

time	x	y	corrected x y	depth	Alvin Dive 4614 port side observations (observer = Ken Rubin)
					<i>important: X-Y values on the overlay were bad in the sub because the startpoint of the dive was not updated for the doplar nav, so all posiotions are incorrect. I have valculated offsets between usbl nav and bogus doplar nav at 15 minut intervals thru the dive. These are used to estimated "corrected" x-y-values = SEE "nav-offset.xls"</i>
1444	22700	8415	22481 7935	1691	7m off bottom; sedimented pillows, completely coalesced pockets, just tops of pillows stickingup, bulbuuous, breadcrust textures, not much ornam.
1500				1697	just finished sorting out computer/nav issues, will look for sample 1
1504	22727	8404	22508 7924	1697	sample 1 is a large pillow bud from a lobey pillow, in two pieces, into basket 7b
1507.5					heading to wp2
1509	22741	8378	22522 7898	1695	flattened pillows and lobate lavas, heavily sedimented, coalseced sed. pockets
1510.5	22747	8329	22528 7849	1695	step down 2m or so into ribbon folded sheet flow, similar sed cover near margin ? (no, there's less); this flow had a high effusion rate, jumbled to hackled texture, autobrecciated chunks on flow top; difficult to tell flow direction
1512	22747	8297	22528 7817		stopping for sample 2 ; sample 2 = 10-15 cm long chink of hackly sheet flow. Going into basket 7d
1516					underway to wp3, folds on sheets are more lineated; fracture head at 10 oclock to sub (WNW), now transitioning to hackly sheet; now I can see clearly that there is less sed cover here then first pillow lavas at landing site
1517.5					still seeing sheet flow; somewhat more sed cover here again; fissures of 10-20 cm wide back 2 minutes ago; flow has more sed cover where it is low relief, lineated sheets and less where it is curtain folded or hackly sheets.
1519	22797	8237	22578 7757	1698	
1519.5					still in sheet, just a little sed down in the pockets, flow top is easy to see; this is an extensive sheet, rather than a channel sheely lobates, low relief to seabed, same sed cover, plates of lobate crust and local collapses, this is the same unit that transitioned fromn sheets to lobates
1520.5	22835	8203	22616 7723	1699	small, 1m deep depression or rill between lobes; seeing some lobes but flow is predominantly sheets again
				1700	small local zone of lobate between sheets with a little more sed cover; can see sheets off to port; the map shows us exiting a small basin
1522.5	22865	8183	22646 7703		abrupt change into lightly sedimented, bulbuuous pillows, definite contact. Slope is up inb front of us;
1523.75	22873	8171	22654 7691	1698	These pillows are big, unornamented, sed in pockets; these look older than the sheet flow; this is a big pile of pilloows on this slope
1525	22891	8169	22672 7689	1698	sample 3 ; it was large so Mark broke it up to a 15 cm piece in to basket 3a (stbd-aft)
1532	22894	8169	22675 7689		heading to wp3 again on the same pillow slope; can see it on sonar continuing ahead of us
1533					pillows, moving up less steep slope, pillows are more squat/flattened, transitional to lobes, sed in pockets, semi-coalesced but not as much as sample 1 spot
					<i>end vn620291.wma</i>
1538					1m wide fissure on stbd side, running 11 o'clock we are going 111 (so heading is 90 to 100°); ground slope has flattened out, we are in lobates, fissure
1539.5	23045	8072	22826 7592		crossing deep fissure, 2m across, can see 5-6 m down into it; I can see truncated pillow and pillow lobes in it, we are still on the same unit up another contour since we came upon the pillow rampart after the sheet flow, so no reason to go all the way to WP3; same sed cover not coalseced pockets
					good view of the fissure as we turned around to go to wp4, it has a sinuous orientation - I see it now a 7 o'clock while we are heading 350, so that makes it about 180° (<i>but since we are turning and the overlay may not have been updated on the heading, I consider this orientation estimate to be flakey</i>)
1541.5	23044	8088	22825 7608	1688	turn is complete. Lobates, fissure running same orinetation as sub, 1m across, discontinuous
1543					1/2m wide fissure, then another at 15-20 cm wide, lobates still, moderate sed cover, pockets starting to coalesce.

1545	22960	8064	22741 7584	1691	heading 270, gentle rise to stb, but it is flat here, pillows transitional to lobates, seeing more pillowly texture, same sed cover
1546.5	22924	8051	22705 7571		broken-drained pillows and occasional pillow debris, flattened lobes, higher relief to see bed so somewhat less sed visible in pockets; slope starting to increase
1549.5	22868	8060	22649 7580	1696	heading to wp4, pillows are fairly elongate, oriented perpendicular to our direction (N flow direction)
1551	22798	8072	22579 7592	1697	heading 287, seeing pillows, same unit, some sed in pockets, slope coming up a bit, some breadcrumb texture but generally elongated direction, now flow direction is same as sub
1554	22724	8086	22505 7606	1692	pillows starting to flatten to lobes, same sed cover, occasional bulbous pillow too, heading 287 to wp4, which is on a mound
1555.5	22673	8094	22454 7614	1692	pillows again, same sed cover (dusting on top, sed in pockets), heading 280
1557	22645	8091	22426 7611	1689	going upslope, elongated. Breadcrumb pillows, no fissures, here.
1559	22600	8086	22381 7606	1683	transitioned into lobates, same unit, consistent sed cover
1600	22570	8082	22351 7602		broader lobes, platier sheets, but some lobey pillows off to port
1601	22519	8080	22300 7600	1682	flatter seabed, locally, lobates
1602.5	22504	8074	22285 7594	1680	seeing slope uptick, bulbous pillows, not much ornament., gentle slope in front of us on sonar
1604.5	22469	8080	22250 7600	1678	looking for sample 4 - tried at one spot without success, so moving a little bit
1615	22467	8086	22248 7606	1679	sample 4 into basket 3b, smallish piece of pillow crust < 10 cm long
1619					heading to wp5
1620.5	22449	8061	22230 7581	1677	lobey pillows, sed in pockets. Hard reflection on sonar off to stbd, skirting slope of mound of wp4
1622	22415	8008	22196 7528	1680	dropoff of gabben wall (depth at sub back before we went off; can't see the bottom (Matt and I thought the map was shifted north a bit, but in fact the problem was that we stopped getting fixes from the ship after sample 4, so our icon wasn't moving on the nav screen
1623.5	22402	7981	22183 7501	1691	25m off bottom
1624.75					approaching bottom, 5m off bottom, can see pillows, a chimney off to stbd
	22390	7958	22171 7478		extinct chimney, anenome growing on it, 4-5m tall, pillows at base
					pillows at base of N. Grabben fault, no talus at base as far as we can tell, Mark see's smaller chimlets, very close to the fault, pillows don't look much different than on top, can see orange-yellow h-therm sed locally in pockets
	22382	7953	22163 7473	1680	another chimney, much taller than the other one, 14 m tall, spire on top, chunky, wide cylindrical construct, narrow to a spire in top m or so, venting had been extensive in the past
	22372	7940	22153 7460	1687	7m off bottom but slope is coming up, seeing other small chimneys;
1632					end of tape 1, tape 2 start; slope coming up, mod sed pillows, some quite broken, others in tack, no debris, constructional slope, upholl
1635				1692	approaching bottom, were chimneys on a bench or step on the fault wall, since we are deeper now? [NO, since we were 14 m off bottom at top of tall chimney, and 1684+14 = 1694 for depth
1636	22283	7837	22048 7345	1694	slope is coming up; sed on pillows is similar, not much ornamentation, small bits of debris that spalled off, hard slope in front of us and to port, <i>NAV still not updating in sub</i>
1639.5	22262	7780	22027 7288		fissure, little step down, 4-5 m, then platform, then another drop off, <i>NAV just updated, we are actually SW or WP5, somehow we went over that WP5 mound we saw pillows and then the small step we went off of might be at the south end of that mound.</i>
1640	22245	7779	22010 7287	1698	dropping down for a sample, breadcrumb pillows, sed dusting on top, sed in pockets, much of the glass has spalled off pillows and sitting as debris next to them, otherwise the pillows look the same as just before the step, NEW FIXES are putting us in the depression NW of the WP6 mound
	22247	7779	22012 7287	1698	sample 5 is a large piece of pillow crust, 25cm long, 20cm wide into basket 6b
1646.75			-492		leaving sampling spot, heading to WP6, so we should go up slope

1648	22257	7765	22022	7273		going up fairly steep constructional pillow slope on NW side of wp6 mound
1649	22273	7748	22038	7256	1684	still coming upslope, flattened pillows and lobes, lots of spalled off glass on top of sed pockets, same sed cover as down in deep, dusting on tops, accumulation in pockets
1650						now we have true lobates, small collapse is visible to port, moderately broad lobes, 4-5m across, same lava unit, consistent sed cover
1652	22319	7703	22084	7211	1676	have come up 20m from the deep, lobates, somewhat smaller than 2 minutes ago, same sed
1653						close to wp6 (20-30m away) we have a slope break in front of us (steeper) we are in lobates trans to pillows, can see same sed cover, Mn crust is evident on lobes, going for a sample here before reaching the top of the mound
	22351	7682	22116	7190	1676	sample 6 in basket 6a (port-forward), 10-15 cm long lobate crust
1657.75	22381	7673	22146	7181	1673	moving again, wp6 mound is off to stbd, pillows beneath us, wide fissure off to stbd on sonar, must be approaching the fault
						<i>end vn620292.wma</i>
1701	22465	7661	22230	7169	1677	we've got the fault off to stb, can see pillows beneath us, slope is dropping off to port, same sed cover, we are travelling along the wall,
						11 m off in back, port can't see anything, stbd sees the wall, expect the ground to come back up as we traverse the divide between the wp6 and wp7 mounds
1703	22527	7662	22292	7170	1681	16m off bottom
1704.5						seeing bottom now, pillows and pillow debris, mostly constructional slope, same sed cover (a little less in pockets? or covered with debris?), platy pieces of rock, can still see wall on stbd
1706	22586	7651	22351	7159	1676	1/2 way up slope to wp7 mound, stopping for sample 7
1712						sample 7 went into basket 4a (misspoke on tape and said "sample 6")
1713.5	22598	7652	22363	7160	1670	depth is leveling off, lobey pillows, not terribly young surface, sea whip, sed dusting on top, broken pillow frags, plenty of Mn coating, gentle slope with pillows in front of me, pouring towards us, can see wall on stb on sonar
1716	22656	7656	22421	7164	1661	saw an extinct chimney edifice, squat, 2-3 m high, 4-5 m wide, second, similar chimney, seeing talus from the slope, fault is to stb, seeing orange sed in pockets, little bits of white stuff
	22682	7647	22447	7155		lots of orange sed at base of chimneys, large, 2m deep pit beneath us, lots of small h-therm edifices on ridge of it off to port
1718.5	22723	7650	22488	7158	1672	pinacle in sentry map must be extinct chimney in this field, we saw a number of extinct chimneys along the edge of a collapse or fissure just north of the main graben bounding fault, we've now seen then top of wp5 mound, will head off to wp8
1719.75	22733	7664	22498	7172	1664	still seeing orange h-thermal sed here but no h-therm edifices. Gentle rise off to port side.
1721	22754	7706	22519	7214	1666	slope is flattened out but small ridge is still off to port, there is whitish debris, shell fragments, dead mussel bed? Not a ton of frags but they are white shells
1724	22777	7779	22542	7287	1680	6m off bottom, downlooking cam, pillows, sed in pockets, looks like same unit, undulating topography, low mounds (1m), now approaching at 3m off
1725.5						can really see bottom now, we are 1m off, elongated pillow tubes, same sed cover (light, small pockets); very little debris here, in fact, constructional slope, a couple of drained pillows
1728						close to wp8, pillows, same sed cover as at wp7, constructional slope, going to get a sample
1732	22794	7835	22559	7343	1695	sample 8 (not described on voice recorder, but from my sample sheet notes....)
					1695	heading to new wp9 (skirting orig wp9), added new target ("wp17") at heading of about 135 from us now
1739	22888	7769	22653	7277	1691	mildly sed pillows coming out of v-shaped gully between mounds
1741	22920	7732			1685	slope starting to tick up a bit, heading 132, starting to come up to alvin target 17
1742.75						flat pillows transitional to lobes, some breadcrust pillows too, sed dusting on top, sed in pockets
1742	22950	7697	22715	7205	1675	quick transition into lobey pillows as we near the crest of the mound

1744	22974	7676	22739	7184	1675	collapsed lobate 2, 3-m m across, 2m deep, we are on a lobate surface, mostly not collapsed, topography on top of the mound is hummocky
1745.5	23002	7662			1675	somewhat less sed here, rocks are shattered, lobate plates, pieces scattered about in quasi in place position - autobrecciated flow surface, longer lobes off to port, small local collapses where top surfaces of flow have fallen 1/3m to form platy debris, Mark feels we are at the top of the mound
1747	23025	7652			1673	stopping on top of mound in lobates to pick up a sample (9)
1751	23027	7652	22792	7160	1673	sample 9 = 10-15 cm long piece of lobate crust into basket 4b, will head to wp 10 but nose around fault at grabben south end
1752						showing rest of lobate crust on video, we took a small piece of a large chunk, Mn and drips on the bottom
1754						going up slope, bits of collapsed lobate and more debris, not sure if this is the wall, collapsed lobate looks local, same sed cover
1755.5	23073	7613	22838	7121	1671	1m wide fissure running E-W, lobates, broken up, rubblyness to top, extinct chimney, small one, there's a series of them as we approach the trace of the fault, 1-2 m high extinct chimlets
1758	23108	7581	22873	7089	1666	more extinct chimlets as we nose around edge of seamount-cutting fault, lot of debris, crinoid or anemone, rocks are more jagged here but look like broken lobey pillows
1800						broken pillows, sed in pockets, 3m off bottom, chimlets just stopped we are south of the fault but saw NO STEP on fault, then as I was talking, fair amt of sed, mostly intact pillows now, breadcrust textures, not much ornament, elongated tubes running 2 o'clock to sub, we are heading 148 so they are 200°
1801.75	23183	7498	22948	7006		approaching northern most mound near wp10, pillows have similar sed cover (light dusting, sed in pockets, but not much), pillows are intact, not as much shattered, spalled off glass, but overall these look similar in sed cover; maybe say current is pushing us west
1804	23176	7446	22941	6954	1676	
1807	23121	7406	22886	6914	1676	sed age 1 to 1.5 pillows, breadcrust pillows, mounds are small features sticking up a few m above a pillow platform; we are heading 242, I can see elongated pillows heading downslope to port, perpendicular to our track, so heading is 150°
1808						still in pillows, nearing wp10 mound
	23099	7396	22864	6904	1675	almost at wp10 mound, good place for a sample, light sed dusting on top, Mn crust, little bit of small corals growing
1812						sample 10 is a piece of a pillow crust at wp10 mound
1813	23074	7396	22839	6904	1677	underway to wp 11, due west
1815	23016	7379	22781	6887		same pillows, heading 278
						pillows beneath us, gentle reflection on sonar off to port, lightly sedimented, flowing downslope with us, we are scooting sideways because of current
1817	22964	7379	22729	6887	1686	4m off bottom, still in pillows?, looking for a contact
1817.75	22947	7377	22712	6885	1692	lobates here, smooth transition, 4m off bottom still, probably a different unit or is the pedestal of the pillow cluster? But didn't see contact, sed in crevices between high parts, sed dusting on top, occasional bulbous pillows but mostly squat lobes
	22888	7409	22653	6917	1696	we are south of wp 11 in lobate pillows (transitional), similar sed age, is this the distal end of the towcam sheet flow province that is 50-100m south of here or part of the mounds? No obvious contact
1822	22888	7409	22653	6917	1696	fairly mixed morphology here; staring at a pillow in front of us, but I see flat lying lobate and a local bit of curtain folded sheet as well
1824	22894	7417	22659	6925	1698	sample 11 is a piece of jumbled sheet, 25 cm long by 10 cm into basket 5a (sample x-y from sheets)
1827	22894	7417	22659	6925	1698	sampling is over, tape 2 is done, tape 3 in starting; just south of wp11
	22899	7422	22664	6930		underway to wp12, back zig to mounds; we were at the edge of the sheet where we samples, now seeing sheets and collapsed lobate; lobates look like distal end of sheet; can see lineation in flow, it is going ESE

1831.5 1832	22930	7418	22695 6926	1696	pillows and squat lobey pilows, we are driving up flow direction (it is coming towards us', transitioned back into lobates
1832.5	22948	7378	22713 6886	1696	lobey pilows, coming up slope, same sed dusting, then abrupt transition to pillows, but no onbvous contac
1833.75	22957	7360	22722 6868	1689	encountered true pilows at nose of platform NW base of WP12 mound, coming up steeped slope now, can see elongated pillows now, no fissuing or debris, same sed cover
1835.5					we are on the pedestal, we went up a steep pillowed flow front and there are elongated pillows up on top, somewhat more sed than on slope, settling in for a sample, fighting current, parked against a pillow (not, julie and alice also sampled one of these mounds, so there are three samples now of this mounf complex
1836.5 1841.5	22994	7335	22759 6843	1682 1680	sample 12 = 20cm long pillow crust piece into basket 1a heading to wp13, heading 320 inb pillows, current is pushing us around a bit
1845.5	22927	7330	22692 6838		8m up, above lobates off base of mound
1848	22862	7333	22627 6841		lobates, small mound in front of us, heading west, lobates are collapsed here, mild sed accumulation in pockets
1848.5 1849	22848	7338	22613 6846	1687	curtain folded sheets - same mix as near wp 11
1850	22811	7352	22576 6860		transitioning back into lobates
1851.5 1853.5	22782	7351	22547 6859	1685	map shows up coming onto smallest bean shapped mound west of pillows, squat lobaes, a few bulb. pillows but mostly squat lobey pilows, same sed cover (dusting a nd light pockets)
					flat lobes at crest
					starting to run low on juice, lobate lavas on west side of mound, a few pillows on this side of coffee bean mound, just like on eastern side; going to grab a sample
1856	22723	7350	22488 6858	1692	sample 13 = 25 cm long piece of a lobate crust in basket 2
1859 1900	22696	7342	22461 6850	1693	heading 220 to wp 13 in lobates - sheet flow of tow cam is localized, this is mostly a lobate terair
1901.5	22665	7297	22430 6805	1691	lobates, gentle rise infront of us, Mark is jheading sub to lava blister on our path in sentry bathy
1903.5	22612	7291	22377 6799	1692	blister is a small lava push up structure/pressure ridge, or tumulus in lobate lavas, broader lobes here, same sed cover little bit of wall on stbd side, small fissure, looks like another tumulis, probably an eruptive fissure, since it is short and discontinuous, mostly flat lying lobes but a few flat pillow tubes, sed dusting on tops, accumulation in pockets, undulating topo, current is pushing us a bit south
1906	22567	7308	22332 6816	1690	same lobates, squat small lobes; heading 330, to go north a bit back to the center of the next low mound (wp 13) striations on lobes make it look like we are driving up flow, we transitioned into flat lobes and occasional ribbon fold, but basically few m accroiss broad lobes. this looks like we are going along an e-w trending fissure complex, bits of curtain folded sheet between the lobes
1909	22516	7352	22281 6860	1698	going to stop for a sample; we have come up onto pedestal of wp 13 mound, jumbled sheets and lobates, some autobrecciation, sed dusting is light, some Mn, sample 14 is a 15 cm long jumbl'd sheet flow frag. into basket 7a.
1913	22516	7370	22281 6878	1684	underway again; we are in lobates transitional to sheets, some swirls, is this an inflated sheet, going to grab 1 more sample almost at wp13; we are in a sheet flow, lineated and ribbon folded transitioning back and forth
1915	22477	7371	22242 6879	1679	sheet flow. small stucture in front of sub, looks like spatter and a volcanic vent complex at wp 13
1918 1924	22458	7364	22223 6872	1678	very jumbled up mnorphology, spatter, v-shapped cleft 1-1.5m deep, piled up aggluntiated lava around it. Unver topography ontop of mound, pieces of scoria are also present. Complex undulatiung topography, 1-2m ups and downs, clefts and piles up mounds of spatter.
					stopping for last sample. Sample 15 is a piece of spatter right from the top of wp13 mound into basket 7c
					full basket full of samples, missed final objective to see contact with the seamounts to the north, leaving the bottom
					<i>end of vn620293.wma</i>