in lobates and then the bottom dropped away; we can see stuff on sonar on either side of us
				current is at our back, bottom is well beneath us now [framegrabber depth change =21m; 1683 to 1704m]
				looks like same steep grabben bounding fault
1930	15156	8136	1693	in a basin with bulb pillows, saw long tubes too; similar amt of sed dusting; same unit? Slope is coming up again
1932.75	15146	8195	1688	pillows, not much sed, is there less than at the last above-the-grabben wall site; bulb pillows, no ornam
1934	15140	8229	1684	1m across fissure running perpendicular to our trajectory
				second fissure, 2m across, then seeing some pillow fragments
1935.5	15131	8253	1680	gently upslope, bulbuous pillows, light sed dusting on top, some accumulation in pockets
1936.5	15129	8272	1677	big fissure coming up?, no, it's a shadow and we are down one HMI light, so it was a trick of the eye

				3/4 of the way to wp 10, rocks are consistent since the step and then driving up constructional slope uphil
	15127	8287	1680	sample 9: pillow crust, 20 cm long, into basket 5b
1944				we will head now to last wp (12) instead of continuing all the way to wp11, to give us one more grabben traverse
				heading 220, same pillows, fissure coming toward sub, it is going 45 to our heading (1 to 2 o'clock) = 270 for fissure heading, can see
1947	15112	8284	1679	elongated and bulb pillows, same sed dusting
				same pillows, but broken up pieces, too, another smaller fissure at same orientation, then a wall with truncated pillows in the face, but not as high of a jump up (~4m); there are bulb pillows on top, and then a 1m wide fissure 10m in from the face on top at same
1950	15070	8274	1690	orientation
				gentle rise off to port side, pillow tubes with some ornamentation; sonar shows a rise in front of us and also on stbd side; same sed
1952.5	15031	8253	1699	cover, now entering flattened lobates
				small slope in front of us, in same light sed pilows, a few broken pieces, some Mn coating; picking up softball sized fragments, drained
1955.5	15005	8219	1700	pillow tube
1958	15188	8182	1704	still down in this little depression, same level of freshness to pillows and lobes
				curtain folded and jumbled sheet in low point of grabben, a little broken up, same sed cover, curtain folds have come off but are sitting
1958.5				essentialy in place
				steep wall in front of us, some discussion of itf this is talus, but I see in tact pieces of curtain folded sheets
				sample 10 is from the in place folds of sheet into basket 7c; significant Mn on the sample, it was coming downslope in subheading
	14972	8154	1709	(=214); jumbled sheet = high effusion rate, locally at least
				underway at 220; left sample 10 spot, trying to go up the souther grabben-bounding fault again; still in curtain folded sheet, then
2007				transitioning into locally drained collapsed lobate
				hard reflection in sonar, Mike sees the wall, then me too: broken pillow frags, small pieces, can see truncagted ends of pilows in talus
2009	14951	8134	1705	ramp
2010.5	14940	8126	1692	now it is vertical, we are 15m off bottom in the back of the sub
2011	14941	8124	1691	24m up
2012	14943	8115	1684	at the crest, butt is still 21m off, pretty big step; lobate lavas, same sed, at the top; we are in the "spillway zone"
				in tact curtain folded sheet in front of us [framegrabber depth change =26m; 1683 to 1709m]
	14940	8114		sample 11 = 2 little pieces of curtain folded sheet into box 7d
2020				we used up our juice; leaving bottom from sample 11 spot
				end of vn620222.wma