

Supplementary file to: **Sedimentology of Lower Pliocene to Upper Pleistocene diamictons from IODP Site U1358, Wilkes Land margin, and implications for East Antarctic Ice Sheet dynamics**

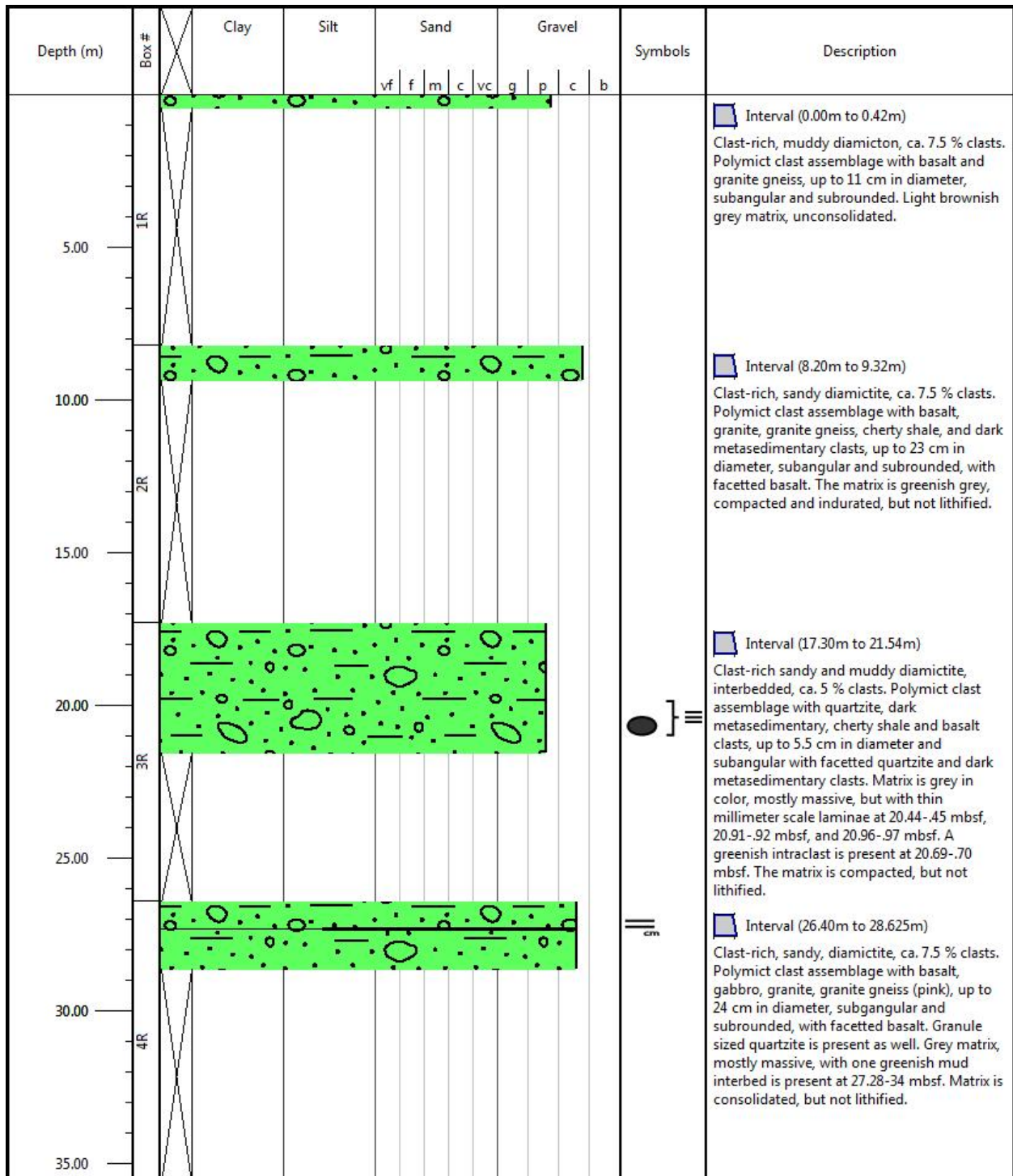


Figure S1. Visual core description for Hole U1358B (Expedition 318 Scientists 2011).

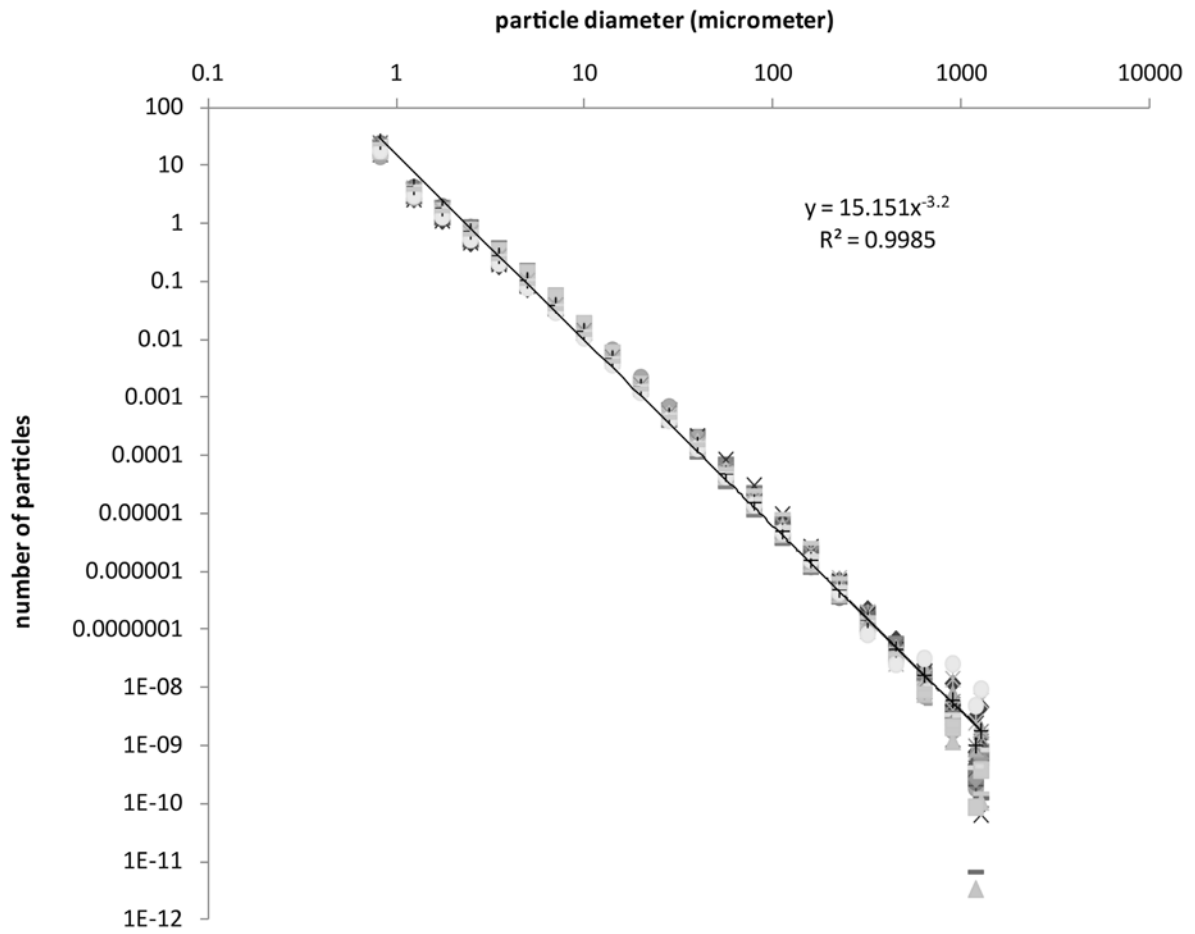


Figure S2. Fractal distributions (slopes of trend lines on log-log plot) for diamictons in IODP Hole U1358B.

Site	Top depth (mbsf)	Sample ID	Ba (ppm)	Cr (ppm)	Ni (ppm)	Sc (pmm)	Sr (pmm)	V (pmm)	Y (pmm)	Zr343 (pmm)
U1358	8.43	2R1_15_17	669.19	66.28	28.38	12.00	180.43	84.75	31.03	263.42
U1358	9.03	2R1_83_85	626.56	46.32	20.23	9.23	152.31	63.45	24.51	300.09
U1358	9.25	2RCC_12_14	637.00	59.81	28.88	11.23	173.91	76.40	28.22	209.32
U1358	17.4	3R1_10_12	598.04	58.84	26.87	11.13	163.64	73.75	26.59	201.28
U1358	18.3	3R1_100_102	659.85	67.47	27.95	12.58	178.59	86.29	30.23	221.67
U1358	18.76	3R1_146_148	587.65	55.21	27.45	11.46	163.43	73.44	26.58	234.68
U1358	18.89	3R2_10_12	575.89	59.11	22.79	11.65	156.48	77.21	27.80	240.53
U1358	19.27	3R2_48_50	625.85	62.10	25.40	12.04	169.66	79.64	28.36	224.15
U1358	19.79	3R2_100_102	664.13	65.61	33.31	12.81	177.23	93.50	35.10	219.83
U1358	20.27	3R2_148_150	677.92	73.07	40.14	13.27	175.35	91.20	29.52	211.08
U1358	20.37	3R3_8_10	686.15	73.53	38.05	14.17	172.09	102.76	29.04	216.36
U1358	20.79	3R3_50_52	640.39	66.61	32.90	12.78	172.39	84.91	30.00	219.45
U1358	21.26	3R3_97_99	661.35	68.34	34.99	13.27	176.87	95.78	29.39	216.09
U1358	21.44	3RCC_10_12	658.17	62.81	27.14	13.05	172.22	83.01	28.46	226.01
U1358	26.66	4R1_26_28	643.75	68.04	27.73	13.61	174.31	87.24	29.85	217.29
U1358	26.94	4R1_54_56	645.98	63.88	36.52	12.27	172.91	82.21	29.08	219.51
U1358	27.28	4R1W 88/90	835.52	78.59	33.15	17.03	218.01	103.49	36.74	185.73
U1358	27.4	4R1W 100/102	808.11	76.50	33.79	15.21	215.19	104.76	39.23	214.06
U1358	27.64	4R2_4_6	623.28	63.90	26.69	13.02	165.46	89.00	28.97	229.19
U1358	28.54	4R_CC_17_19	520.60	59.88	28.16	12.44	152.34	82.75	28.06	251.29

Table S1. Trace elements measured via ICP-OES for samples from IODP Site U1358.

Site	Top depth (mbsf)	Sample ID	SiO2	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5
U1358	8.43	2r1w 15/17	70.81	0.63	13.15	4.99	0.08	2.24	2.15	2.30	3.47	0.18
U1358	9.03	2r1w83/85	78.06	0.49	10.11	3.34	0.05	1.57	1.61	2.05	2.57	0.15
U1358	9.25	2r-cc-12/14	70.61	0.60	13.04	4.88	0.08	2.41	2.33	2.47	3.41	0.18
U1358	17.4	3r1w 10/12	69.71	0.62	13.36	5.15	0.08	2.55	2.56	2.21	3.58	0.18
U1358	18.3	3r1w 100/102	68.32	0.64	13.73	5.45	0.09	2.75	2.82	2.37	3.66	0.18
U1358	18.76	3r1w 146/148	69.11	0.62	13.32	5.09	0.09	2.65	3.05	2.44	3.46	0.18
U1358	18.89	3r2w 10/12	68.44	0.64	13.48	5.33	0.09	2.78	2.97	2.49	3.60	0.18
U1358	19.27	3r2w 48/50	68.91	0.61	13.45	5.19	0.09	2.65	2.93	2.50	3.49	0.17
U1358	19.79	3r2w 100/102	68.21	0.64	13.73	5.47	0.10	2.80	2.93	2.34	3.60	0.18
U1358	20.27	3r2w 148/150	67.63	0.65	13.93	5.66	0.10	2.90	2.89	2.34	3.72	0.17
U1358	20.37	3r3w 8/10	67.19	0.66	14.16	5.87	0.10	3.02	2.83	2.23	3.77	0.17
U1358	20.79	3r3w 50/52	67.89	0.65	13.77	5.55	0.09	2.84	2.90	2.45	3.67	0.18
U1358	21.26	3r3w 97/99	67.94	0.64	13.82	5.45	0.09	2.82	2.92	2.54	3.61	0.17
U1358	21.44	3r-cc-10/12	68.87	0.63	13.73	5.28	0.08	2.51	2.62	2.54	3.56	0.17
U1358	26.66	4r1w 26/28	68.62	0.64	13.70	5.42	0.09	2.72	2.66	2.33	3.64	0.18
U1358	26.94	4r1w-54/56	69.02	0.64	13.53	5.31	0.08	2.58	2.60	2.45	3.61	0.18
U1358	27.28	4R1W 88/90	68.94	0.62	13.39	5.29	0.09	2.63	2.98	2.22	3.62	0.22
U1358	27.4	4R1W 100/102	69.98	0.60	13.09	5.02	0.09	2.45	2.91	2.16	3.49	0.21
U1358	27.64	4r2w 4/6	68.88	0.63	13.71	5.36	0.09	2.74	2.53	2.26	3.62	0.18
U1358	28.54	4r-cc-17/19	68.96	0.60	12.67	4.91	0.09	2.66	3.84	2.80	3.29	0.17

Table S2. Major elements measured via ICP-OES for samples from IODP Site U1358.

Petrological Assemblage	Rock type	Protolith	Source terrain	Minerals
1	metamorphic: prehnite-pumpellyite greenschist facies	mafic-intermediate igneous/granodioritic	Bowers Terrane	kaersutite, stilpnomelane, ilmenite, rutile, sphene, magnetite, piemontite, garnet, pumpellyite, labradorite, orthoclase, zeolite, fluorapatite, muscovite/illite, allanite, ulvospinel
2	metamorphic: amphibolite facies	mafic igneous	metagranitoids Commonwealth Bay	actinolite, hornblende, garnet, fluorapatite
3	metamorphic: amphibolite facies	mafic igneous	metabasalts of Commonwealth Bay	cumingtonite, gedrite, magnetite, albite, labradorite, hornblende, stilpnomelane, garnet, augite
4	metamorphic: amphibolite facies	mafic/ultramafic igneous	metabasalts of Commonwealth Bay	anthophyllite, augite, hornblende, magnetite, labradorite, muscovite/illite
5	igneous: type A	mafic-intermediate igneous	Oates Land Granodiorite/Ferrar Group	magnetite, ilmenite, rutile
6	igneous: type B	mafic-intermediate igneous	Oates Land Granodiorite/Ferrar Group	pigeonite/orthopyroxene, pyrite, orthoclase, albite
7	metapelitic: staurolite zone (amphibolite facies)	pelitic sediments	Garnet Point/Cape Gray	albite, staurolite, magnetite, ilmenite
8	metapelitic: sillimanite zone (amphibolite/granulite facies)	pelitic sediments	Garnet Point/Cape Gray	sillimanite/andalusite/kyanite, garnet, muscovite/illite, magnetite, stilpnomelane
9	metamorphic: tremolite zone	limestone/dolostone	Garnet Point, Bowers Terrane	dolomite, ankerite, calcite, magnetite, tremolite

Table S3. Source rock types, protoliths and source terrains of petrological assemblages and rock fragments detected by scanning electron microscope (SEM) electron dispersive spectroscopy (EDS) in samples from IODP Site U1358. Orthoclase, albite and labradorite refer to feldspars present in heavy mineral rock fragments. Location names are indicated in Figures 1 and 6 of the main text.

Diatom datums Hole U1358B:	Age (Ma)	Top (cm)	Bottom (cm)	Top (mbsf)	Bottom (mbsf)
FO <i>Thalassiosira antarctica</i>	0.61	1R-1, 0	1R-CC	0.00	0.42
FO <i>Fragilariopsis rhombica</i>	1.41	1R-1, 0	1R-CC	0.00	0.42
FO <i>Fragilariopsis separanda</i>	1.41	1R-1, 0	1R-CC	0.00	0.42
FO <i>Shionodiscus gracilis var. gracilis</i>	1.87	1R-1, 0	1R-CC	0.00	0.42
FO <i>Fragilariopsis kerguelensis</i>	2.29	1R-1, 0	1R-CC	0.00	0.42
FO <i>Actinocyclus actinochilus</i>	2.77	1R-1, 0	1R-CC	0.00	0.42
FO <i>Fragilariopsis ritscheri</i>	2.85	1R-1, 0	1R-CC	0.00	0.42
FO <i>Fragilariopsis curta</i>	3.56	1R-1, 0	1R-CC	0.00	0.42
FO <i>Thalassiosira lentiginosa</i>	3.99	1R-1, 0	1R-CC	0.00	0.42
LO <i>Thalassiosira torokina</i>	2.24	1R-CC	2R-CC	0.42	9.32
LO <i>Thalassiosira insigna</i>	2.48	1R-CC	2R-CC	0.42	9.32
LO <i>Thalassiosira inura</i>	2.54	1R-CC	2R-CC	0.42	9.32
FO <i>Thalassiosira insigna</i>	3.25	3R-CC	4R-1, 92	21.54	27.32
FO <i>Thalassiosira inura</i>	4.74	4R-1, 92	4R-CC	27.32	28.62
FO <i>Thalassiosira torokina</i>	7.23	4R-CC	4R-CC	28.62	28.62

Table S4. Diatom datums for Hole U1358B (Expedition 318 Scientists 2011). The presence of *Thalassiosira insigna* was not confirmed during post-cruise analyses and is removed from the age model due to likely misidentification during onboard analysis (Masao Iwai pers. comm. 2013).