

## 5. DATA REPORT: ICE-RAFTED DEBRIS OF THE PLIOCENE PORTION OF ODP SITE 1092<sup>1</sup>

L. Murphy<sup>2</sup> and D.A. Warnke<sup>2</sup>

### INTRODUCTION

In the following report, we describe the methodology employed to generate the ice-rafted debris (IRD) data for Murphy et al. (in press) followed by the pertinent data set. Raw data files can be obtained from the corresponding author.

### METHODS

Procedures and techniques were those followed by Allen and Warnke (1991) and Stanton (1997). The coarse-grained fractions (150  $\mu\text{m}$ –2 mm) were split repeatedly until a split with a total of about 500 grains (or more) was achieved. The number of splits was recorded, and the final split was examined under the binocular microscope and point counted. Point-counting categories were quartz, feldspars, mafic minerals, volcanic ash/glass, lithic fragments, diatoms, benthic foraminifers, planktonic foraminifers, radiolarians, and “other”. Quartz, feldspars, mafic minerals, and lithic fragments were considered to be IRD. Volcanic ash/glass was not counted as IRD because it did not necessarily reach the drill site by icebergs.

After the samples are counted, the following indices were calculated: volume percent IRD, milligrams per gram, number of IRD grains per gram of total sample, and the IRD index. The ratio of IRD grains over all grains in the split determines the volume percent of IRD in the fraction. The volume percent of IRD multiplied by the weight of the fraction produces a value for the minimum weight of the IRD in the sample; mini-

<sup>1</sup>Murphy, L., and Warnke, D.A., 2002. Data report: Ice-rafted debris of the Pliocene portion of ODP Site 1092. *In* Gersonde, R., Hodell, D.A., and Blum, P. (Eds.), *Proc. ODP, Sci. Results*, 177, 1–6 [Online]. Available from World Wide Web: <[http://www-odp.tamu.edu/publications/177\\_SR/VOLUME/CHAPTERS/SR177\\_05.PDF](http://www-odp.tamu.edu/publications/177_SR/VOLUME/CHAPTERS/SR177_05.PDF)>. [Cited YYYY-MM-DD]

<sup>2</sup>Department of Geological Sciences, California State University, Hayward, 25800 Carlos Bee Blvd., Hayward CA 94542-3088, USA. Correspondence author: [dwarnke@csuhayward.edu](mailto:dwarnke@csuhayward.edu)

imum because density differences of the different kinds of grains (heavier lithic fragments, and lighter biogenic components) were not considered. The ratio of the minimum weight of IRD to total sample weight produces a value for the concentration of IRD in milligrams of IRD per gram of sediment. This value is independent of dry bulk density and sedimentation rate. The IRD index is the number of IRD grains in the split divided by the sum of IRD and planktonic foraminifers in the same split, multiplied by 100. This IRD index is also independent of the age model. Estimated Total IRD is the number of coarse-grained IRD grains in the split raised to the power of the number of splits required to produce approximately 500 grains. This number, when divided by the dry weight of the entire sample, produces a value for the number of coarse IRD grains per gram of total sample. The indices that most commonly appear in published paleoclimate research are mass accumulation rate (MAR) and apparent mass accumulation rate (AMAR). However, these indices are dependent on the age model, and since the age model is still evolving, have not been included in our presentation. All IRD data are recorded as single datum point entries. Running-point averages were not employed. Data are presented in Table [T1](#).

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[T1](#). IRD point-counting results,  
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## REFERENCES

- Allen, C.P., and Warnke, D.A., 1991. History of ice rafting at Leg 114 sites, subantarctic/South Atlantic. *In* Ciesielski, P. F., Kristoffersen, Y., et al., *Proc. ODP, Sci. Results, 114*: College Station, TX (Ocean Drilling Program), 599–607.
- Murphy, L., Warnke, D.A., Andersson, C., Channell, J., and Stoner, J., in press. History of ice-rafting at South Atlantic ODP Site 177-1092 during the Gauss and Late Gilbert Chrons. *Palaeogeogr., Palaeoclimatol., Palaeoecol.*
- Stanton, C., 1997. A history of ice-rafted debris on the Rockall Plateau in the North Atlantic at Site 982 for the past 2 million years [M.S. thesis]. Calif. State Univ., Hayward.

Table T1. IRD point-counting results. (See table notes. Continued on next two pages.)

Depth (mcd)	IRD (mg/g)	Estimated number of grains (g)	IRD index	Depth (mcd)	IRD (mg/g)	Estimated number of grains (g)	IRD index
50.00	0.7	132,502.7	0.02	53.45	0.0	0.0	0.00
50.05	0.7	424.4	0.01	53.50	0.0	0.0	0.00
50.10	0.1	0.1	0.00	53.55	0.0	0.0	0.00
50.15	0.9	16,392.1	0.03	53.60	0.0	0.0	0.00
50.20	0.8	61.5	0.00	53.65	0.0	0.0	0.00
50.25	13.2	30,296,360.0	0.52	53.70	0.4	0.0	0.00
50.30	2.7	16,462,620.0	0.04	53.75	0.0	0.0	0.00
50.35	1.9	12,000,000.0	0.01	53.80	1.5	1,004.2	0.01
50.40	0.7	29.5	0.00	53.85	0.0	0.0	0.00
50.45	1.2	ND	0.07	53.90	0.4	0.0	0.00
50.50	1.2	90,937.5	0.01	53.95	1.1	232.2	0.00
50.55	0.0	0.0	0.00	54.00	0.3	0.0	0.00
50.60	0.0	0.0	0.00	54.05	0.8	1,065.1	0.00
50.65	0.0	0.0	0.00	54.10	0.8	951.8	0.00
50.70	0.0	0.0	0.00	54.15	0.0	0.0	0.00
50.75	0.6	772.8	0.01	54.20	0.6	397.4	0.00
50.80	0.6	2,924.4	0.00	54.25	0.0	0.0	0.00
50.85	0.5	292.4	0.01	54.30	0.0	0.0	0.00
50.90	0.7	22.6	0.00	54.35	0.5	0.0	0.00
50.95	1.0	27.0	0.00	54.40	0.0	0.0	0.00
51.00	3.3	2,723,702.0	0.02	54.45	0.0	0.0	0.00
51.05	1.8	1,937,296.0	0.02	54.50	0.0	0.0	0.00
51.10	2.1	10,000,000.0	0.02	54.55	0.0	0.0	0.00
51.15	1.8	13,193.0	0.08	54.60	0.8	26.4	0.00
51.20	0.4	24.1	0.00	54.65	0.0	0.0	0.00
51.25	0.0	0.0	0.00	54.70	0.0	0.0	0.00
51.30	0.0	0.0	0.00	54.75	0.0	0.0	0.00
51.35	0.0	0.0	0.00	54.80	0.0	0.0	0.00
51.40	0.4	0.1	0.00	54.85	0.0	0.0	0.00
51.45	0.3	0.0	0.00	54.90	0.0	0.0	0.00
51.50	1.0	12,719.3	0.01	54.95	0.0	0.0	0.00
51.55	0.0	0.0	0.00	55.00	0.0	0.0	0.00
51.65	0.0	0.0	0.00	55.05	0.0	0.0	0.00
51.70	0.0	0.0	0.00	55.10	0.0	0.1	0.00
51.75	0.0	0.0	0.00	55.15	0.0	0.0	0.00
51.80	0.2	0.0	0.00	55.20	0.0	0.0	0.00
51.85	0.2	0.1	0.00	55.25	0.0	0.0	0.00
51.90	0.9	12.2	0.00	55.30	0.0	0.0	0.00
51.95	0.7	562,999.7	0.01	55.35	0.0	0.1	0.00
52.00	2.1	32,900,000.0	0.03	55.40	0.0	0.1	0.00
52.05	0.9	776.4	0.01	55.45	0.0	0.0	0.00
52.10	0.6	5.9	0.00	55.50	0.0	2,942.8	1.00
52.15	0.6	870.2	0.01	55.55	0.0	0.0	0.00
52.20	0.0	0.0	0.00	55.60	0.0	21.7	0.01
52.25	0.0	0.0	0.00	55.65	0.0	0.0	0.00
52.30	0.0	0.0	0.00	55.70	0.0	0.0	0.00
52.35	0.0	0.0	0.00	55.75	0.0	0.0	0.00
52.40	0.3	10.8	0.00	55.80	0.0	0.0	0.00
52.45	0.0	0.0	0.00	55.85	0.0	0.0	0.00
52.50	0.3	11.1	0.00	55.90	0.0	0.0	0.00
52.55	0.3	14.4	0.00	55.95	0.0	0.1	0.00
52.60	0.4	281.0	0.00	56.00	0.0	24.6	1.00
52.65	0.2	978.8	0.00	56.05	0.0	0.0	0.00
52.70	0.4	304.6	0.01	56.10	0.0	10.5	0.00
52.75	0.4	18,253.5	0.01	56.15	0.0	16,599.6	0.01
52.80	0.4	441,230.1	0.01	56.20	0.0	115.5	0.02
52.85	0.0	0.0	0.00	56.25	0.0	0.0	0.00
52.90	0.2	0.0	0.00	56.30	0.0	0.0	0.00
52.95	0.4	976.3	0.00	56.35	0.0	0.0	0.00
53.00	0.1	0.1	0.00	56.40	0.0	0.0	0.00
53.05	0.3	988.1	0.01	56.45	0.0	0.0	0.00
53.10	0.0	0.0	0.00	56.50	0.0	0.0	0.00
53.15	0.0	0.0	0.00	56.55	0.0	0.0	0.00
53.20	0.2	11.7	0.00	56.60	0.0	0.0	0.00
53.25	0.0	0.0	0.00	56.65	0.0	0.0	0.00
53.30	0.0	0.0	0.00	56.70	0.0	0.0	0.00
53.35	0.0	0.0	0.00	56.75	0.0	0.0	0.00
53.40	0.0	0.0	0.00				

**Table T1 (continued).**

Depth (mcd)	IRD (mg/g)	Estimated number of grains (g)	IRD index	Depth (mcd)	IRD (mg/g)	Estimated number of grains (g)	IRD index
56.80	0.0	0.0	0.00	60.25	0.0	0.0	0.00
56.85	0.0	0.0	0.00	60.30	0.0	0.0	0.00
56.90	0.0	0.0	0.00	60.35	0.0	1,883.5	1.00
56.95	0.0	0.0	0.00	60.40	0.0	0.0	0.00
57.00	0.0	0.0	0.00	60.45	0.0	0.0	0.00
57.05	0.0	0.0	0.00	60.50	0.0	0.0	0.00
57.10	0.0	0.0	0.00	60.55	0.0	0.0	0.00
57.15	0.0	0.0	0.00	60.60	0.0	0.0	0.00
57.20	0.0	0.0	0.00	60.65	0.0	0.0	0.00
57.25	0.0	0.0	0.00	60.70	0.0	0.0	0.00
57.28	0.0	0.0	0.00	60.75	0.0	0.0	0.00
57.35	0.0	0.0	0.00	60.80	0.0	0.0	0.00
57.40	0.0	0.0	0.00	60.85	0.0	0.0	0.00
57.45	0.0	0.0	0.00	60.90	0.0	0.0	0.00
57.50	0.0	0.0	0.00	60.95	0.0	0.0	0.00
57.55	0.0	0.0	0.00	61.00	0.0	0.0	0.00
57.60	0.0	0.0	0.00	61.05	0.0	0.0	0.00
57.65	0.0	0.0	0.00	61.10	0.0	0.0	0.00
57.70	0.0	0.0	0.00	61.15	0.0	0.0	0.00
57.75	0.0	0.0	0.00	61.20	0.0	0.0	0.00
57.78	0.0	0.0	0.00	61.25	0.0	0.0	0.00
57.85	0.0	0.0	0.00	61.30	0.0	0.0	0.00
57.90	0.0	0.0	0.00	61.35	0.0	0.0	0.00
57.95	0.0	0.0	0.00	61.40	0.0	0.0	0.00
58.00	0.0	0.0	0.00	61.45	0.0	0.0	0.00
58.05	0.0	0.0	0.00	61.50	0.0	0.0	0.00
58.10	0.0	0.0	0.00	61.55	0.0	0.0	0.00
58.15	0.0	0.0	0.00	61.60	0.0	0.0	0.00
58.20	0.0	2,324.0	1.00	61.65	0.0	0.0	0.00
58.25	0.0	0.0	0.00	61.70	0.0	0.0	0.00
58.30	0.0	0.0	0.00	61.75	0.0	0.0	0.00
58.35	0.0	258.9	0.00	61.80	0.0	0.0	0.00
58.40	0.0	0.0	0.00	61.85	0.0	0.0	0.00
58.45	0.0	0.0	0.00	61.90	0.0	0.0	0.00
58.50	0.0	0.0	0.00	61.95	0.0	0.0	0.00
58.55	0.0	0.0	0.00	62.00	0.0	0.0	0.00
58.60	0.0	0.0	0.00	62.05	0.0	0.0	0.00
58.65	0.0	0.0	0.00	62.10	0.0	0.0	0.00
58.70	0.0	9.2	0.00	62.15	0.0	0.0	0.00
58.75	0.0	20.0	0.00	62.20	0.0	0.0	0.00
58.78	0.0	0.0	0.00	62.25	0.0	0.0	0.00
58.85	0.0	0.1	0.00	62.30	0.0	0.0	0.00
58.90	0.0	0.0	0.00	62.35	0.0	0.0	0.00
58.95	0.0	0.0	0.00	62.39	0.0	0.0	0.00
59.00	0.0	18.2	0.00	62.44	0.0	0.0	0.00
59.05	0.0	0.0	0.00	62.49	0.0	0.0	0.00
59.10	0.0	0.0	0.00	62.54	0.0	0.0	0.00
59.15	0.0	0.0	0.00	62.59	0.0	0.0	0.00
59.20	0.0	0.0	0.00	62.64	0.0	0.0	0.00
59.25	0.0	0.0	0.00	62.69	0.0	0.0	0.00
59.28	0.0	0.0	0.00	62.74	0.0	0.0	0.00
59.35	0.0	0.0	0.00	62.79	0.0	0.0	0.00
59.40	0.0	0.0	0.00	62.84	0.0	0.0	0.00
59.45	0.0	0.0	0.00	62.89	0.0	0.0	0.00
59.50	0.0	0.0	0.00	62.94	0.0	0.0	0.00
59.55	0.0	0.0	0.00	62.99	0.0	0.0	0.00
59.60	0.0	0.0	0.00	63.04	0.0	0.0	0.00
59.65	0.0	0.0	0.00	63.09	0.0	0.0	0.00
59.70	0.0	0.0	0.00	63.14	0.0	0.0	0.00
59.75	0.0	0.0	0.00	63.19	0.0	0.0	0.00
59.80	0.0	0.0	0.00	63.24	0.0	0.0	0.00
59.90	0.0	0.0	0.00	63.29	0.0	0.0	0.00
59.95	0.0	0.0	0.00	63.34	0.0	0.0	0.00
60.00	0.0	0.0	0.00	63.39	0.0	0.0	0.00
60.05	0.0	0.0	0.00	63.44	0.0	0.0	0.00
60.10	0.0	0.0	0.00	63.49	0.0	0.0	0.00
60.15	0.0	0.0	0.00	63.54	0.0	0.0	0.00
60.20	0.0	0.0	0.00	63.59	0.0	0.0	0.00

**Table T1 (continued).**

Depth (mcd)	IRD (mg/g)	Estimated number of grains (g)	IRD index
63.64	0.0	0.0	0.00
63.69	0.0	0.0	0.00
63.74	0.0	0.0	0.00
63.79	0.0	0.0	0.00
63.84	0.0	0.0	0.00
63.89	0.0	0.0	0.00
63.94	0.0	0.0	0.00
63.99	0.0	0.0	0.00
64.04	0.0	0.0	0.00
64.09	0.0	0.0	0.00
64.14	0.0	0.0	0.00
64.19	0.0	0.0	0.00
64.24	0.0	0.0	0.00
64.29	0.0	0.0	0.00
64.30	n.s.	0.0	0.00
64.34	0.0	0.0	0.00
64.39	0.0	0.0	0.00
64.44	0.0	0.0	0.00
64.49	0.0	0.0	0.00
64.54	0.0	0.0	0.00
64.59	0.0	0.0	0.00
64.64	0.0	0.0	0.00
64.69	0.0	0.0	0.00
64.74	0.0	0.0	0.00
64.79	0.0	0.0	0.00
64.84	0.0	0.0	0.00
64.89	0.0	0.0	0.00
64.94	0.0	0.0	0.00
64.99	0.0	0.0	0.00
65.04	0.0	0.0	0.00
65.09	0.0	0.0	0.00

Notes: IRD = ice-rafted debris. Numbers have been rounded up to one decimal place for the "IRD" and "Estimated number of grains" columns and rounded up to two decimal places for the "IRD index" column. ND = no data.