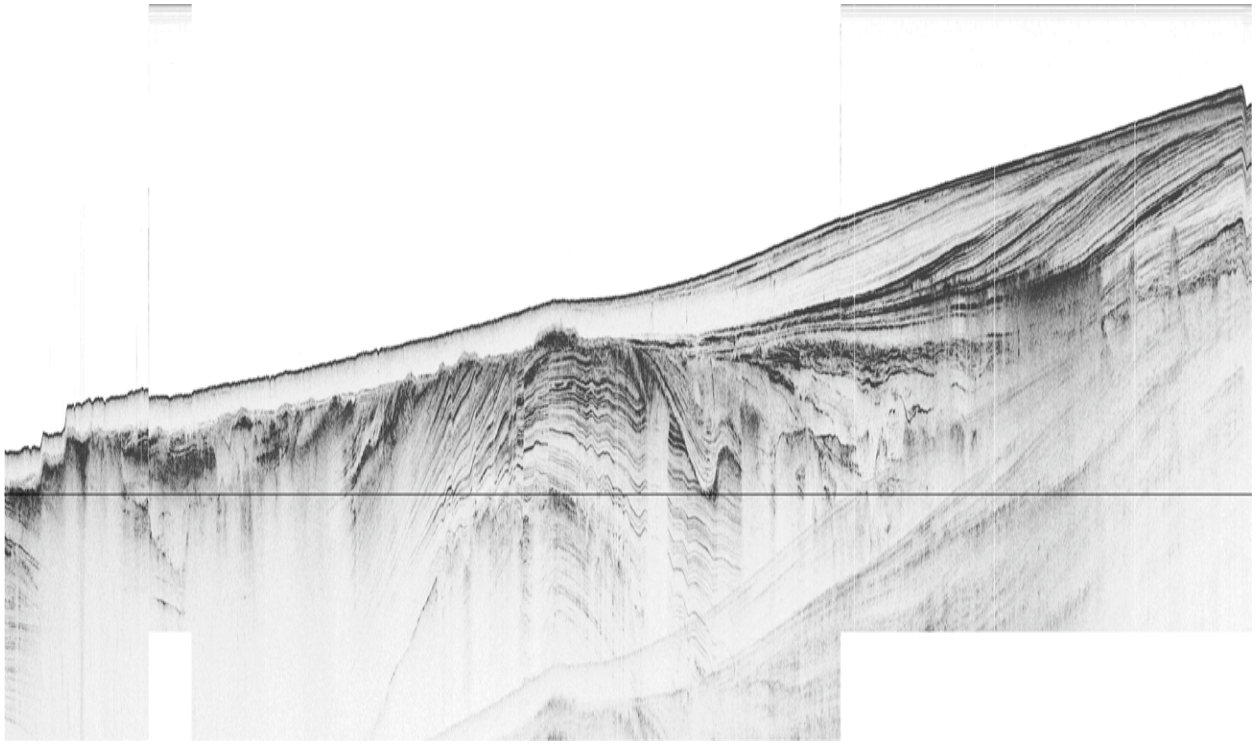
Cruise Report MV220402:
Clinoform Sequence Stratigraphy in a Modern Foreland

Co-Chief Scientists:

John Milliman
Neal Driscoll



Cruise Particpants

Cruise Participants MV220402

Jeff Babcock – Project Scientist, Scripps Institution of Oceanography, University of California, San Diego

Neal Driscoll – Professor, Scripps Institution of Oceanography, University of California, San Diego

Denise Elwood – Scripps Institution of Oceanography, University of California, San Diego volunteer

Rebecca Fenwick – Graduate Student, Scripps Institution of Oceanography, University of California, San Diego

Jenna Hill – Graduate Student, Scripps Institution of Oceanography, University of California, San Diego

John Milliman – Professor, College of William & Mary

Matt Niemitz – JOI Fellowship

Rudy Slingerland – Professor, Penn State University

John Walsh – Assistant Professor, East Carolina University

Preliminary Shipboard Results MV220402: Clinoform Sequence Stratigraphy in a Modern Foreland

Neal Driscoll, John Milliman, Rudy Slingerland, J. P. Walsh, Jeffrey Babcock

The MARGINS Source to Sink program in the Papua New Guinea foreland basin is providing a unique opportunity to determine the genesis and character of foreland stratigraphic sequences as a function of ice-house eustatic sea-level fluctuations, high sediment fluxes, and foreland-style tectonic subsidence.

Although our team is collecting data aboard the R/V Melville as we write this, we already have identified an apparent relationship between relative sea-level change and the genesis of the Gulf of Papua clinoform sequences. Preliminary analysis of 21 piston cores, 24 gravity cores, 1300 nmi of deep-towed CHIRP and more than 2500 nmi of hull-mounted CHIRP sub-bottom profiles in the southern Papua New Guinea foreland basin shows that this shelf is characterized by two distinct stratigraphic units: 1) a modern clinoform on the inner shelf thickening to the north and west whose topsets lie at approximately 20 m water depth and whose foresets extend down to 50-70 m, and 2) an older, as yet un-dated thick sequence of horizontal strata that underlies at least the lower portion of the foresets and extends seaward across the middle shelf (Fig. 1). We interpret this unit as an older clinoform. This unit has been dissected into cross-shelf trending channels separated by elongate topographic highs as first noted by Harris et al. (1996). The little modern sediment that mantles this eroded landscape lies mostly in the topographic lows.

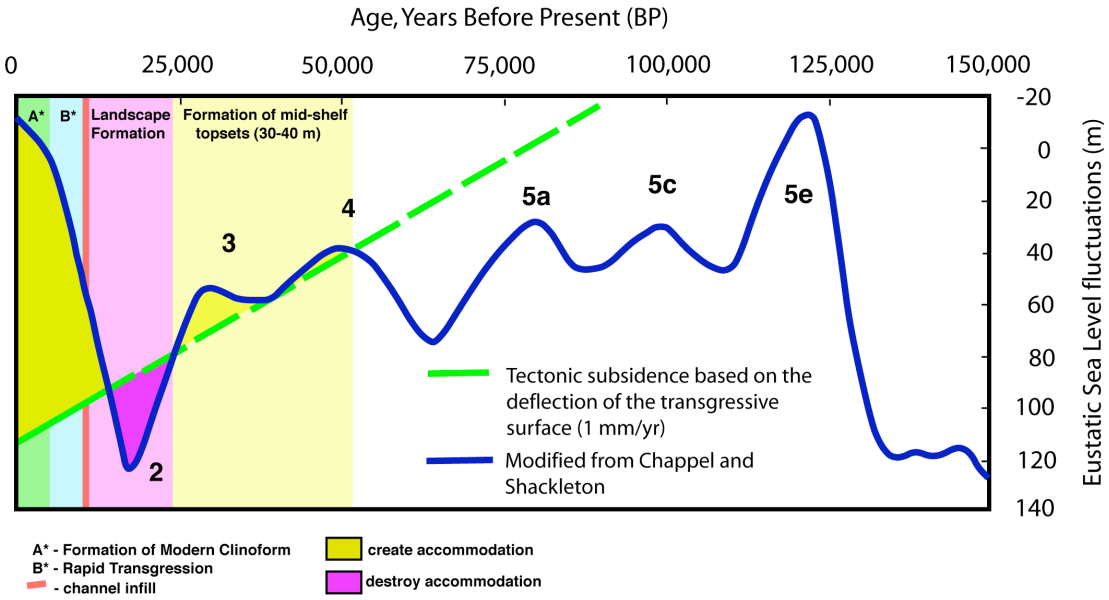


Figure 1. Conceptual sea level subsidence model illustrating clinoform development, erosion and redevelopment in the Gulf of Papua

Based on the configuration of the horizontal strata within the middle shelf clinoform, their stiff character when cored, and their present elevation, we deduce that the mid-shelf clinoform prograded two-thirds of the way across the pre-existing shelf in response to relative sea-level rise during stage 3 and possibly stage 4, when the rate of tectonic subsidence outpaced the rate of eustatic sea-level fall; the resulting newly created accommodation was roughly equal to the sediment input from the Fly, Kikori, Purari, and other coastal rivers. These may be the first stage-3 clinoforms reported from a continental shelf; topsets are 30-40 m thick. Deflection of the transgressive surface from horizontal yields a post-LGM differential subsidence of about 1 mm/yr from the peripheral bulge in the southwest to near the basin depocenter in the northeast. On the basis of the Chappel and Shackleton eustatic sea level curve, eustatic sea level fell from ~-40 to ~-80 m between 45,000 and 25,000 years BP. During this period, tectonic subsidence must have outpaced eustasy to create the observed 30-40 m of accommodation.

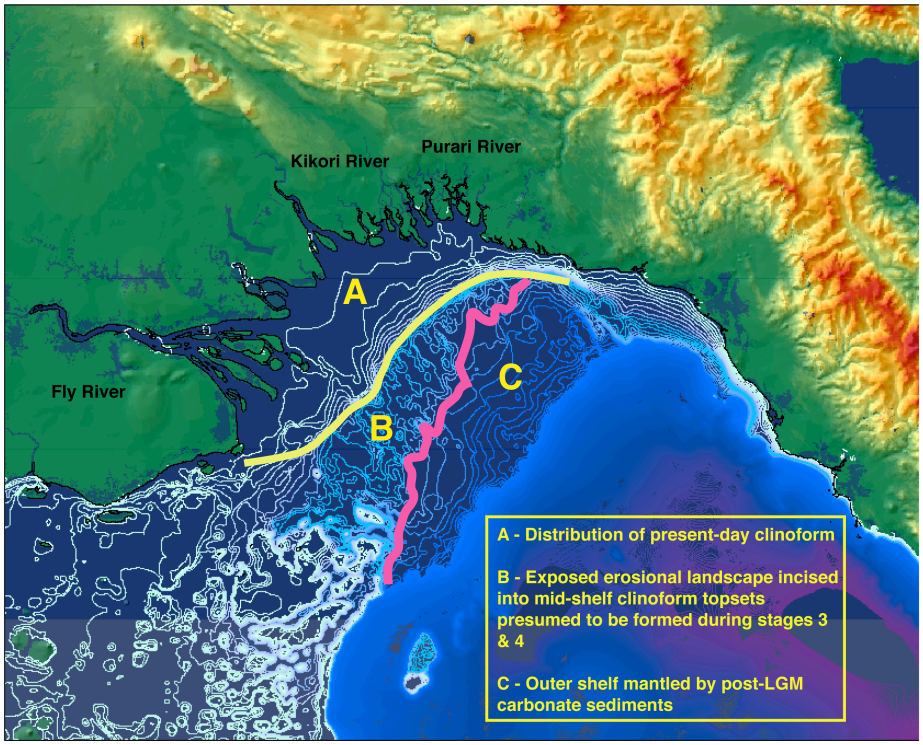


Figure 2. Gulf of Papua showing distribution of different morphologic provinces.

Without firm dates, however, we cannot negate the possibility that the topsets predate

stages 3 and 4, which thereby would require lower rates of tectonic subsidence to create the observed accommodation. Cut and filled channels within the topset sequence suggest short-term fluctuations in relative sea level, consistent with the Chappel and Shackleton sea-level curve.

The advent of Stage 2 resulted in a rapid eustatic fall commencing ~25,000 years BP that lowered sea level to -120 m, causing incision and headward erosion of streams across the topsets and seaward foresets. The consequent erosion created a

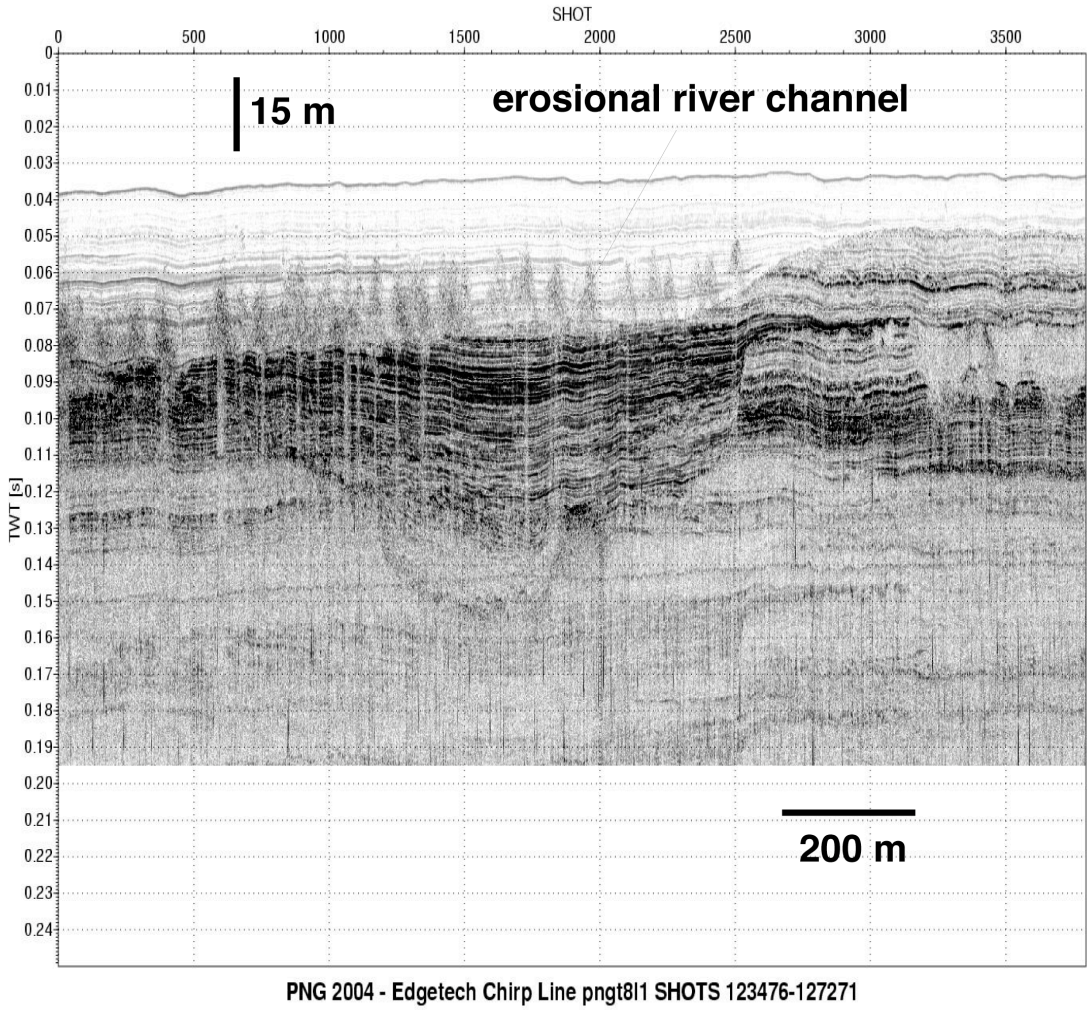


Figure 3. Chirp seismic line collected during our cruise MV220402 imaging the buried erosional landscape along the inner continental shelf

landscape with ~20-40 m of relief and a dendritic drainage pattern. As eustatic sea level rose from –120 to +3 m about 7,000 years BP, the former mid-shelf river channels within the river valley were partially filled, presumably by fluvial and estuarine facies. The transgression was so rapid, however, that the valleys themselves remained unfilled except for minimal input from eroding interfluves. During this rise the river mouths

backstepped landward, carbonate sediments began to be deposited on the outer shelf, blanketing the former alluvial plain. By 7,000 years BP the shoreline had migrated northwestward of its present position, although the precise location remains unknown. Sediment was sequestered close to shore, thereby preserving the drowned landscape that incised into the mid-shelf clinoform. From 7,000 years BP to present, sediment supply to the shelf exceeded the creation of new accommodation and the modern clinoform prograded seaward to its present position, progressively covering up the drowned landscape of the subjacent clinoform.

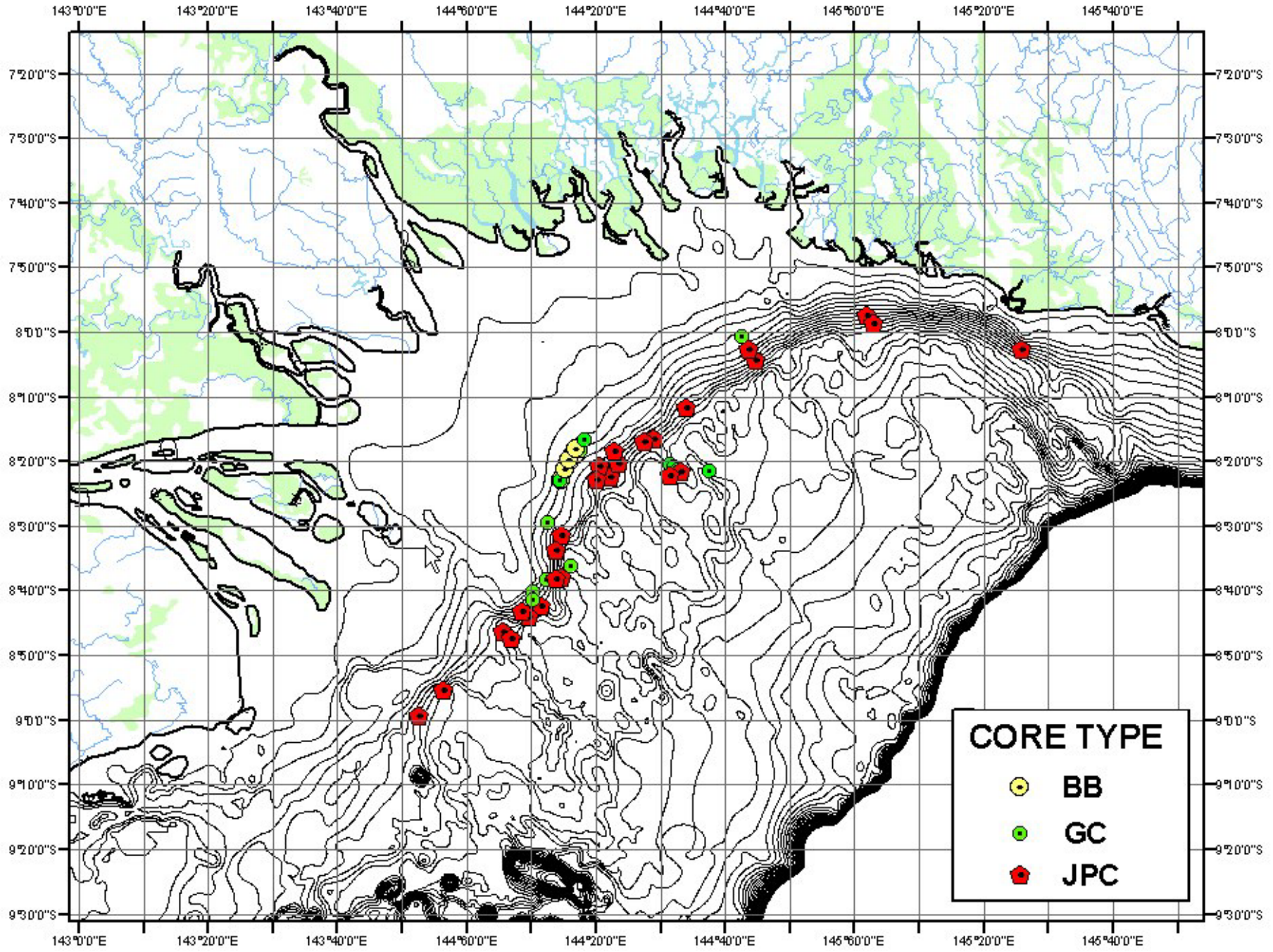
Our seismic profiles also provide evidence for the sediment transport processes that are building the modern clinoform. Much of the upper foreset sequence is composed of discrete sand/mud bars or lobes, which show a preponderance of northeast-dipping reflectors. These lobes appear to coalesce down the clinoform, presumably the result of downslope gravitational movement and along-slope smoothing by NE-flowing regional currents. Numerical modeling of circulation and sediment transport for the proposed paleogeographic configurations will help to test these ideas as will more detailed analysis of our piston and gravity cores co-registered with CHIRP profiles.

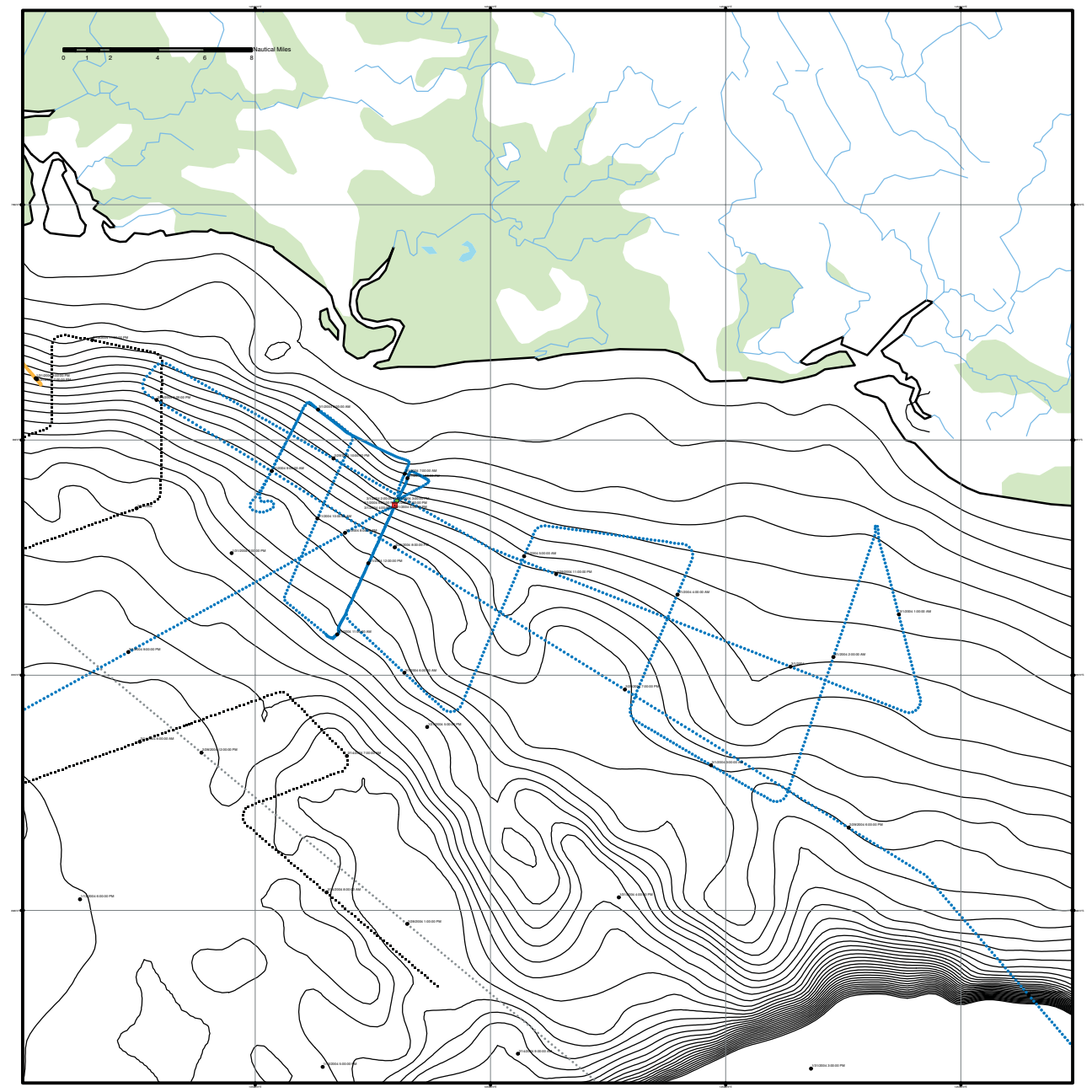
These preliminary observations suggest that tectonic subsidence typical of foreland basins can generate accommodation during ice-house eustatic sea-level falls. The asymmetry of ice-house sea-level fluctuations means that regressions average about 1 mm per year whereas transgressions can be an order of magnitude faster. Analysis of the sediment cores and dating of selected samples should provide evidence to support or modify this conceptual model.

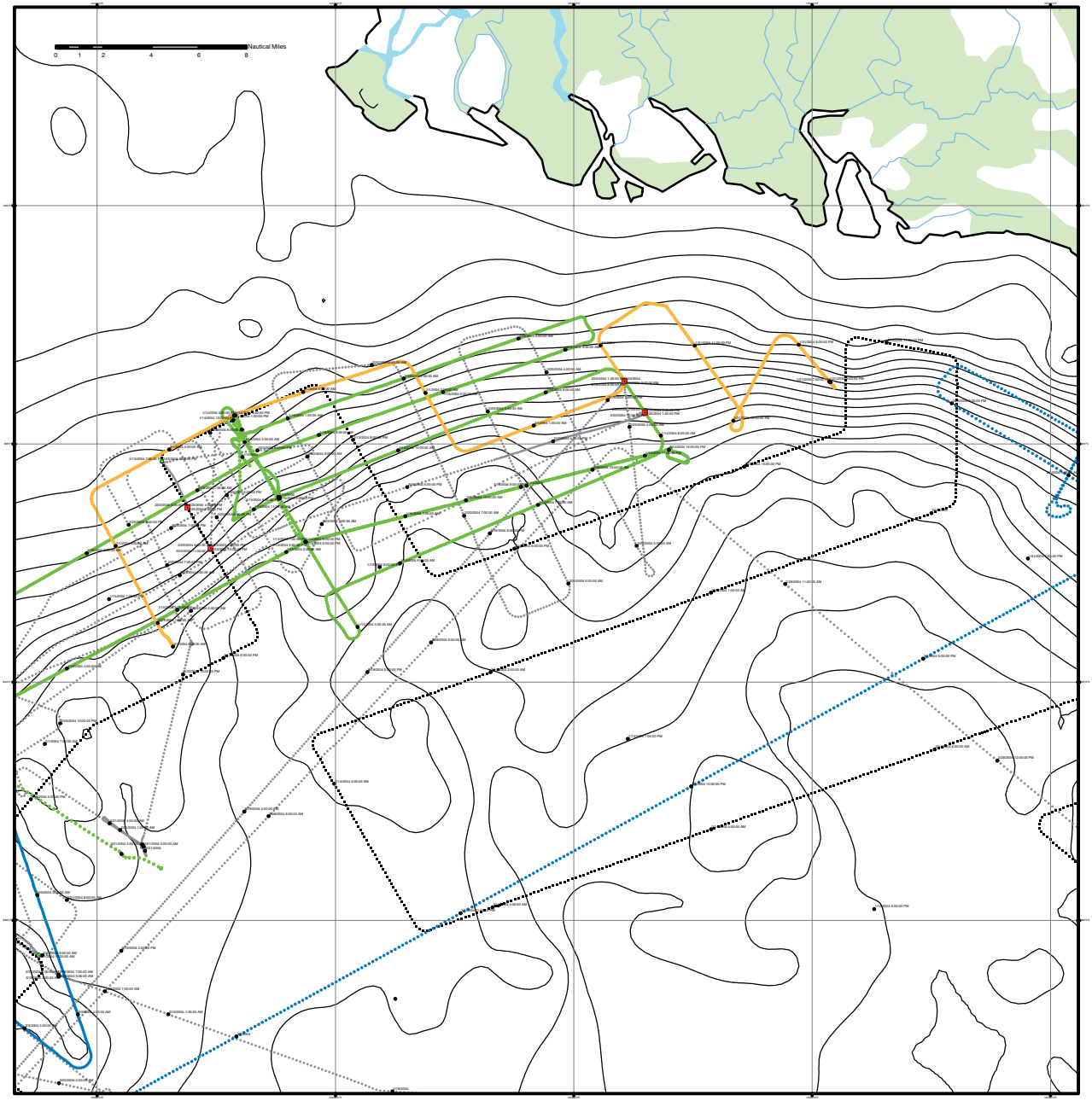
References

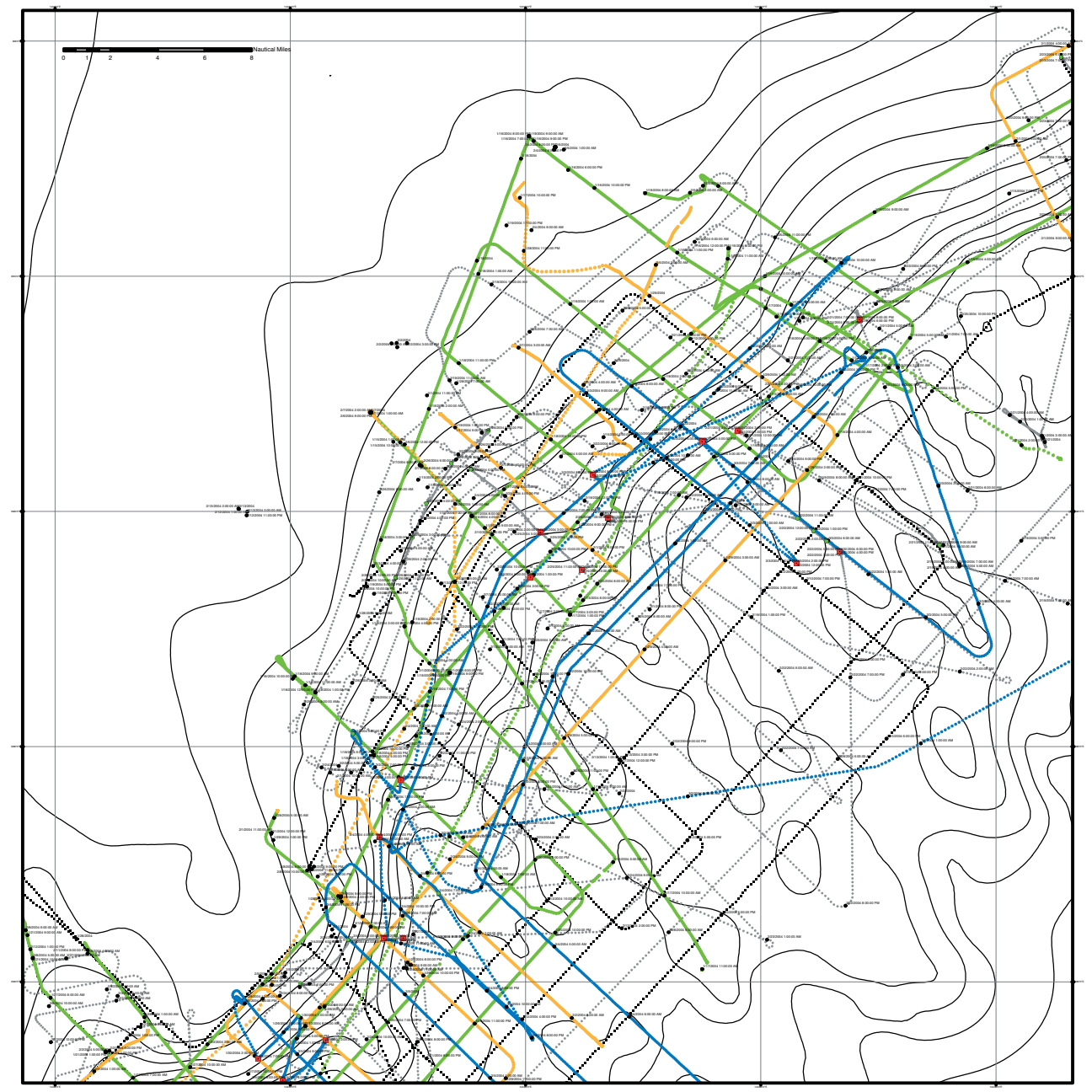
Harris, P. T., C. B. Pattiaratchi, J. B. Keene, R. W. Dalrymple, J. V. Gardner, E. K. Baker, A. R. Cole, D. Mitchell, P. Gibbs, and W. W. Schroeder, 1996, Late Quaternary deltaic and carbonate sedimentation in the Gulf of Papua foreland basin: Response to sealevel change. *Journal of Sedimentary Research*, 66:801-819.

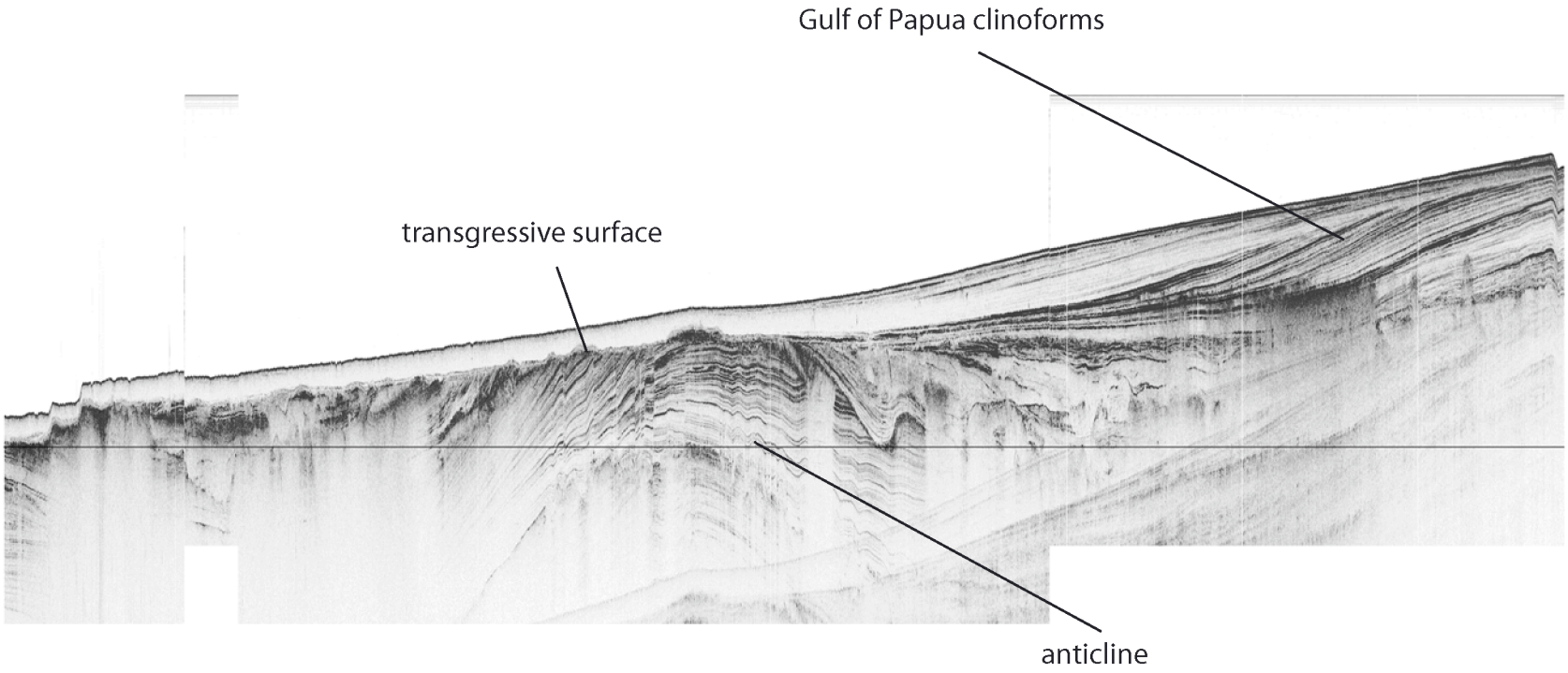
rv	cruise	leg	date	station #	core ID	observer	lat d launch	lat m launch	lat d bott	lat m bott	long d launch	long m launch	long d bott	long m bott	nav type	sampler type	t launch	t bott	t recov	d launch	d bott	d recov	w launch	w bott	w recov	scope	trigger	pin	act d	pinger	tension surf	tension trip	tension bott	tension max	tension asc	core length	TC type	remarks
Melville	MV22-0402	1	2/20/04 0:00	1	jpc01	jenna hill	-7.9564383	0	-7.956445		145.0352083		145.035238		3	2	1/0/00 0:00	1/0/00 0:04	1/0/00 0:33	53.9	53.9	54	-8	-40	20	24	38					5200	4937	12498	9500	30		there is no PC section I--miscalculation on 30' core, this section ended up being chopped off.
Melville	MV22-0402	1	2/20/04 0:00	2	JPC02	Jenna Hill	-7.97808	0	-7.9780683		145.0496917		145.049697		3	2	1/0/00 12:48	1/0/00 12:56	1/0/00 13:33	62.2	62.6	62	0	45	24	24	48					8800	4700	17399	10000	40		voids in core: top sec II - 12cm all sec III bot sec IV - 4 cm
Melville	mv22-0402	1	2/21/04 0:00	3	GC03	jenna hill	-8.3570167	0			144.6262667				3	4	1/0/00 9:20	1/0/00 9:25	1/0/00 9:30	75	75	75	7	72	0					650	325	1100	700	10		7 lead weights ~500lb core
Melville	mv22-0402	1	2/21/04 0:00	4	gc04	dale hubbard	-8.35707	0			144.62633				3	4	1/0/00 10:17	1/0/00 10:34		75.6			0							970		300	1423	860	10		replicate core from stn 3, for PNG folks. 9 lead wts on stand; wt = approx 625 lbs
Melville	mv22-0402	1	2/21/04 0:00	5	jpc05	jenna hill	-8.2761633	0	-8.2761633		144.4835583		144.483542		4	2	1/0/00 14:18	1/0/00 14:24	1/0/00 15:05	54.8	54.8	55	0	37	0	22	43					8900	6200	14700	11000	40		no section info
Melville	mv22-0402	1	2/21/04 0:00	6	JPC06	jenna hill	-8.1976933	0	-8.1976867		144.5696467		144.56964		4	2	1/0/00 18:32	1/0/00 18:38		55.2	55.1	55	0	37	0	22	48					9000	6000	14200	9500	40		
Melville	mv22-0402	1	2/22/04 0:00	7	gc07	jenna hill	-8.3383133	0			144.5258133				4	4	1/0/00 10:57	1/0/00 11:00	1/0/00 21:00	64.9	64.9	65	0	64	0							1000	154	1400	1000	10		12 lead weights + 750 lbs. Tension on bottom questionable.
Melville	mv22-0402	1	2/22/04 0:00	8	gc08	jenna hill	-8.3383217	0			144.525775				4	4	1/0/00 11:20	1/0/00 11:22	1/0/00 11:27	63.2	63.2	62	0	64	0							1000	150		1000	10		same location as gc07
Melville	mv22-0402	1	2/22/04 0:00	9	gc09	jenna hill	-8.3472283	0			144.5370567				4	4	1/0/00 12:18	1/0/00 12:22	1/0/00 12:30	69.4	69.7	69.7	5	70	5						1000		1860	1000	10		
Melville	mv22-0402	1	2/22/04 0:00	10	gc10	jenna hill	-8.347225	0	-8.3472317		144.53706		144.5371		4	4	1/0/00 12:41	1/0/00 12:44	1/0/00 12:52	69.4	69.4	69.4	5	71	5						1000	160			10		
Melville	mv22-0402	1	2/22/04 0:00	11	gc11	jenna hill	-8.3544967	0	-8.35448		144.5463		144.546328		4	4	1/0/00 13:30	1/0/00 13:33	1/0/00 13:40	67.1	67.1	67.1	5	73	5						1000	169	1700	1000	10		
Melville	mv22-0402	1	2/22/04 0:00	12	gc12	jenna hill	-8.3544485	0	-8.35436		144.5462783		144.546288		4	4	1/0/00 13:55	1/0/00 13:58	1/0/00 14:05	67.1	67.1	67.1	5	74	5						1000	200	1200	1200	10		pullout tension questionable. Same loc'n as gc11.
Melville	mv22-0402	1	2/22/04 0:00	13	jpc13	jenna hill	-8.36175	0	8.36175		144.5555433		144.555527		4	2	1/0/00 16:26	1/0/00 16:33		82.6	82.6	82.6	0	65	0	22	48					9000	4700		10000	40		voids: sec II 72.5 cm sec III,IV 216.5 cm void inside of X, at least 40 cm lower part of X got bagged
Melville	mv22-0402	1	2/23/04 0:00	14	jpc14	jenna hill	-8.0728583	0	-8.0728617		144.74644		144.746472		4	2	1/0/00 10:59	1/0/00 11:05	1/0/00 11:33	49.6	49.6	50	0	32	0	22	48					9000	6000	14200	10500	40		
Melville	MV22-0402	1	2/23/04 0:00	15	JPC15	Jenna Hill	-8	-2.6804	-8	-2.68	144	43.8199	144	43.8192	4	2	1/0/00 14:29	1/0/00 14:33		35.7	36.7	35.7	0	18	0	22	48					9000	5800	14900	9000	40		
Melville	MV22-0402	1	2/23/04 0:00	16	GC16	Jenna Hill	-8	-0.7146	-8	-0.712	144	42.7417	144	42.7382	4	4	1/0/00 17:06	1/0/00 17:08	1/0/00 17:14	23.3	23.3	23.3	5	22	5						1000	180	1115	1000	10		
Melville	MV22-0402	1	2/24/04 0:00	17	JPC17	J.P. Walsh	-8	-38.1086	-8	-38.11	144	14.8092	144	14.8095	4	2	1/0/00 13:17	1/0/00 13:23	1/0/00 13:54	58.6	58.2	58.6	-3	41	5	22	48					9058	6600	16700	9501	40		Void Sections 2 & 3 upper 92 cm of section 2 lower 39 cm of section 3
Melville	MV22-0402	1	2/24/04 0:00	18	GC18	Jenna Hill	-8	-38.1298	-8	-38.1361	144	13.9885	144	13.992	4	4	1/0/00 15:58	1/0/00 16:01	1/0/00 14:10	47.1	47.1	47.1	0	44	0						1000	175	1580	1000	10		
Melville	MV22-0402	1	2/24/04 0:00	19	GC19	J.P. Walsh	-8	-38.18	-8	-38.1825	144	12.47	144	12.4655	4	4	1/0/00 17:17	1/0/00 17:17	1/0/00 17:18	30.7	30.7	30.7	0	31	0						1000	180		1040	10		
Melville	MV22-0402	1	2/24/04 0:00	20	GC20	J.P. Walsh	-8	-40.02	-8	-40.0228	144	10.43	144	10.4346	4	4	1/0/00 18:23	1/0/00 18:24	1/0/00 18:27	23.2	23.2	23.2	0	24	0						1000	183	1540	1115	10		
Melville	MV22-0402	1	2/25/04 0:00	21	JPC21	J.P. Walsh	-8	-22.4818	-8	-22.4811	144	22.387	144	22.3903	4	2	1/0/00 10:38	1/0/00 10:42	1/0/00 11:12	52.8	52.5	52.5	0	35	0	22	48					8900	5028	13900	9550	40		
Melville	MV22-0402	1	2/24/04 0:00	22	JPC22	Jenna Hill	-8	-20.8893	-8	-20.89	144	20.6294	144	20.6298	4	2	1/0/00 14:05	1/0/00 14:10	1/0/00 14:25	41.1	41.1	41.1	0	23	0	22	48					10000	4600	15100	10000	40		
Melville	MV22-0402	1	2/25/04 0:00	23	GC23	Jenna Hill	-8	-18.2151	-8	-18.2158	144	17.8847	144	17.8855	4	4	1/0/00 16:41	1/0/00 16:42	1/0/00 16:49	23.9	23.9	23.9	0	24	0						1000	175	14800	1000	10		
Melville	MV22-0402	1	2/25/04 0:00	24	JPC24	Jenna Hill	-8	-20.3682	-8	-20.269	144	23.5081	144	23.5082	4	2	1/0/00 18:33	1/0/00 18:36		48.6	48.6	48.6	0	32	0	22	48					10000	4500	13800	4000	40		Bottom of TC Sec II lost a few centimeters
Melville	MV22-0402	1	2/26/04 0:00	25	BB25	Jenna Hill	-8	-22.8149	-8	-22.8148	144	14.4908	144	14.4916	4	3	1/0/00 11:34	1/0/00 11:37	1/0/00 11:39	17.1	17.1	17.1	0	13	0						8000	5500	9200		20		EMPTY
Melville	mv22-0402	1	2/26/04 0:00	26	BB26	jenna hill	-8	-22.8161	-8	-22.8145	144	14.4904	144	14.4907	4	3	1/0/00 12:39	1/0/00 12:41	1/0/00 12:45	17.1	17.1	17.1	0	0							8000	7500	8000	8000	20		empty!
Melville	mv22-0402	1	2/26/04 0:00	27	gc27	jenna hill	-8	-22.814	-8	-22.8137	144	14.4904	144	14.4905	4	4	1/0/00 13:30	1/0/00 13:31		17.2	17.2	17.2	0	14	0						1000	190	1000	1000	10		empty again--moving on to next station
Melville	mv22-0402	1	2/26/04 0:00	28	BB28	jenna hill	-8	-21.1238	-8	-21.1241	144	15.192	144	15.1939	4	3	1/0/00 14:39	1/0/00 14:42	1/0/00 14:47	21.5	21.5	21.5	0	15	0						8000	4800	8900	8500	20		
Melville	mv22-0402	1	2/26/04 0:00	29	BB29		-8	-19.6618	-8	-19.6623	144	15.7974	144	15.7974	4	3	1/0/00 16:33	1/0/00 16:38	1/0/00 16:43	23.1	23.1	23.1	0	23	0						8000	4700	9800	8300	20		
Melville	mv22-0402	1	2/26/04 0:00	30	BB30	jenna hill	-8	-17.6574	-8	-17.5576	144	16.8539	144	16.8517	4	3	1/0/00 18:17	1/0/00 18:20	1/0/00 18:25	22.5	22.5	22.5	0	22	0						8000	4700	10800	8500	20		
Melville	mv22-0402	1	2/26/04 0:00	31	gc31	jenna hill	-8	-16.566	############	-16.5662	144	18.417	144	18.4166	4	4	1/0/00 19:47	1/0/00 19:48	1/0/00 19:53	20.8	20.8	20.8	0	20	0						1000	179	1250	1000	10		lost few cms between sections I & II
Melville	mv22-0402	1		32	32	jenna hill								0																						skipped--mislabelled
Melville	mv22-0402	1		33	33	jenna hill								0																						skipped--mislabelled
Melville	mv22-0402	1	2/27/04 0:00	34	jpc34	jenna hill	-8	-46.4642	-8	-46.469	144	5.835	144	5.8342	4	2	1/0/00 13:18	1/0/00 13:35	1/0/00 13:49	52.6	52.9	52.9	0	35	0	22	58					10000	4700	23500	13000	50		40' of mud on outside of core barrel JPC cumulative lengths are bass-ackwards (i.e. from bottom-to-top rather than from top-to-bottom)
Melville	mv22-0402	1	2/27/04 0:00	35	jpc35	jenna hill	-8	-47.5013	-8	-47.5016	144	6.9551	144	6.9551	4	2	1/0/00 17:42	1/0/00 17:47		62.9	62.9	62.9	0	46	0	22	58					12000	7000	19200	13000	50		
Melville	mv22-0402	1	2/27/04 0:00	36	jpc36	jenna hill	-8	-47.5025	-8	-47.5029	144	6.9555	144	6.9561	4	2	1/0/00 20:35	1/0/00 20:40		63.6	63	63				22	58					12000	7000	21400	14000	50		same site as jpc35
Melville	MV22-0402	1	3/1/04 0:00	37	GC37	Jenna Hill	-8	-2.5884	-8	-2.5844	145	26.0403	145	26.0337	4	4	1/0/00 2:38	1/0/00 2:39	1/0/00 2:47	35.7	35.7	35.7	0	34	0						1000	175	15700	1000	10		very top of section! fell on deck and was replaced back into core
Melville	MV22-0402	II	3/1/04 0:00	38	JPC38	Jenna Hill	-8	-2.7813	-8	-2.7807	145	25.9449	145	25.9441	4	2	1/0/00 17:52	1/0/00 17:54		38.4	38.4	38.4	0	20	0	22	58					12000	8000	18400	14000	50		42ft of mud on outside of barrel Void in secs V,VI, and part of IV and VII 12 sections
Melville	MV22-0402	II	3/2/04 0:00	39	JPC39	Jenna Hill	-8	-22.7926	-8	-22.7931	144	20.2088	144	20.209	4	2	1/0/00 12:43	1/0/00 12:47		49.8	49.8	49.8	0	32	0	22	58					12000	7600	19100	14000	50		45 ft of mud on outside of barrel 10 full sections, no mud in upper 3 sections C. Moser wonders if water is seeping through liner joints... will try taping
Melville	MV22-0402	II	3/2/04 0:00	40	JPC40	Jennna Hill	-8	-31.4083	-8	-31.4041	144	14.7139	144	14.7091	4	2	1/0/00 15:43	1/0/00 15:45		43.6	43.6	43.6	0	26	0	22	58					12000	9000	19700	12000	50		just under 45ft of mud on outside of barrel 12 sections, no voids (sec I and XII are short)
Melville	MV22-0402	II	3/2/04 0:00	41	GC41	Jenna Hill	-8	-29.4287	-8	-29.4288	144	12.6795	144	12.6793	4	4	1/0/00 18:21	1/0/00 18:22		29.3	29.3	29.3	0	29	9						1000	178	1350	1000	10		
Melville	MV22-0402	II	3/3/04 0:00	42	JPC42	Jenna Hill	-8	-22.1995	-8	-22.1994	144	31.5018	144	31.5038	4	2	1/0/00 12:06	1/0/00 12:11		64.7	64.9	64.7	0	47	0	22	58					12000	7000	19000	14000	50		not at planned site voids: sec V, VI and 1/2 of VII clump of mud in sec XIII placed into section XII
Melville	MV22-0402	II	3/3/04 0:00	43	JPC43	Jenna Hill	-8	-17.0302	-8	-17.0297	144	27.4928	144	27.4946	4	2	1/0/00 15:45	1/0/00 15:47		50.8	50.8	50.8	0	32	0	22	58					12000	7600	18500	14000	50		46ft of mud on outside of barrel upper 3 sections empty
Melville	MV22-0402	II	3/3/04 0:00	44	JPC44	Jenna Hill	-8	-18.4502	-8	-18.4496	144	22.857	144	22.8653	4	2	1/0/00 19:14	1/0/00 19:17		38.6	38.6	38.6	0	22	0	22	58					12000	7600	17000	14000	50		
Melville	MV22-0402	II	3/4/04 0:00	45	JPC45	Jenna Hill	-8	-38.1298	-8	-38.129	144	13.992	144	13.9916	4	2	1/0/00 12:33	1/0/00 12:38	1/0/00 12:54	47.5	47		0	30	0	22	58					12000	7600	19500	13000	50		very gassy 7 in popped out of bottom of sec IV (was bagged) 7 in popped out between sec VIII and IX (two bags) mud 45ft up outside of barrel void in part of IX
Melville	MV22-0402	II	3/4/04 0:00	46	JPC46	Jenna Hill	-8	-33.8253	-8	-33.8261	144	13.816	144	13.8187	4	2	1/0/00 16:26	1/0/00 16:29		45.2	44.6	45	0	27	0	22	58					12000	7600	19400	12000	50		mud 43ft up on outside of barrel
Melville	MV22-0402	II	3/4/04 0:00	47	GC47	Jenna Hill	-8	-36.2106	-8	-36.2125	144	16.3054	144	16.3082	4	4	1/0/00 18:43	1/0/00 18:47	1/0/00 18:52	63.5	65.5	65	0	63	0						1000	400	1700	1000	10		
Melville	MV22-0402	II	3/5/04 0:00	48	JPC48	Jenna Hill	-8	-42.4391	-8	-42.4386	144	11.5229	144	11.5204	4	2	1/0/00 12:41	1/0/00 12:44		45.1	44.8		0	27		22	58					12000	7800	19500	14000	50		13 sections, void between VII and VII
Melville	MV22-0402	II	3/5/04 0:00	49	JPC49	Jenna Hill	-8	-44.1455	-8	-44.1476	144	9.7032	144	9.7016	4	2	1/0/00 16:35	1/0/00 16:33		49.4	49.6	49.6	0	31	0	22	58					12000	7600	17500	14000	50		Section VII disturbed
Melville	MV22-0402	II	3/5/04 0:00	50	GC50	Jenna Hill	-8	-41.4156	-8	-41.4183	144	10.3672	144	10.3665	4	4	1/0/00 17:31	1/0/00 17:33	1/0/00 17:39	28.9	28.9	28.6	0	29	0						1000	200		1000	10		
Melville	MV22-0402	II	3/5/04 0:00	51	JPC51	Jenna Hill	-8	-43.2382	-8	-43.2377	144	8.6451	144	8.6449	4	4	1/0/00 18:36	1/0/00 18:38	1/0/00 18:43	30.1	30.3	29.9	0	31	0						1000	175	1435	1000	10		
Melville	MV22-0402	II	3/6/04 0:00	52	JPC52	Jenna Hill	-8	-54.7633	-8	-54.7641	145	57.2443	145	57.244	4	2	1/0/00 11:07	1/0/00 11:11		60.8	60		0	41	0	22	58					12000	7800			50		void in section!V, part of IV disturbed section!VI (sand washout reconstructed)
Melville	MV22-0402	II	3/6/04 0:00	53	JPC53	Jenna Hill	-8	-55.4117	-8	-55.4124	143	56.3859	143	56.3855	4	2	1/0/00 13:16	1/0/00 13:19		55.8	56.3	55.8	0	37	0	22	58					12000	7600	17200		50		sec V and VII disturbed (sand washouts) sec VI void
Melville	MV22-0402	II	3/6/04 0:00	54	JPC54	Jenna Hill	-8	-59.9088	-8	-59.5097	143	52.6161	143	52.6151	4	2	1/0/00 16:02	1/0/00 16:05		45.9	45.7	45.7	0	29	0	22	58					12000	6000	18700	13500	50		


143°0'0"E
143°20'0"E
143°40'0"E
144°60'0"E
144°20'0"E
144°40'0"E
145°60'0"E
145°20'0"E
145°40'0"E
7°20'0"S
7°30'0"S
7°40'0"S
7°50'0"S
8°0'0"S
8°10'0"S
8°20'0"S
8°30'0"S
8°40'0"S
8°50'0"S
9°0'0"S
9°10'0"S
9°20'0"S
9°30'0"S
CORE TYPE
BB
GC
JPC


0 1 2 4 6 8
Nautical Miles


Nautical Miles
0 1 2 4 6 8


Nautical Miles
0
1
2
4
6
8



Chirp seismic profile across the Northern Gulf of Papua illustrating clinoform development along the margin. The Gulf of Papua is an actively deforming foreland basin with up to 1-2 mm/yr differential subsidence. Note the prominent anticline and high-angle faulting in this region.