Natural Resources Canada
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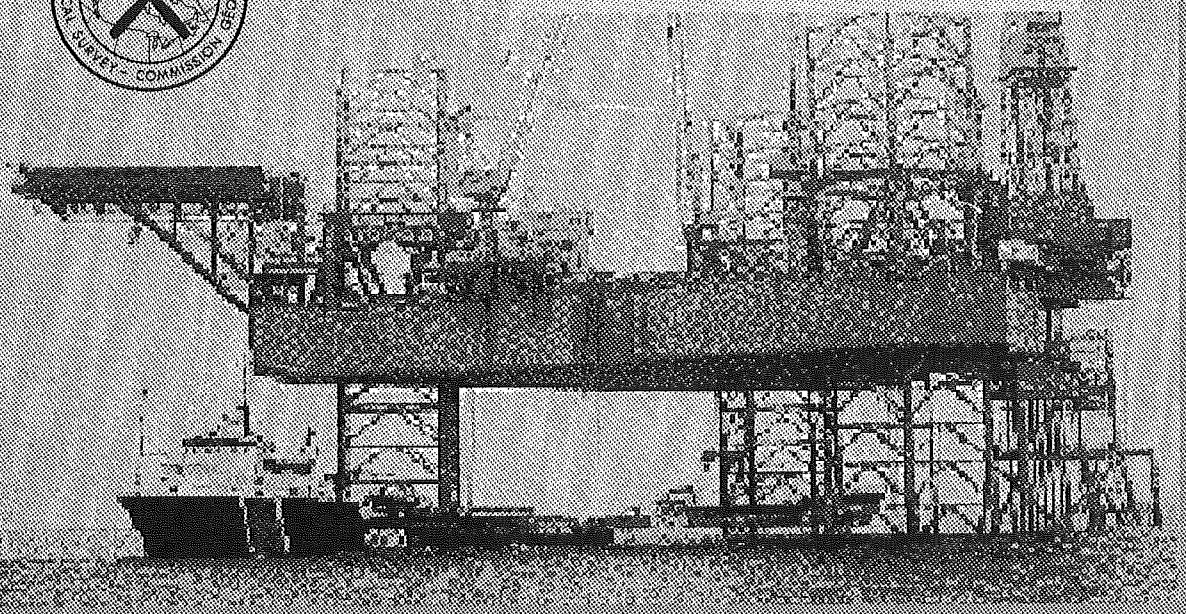

Hydrodynamics and Seabed Stability Observations on Sable Island Bank - AGC/LASMO Joint Program: A Summary of the Data for 1993/94

by

M.Z. Li, C.L. Amos, J. Zevenhuizen, D.E. Heffler, B. Wile, and G. Drapeau

for

Program on Energy Research and Development
Offshore Geotechnics SubProgram, Task 6A4
and LASMO Nova Scotia Ltd.

Geological Survey of Canada
Open File Report No. 2949

August, 1994

OPEN FILE 2949

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1. INTRODUCTION

Storm processes dominate sediment transport on the Scotian shelf and the resulting large-scale bedform migration, seabed scouring and infilling cause serious problems for offshore installations. Several combined flow bottom boundary layer models have been proposed to predict near bed velocity profiles and enhanced flow stresses due to wave-current interaction (Smith, 1977; Grant and Madsen, 1979, 1986), but their applicability over a wide range of conditions is not tested due to the lack of high quality field data of simultaneously measured waves, currents and seabed responses. Bedforms are almost always present on the continental shelf and they interact with waves and currents to affect nearbed velocity structures, skin friction/form drag partition and sand resuspension (Wiberg and Nelson, 1992; Vincent et al., 1991; Li, 1994; Li et al., in review). Yet tested ripple predictive models are not available for combined waves and currents. Before sediment transport and seabed stability can be correctly accessed, threshold criteria have to be defined for the initiation of bedload transport, saltation/suspension and sheet flows. While these are reasonably defined for either waves or unidirectional flows, solutions and field data are very limited for combined flows (Hammond and Collins, 1977; Amos et al., 1988). Due to the complexity of the above mentioned processes and problems, the predictions of sediment transport and

seabed scouring are poor both for the free stream (without structure interference) and around the offshore structures. In order to deal with these issues, the Atlantic Geoscience Centre continental shelf sediment transport model, SEDTRANS, has been developed (Martec Ltd., 1984, 1987; Davidson and Amos, 1985). This Fortran 77 numerical model uses either the Grant and Madsen (1986) or the Smith (1977) combined flow bottom boundary layer model to obtain nearbed velocity profiles and bed stresses, and then predicts sediment transport rates using one of five algorithms chosen by the user. This model has recently been re-evaluated and upgraded to SEDTRANS92 and has been tested using limited field data by Li and Amos (1993). However, more field data are needed for further improvement and full testing of this model.

A joint project between Atlantic Geoscience Centre (AGC) and LASMO Nova Scotia Limited (LASMO) was initiated in 1993 to monitor storm wave-current dynamics and seabed responses on the Scotian shelf. The objectives of the project are (a) to determine the mode, magnitude and direction of free-stream seabed sediment transport at the LASMO production site, (b) to investigate the interaction and relationship between the free stream bottom boundary layer dynamics and sediment transport, (c) to improve our modelling and predictive abilities for storm sediment transport on the continental shelf and (d) to monitor and measure scour around seabed installations and adapt predictive capabilities for installation scour/siltation. AGC instrumented tripods (RALPH and SOBS), S4 current meters, the benthic annular field flume Sea Carousel and several Helley-Smith sediment traps were deployed near the LASMO Cohasset/Panuke production site (Figure 1) during several cruises in 1993 and 1994 to obtain in situ wave, current and seabed response data under storm conditions. The following is a list of the deployments completed to date:

Site	Duration	Instruments Deployed and Activities
1	16/1/1993 26/2/1993	RALPH, continuous-mode S4, control site continuous-mode S4, Van Veen grab samples
2	24/2/1993 30/4/1993	SOBS, continuous-mode S4, burst-mode S4, control site continuous-mode S4
2A	30/4/1993 16/6/1993	RALPH, continuous-mode S4 at the control site, Van Veen grab samples
The whole region	10/6/1993 17/6/1993	CSS Hudson cruise to gather geological, geophysical and sediment dynamics information for the whole region; retrieved RALPH, SOBS, S4s; 5 Sea Carousel deployments

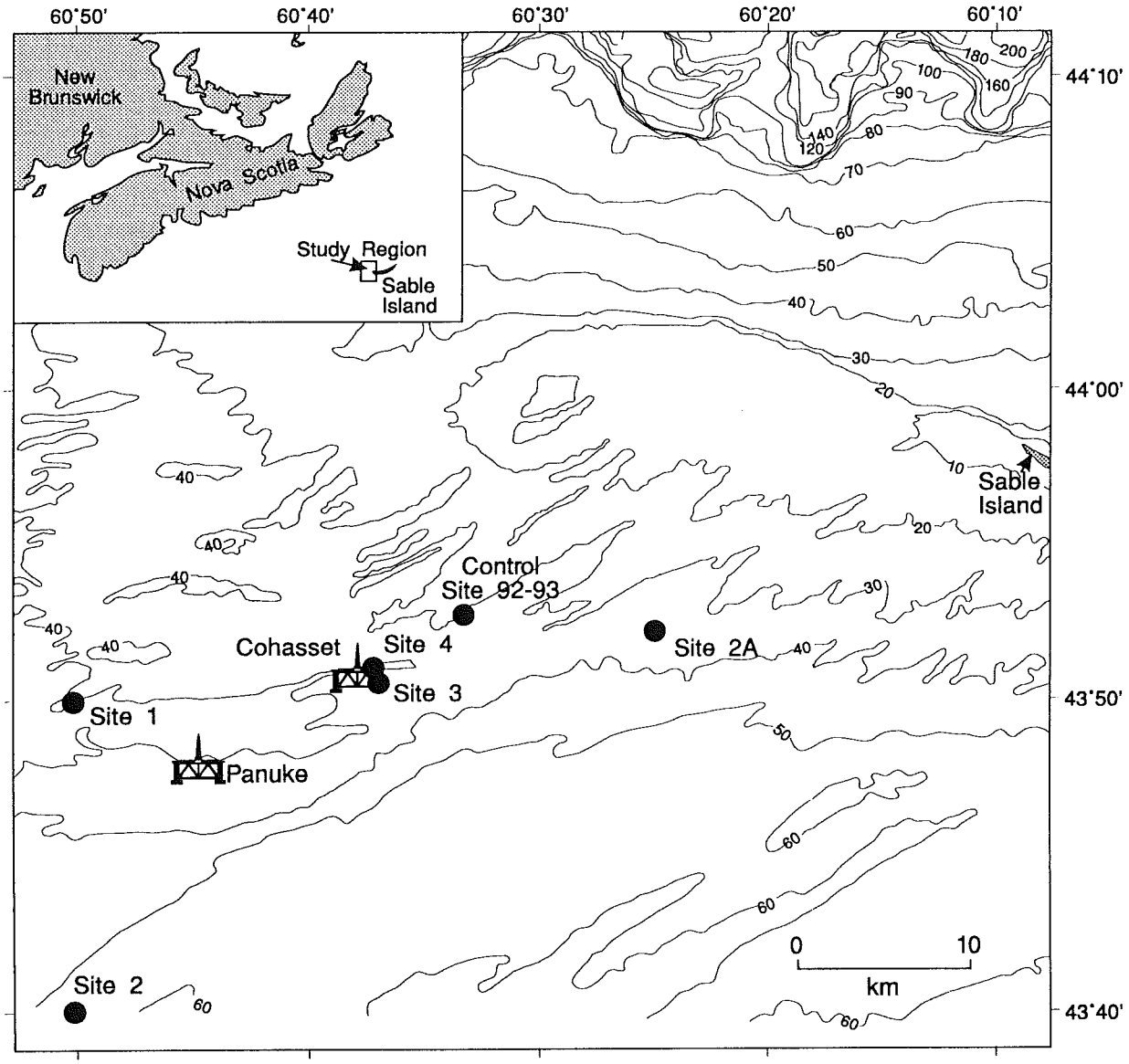


Figure 1 The location map showing the AGC/LASMO hydrodynamical and seabed stability project site, on the Sable Island Bank, Nova Scotia continental shelf.

3	27/11/1993 25/1/1994	RALPH, SOBS, two burst-mode S4s, Van Veen grab samples
4	7/3/1994 29/4/1994	RALPH, SOBS and Van Veen grab samples

A bar plot is given in Figure 2 showing the durations and instrument types deployed at each site. A field program report has been compiled by Zevenhuizen and Li (1994), which provides in-depth information on instrument and mooring design preparation, equipment alterations, sampling protocol design and transportation/deployment/recovery logistics.

Three sets of high quality data were collected during these deployments. While the data from later sites are still waiting for processing, analysis of site 1 data has been completed. This open file report provides a summary of the data collected during the 1993/1994 period and focuses on the analysis of data from site 1.

2. INSTRUMENTATION

RALPH is a computer controlled, autonomous instrumented tripod used for measuring nearbed wave-current dynamics and monitoring seabed responses in marine environments (Heffler, 1984). It was equipped with a pressure transducer (for wave and depth measurements), two acoustic current meters (for velocity measurements), two light transmissometers (for suspended sediment concentration measurements), a compass (for orientation), a super-8 movie camera with flash (for seabed response measurements) and a 20 Mbyte TattleTale Model 6 data logger (Figure 3). A shadow bar was also installed about 17 cm above the seabed on the tripods in this study. Knowing the geometry and setups of the light, camera and the shadow bar, we can use the shadow casted on the rippled bed to measure ripple heights as well as ripple lengths and ripple migration rates.

SOBS is a similar instrumented tripod to Ralph, but focuses on monitoring seabed responses and suspended sediment concentration profiles (Figure 4). It is equipped with a pressure transducer for wave measurement and six Optical Backscatter Sensors (OBS) in a vertical array for suspended sediment concentration profile measurements. The seabed response is monitored using a Sony 101 video camera and data are again logged on a TattleTale Model 6 microcomputer.

Figure 2 Bar plot showing the duration and instrument types for each deployment site.

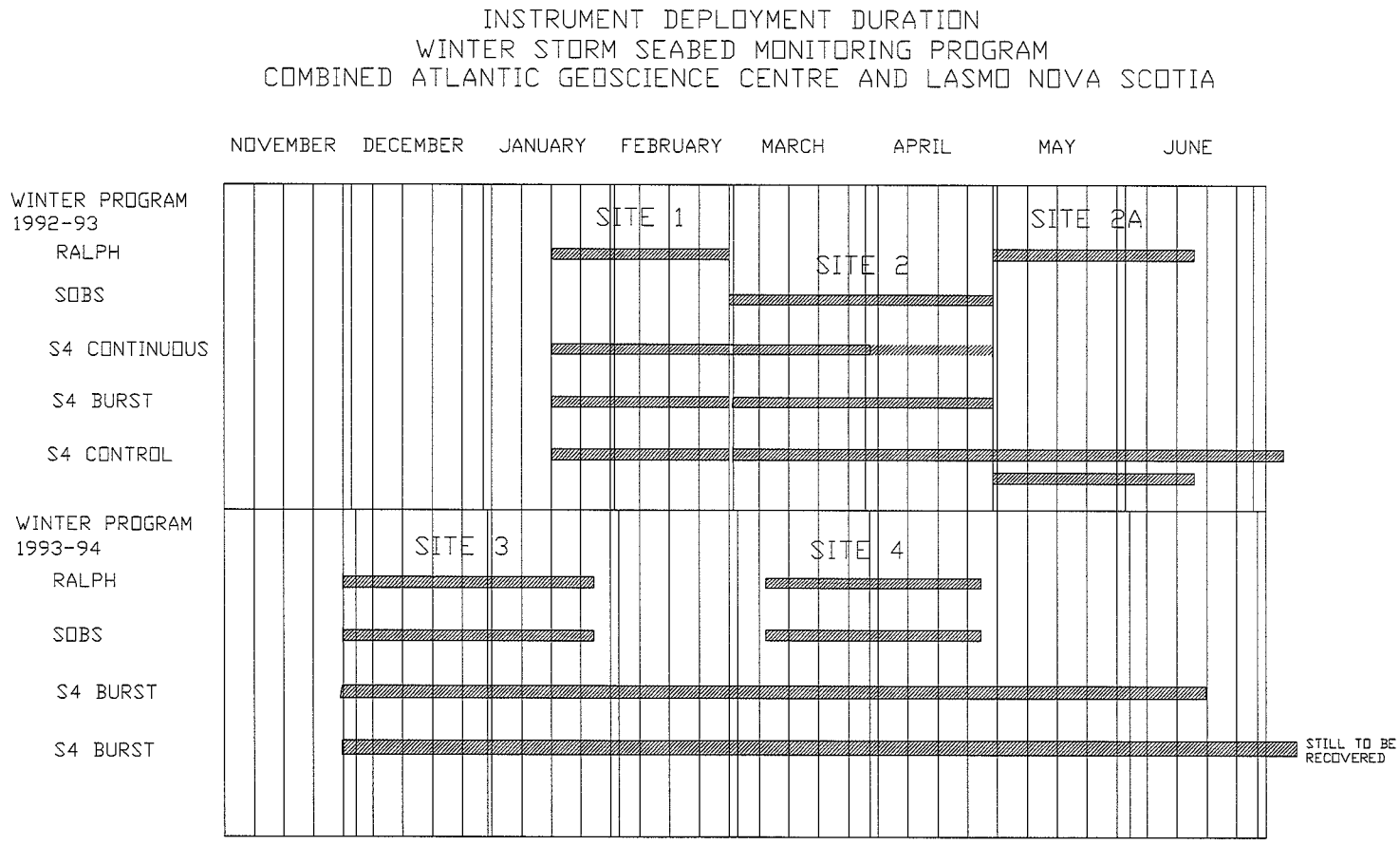

INSTRUMENT DEPLOYMENT DURATION
WINTER STORM SEABED MONITORING PROGRAM
COMBINED ATLANTIC GEOSCIENCE CENTRE AND LASMO NOVA SCOTIA
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
WINTER PROGRAM 1992-93
RALPH
SOBS
S4 CONTINUOUS
S4 BURST
S4 CONTROL
SITE 1
SITE 2
SITE 2A
WINTER PROGRAM 1993-94
RALPH
SOBS
S4 BURST
S4 BURST
SITE 3
SITE 4
STILL TO BE RECOVERED

FIGURE 2

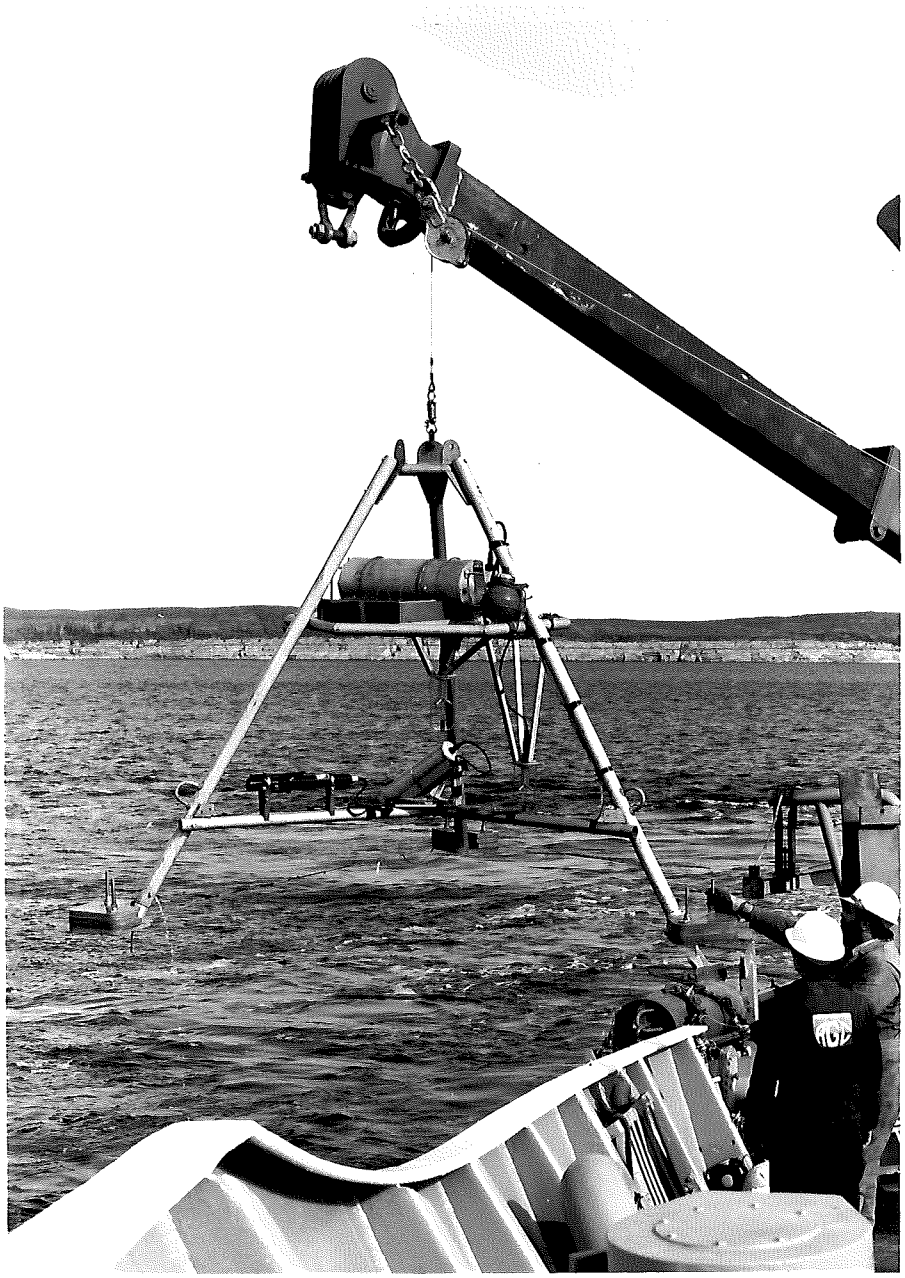


Figure 3 AGC instrumented tripod, Ralph.

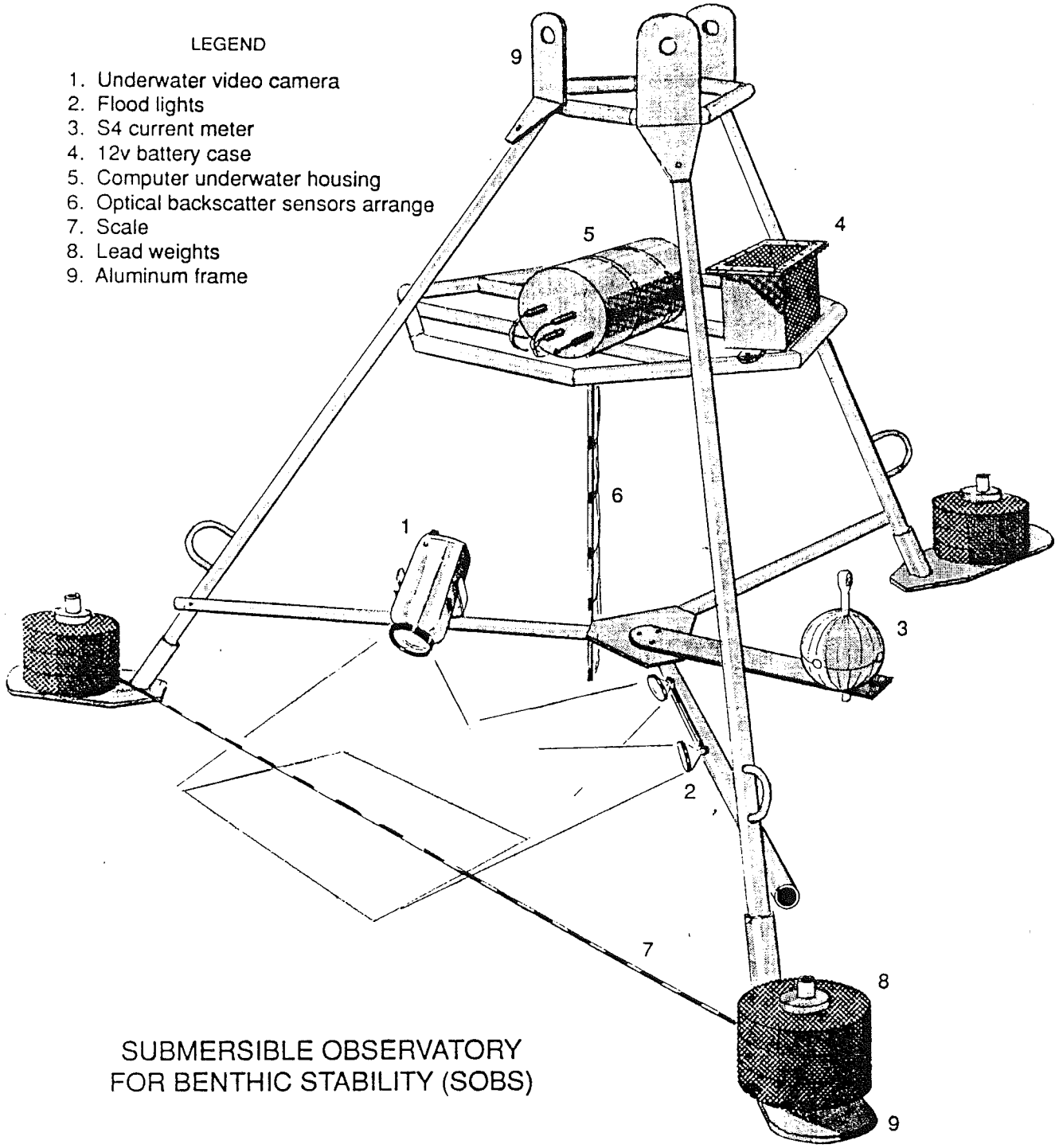


Figure 4 AGC instrumented tripod, Sobs.

S4 Wave-Current Meters are self-contained, spherically shaped and commercially available electromagnetic wave-current meters from InterOcean Systems Inc (Figure 5). They measure depth, waves, current magnitude and direction. An internal flux-gate compass records the current direction relative to magnetic north. Data are stored internally in solid-state, high-reliability memory (1 Mbyte). The electronics and power supply modules are contained within a compact 25 cm diameter sphere. S4 wave-current meters can be deployed independently on current meter stands, or incorporated on a tripod.

Sea Carousel is a benthic annular flume capable of submarine monitoring of seabed erosion (Amos et al., 1992). The annulus is 2 m in diameter, 0.3 m high and 0.15 m wide (see Figure 6). It is equipped with three OBS sensors to monitor suspended sediment concentration and a Marsh-McBirney current meter to measure flow velocity. Flow is generated by the rotation of a lid to which eight paddles are attached. An underwater video camera views the eroding bed through a window in the side of the annulus. The controller boards and power (12v DC) are contained in the underwater pod located above the annulus. Data are digitized and transformed to scientific units on a Campbell Scientific CR10 data logger which is also located in the underwater pod. The Sea Carousel is cabled to the surface and is operated using a microcomputer on board ship.

Sediment Traps The Helley-Smith sand traps have been used extensively in rivers and are well calibrated. The modified version of these traps used in this study (Figure 7) was constructed two times the size of the original design with mouth dimensions of 0.15 m x 0.15 m. Sample nets were made of a 125 micron mesh. The trap door is closed on deployment and recovery, but springs open when the trap reaches the seabed. A second trap was deployed with its mouth being raised to a height of 0.15 m above the base to sample the suspended load sediment.

3. RALPH AND S4 DATA

RALPH and a S4 current meter were deployed in a water depth of 39 meters at Site 1 (43^0 59.91' N, 60^0 50.15' W) from January 17 to February 14, 1993. Another S4 current meter was also deployed at the control site (43^0 52.61' N, 60^0 34.19' W) during the same period. RALPH was programmed to sample all sensors for 18 minutes every two hours at a frequency of 1 Hz. The camera system on RALPH was programmed to image the seabed twice with a 15 minute separation at the beginning of every other hour

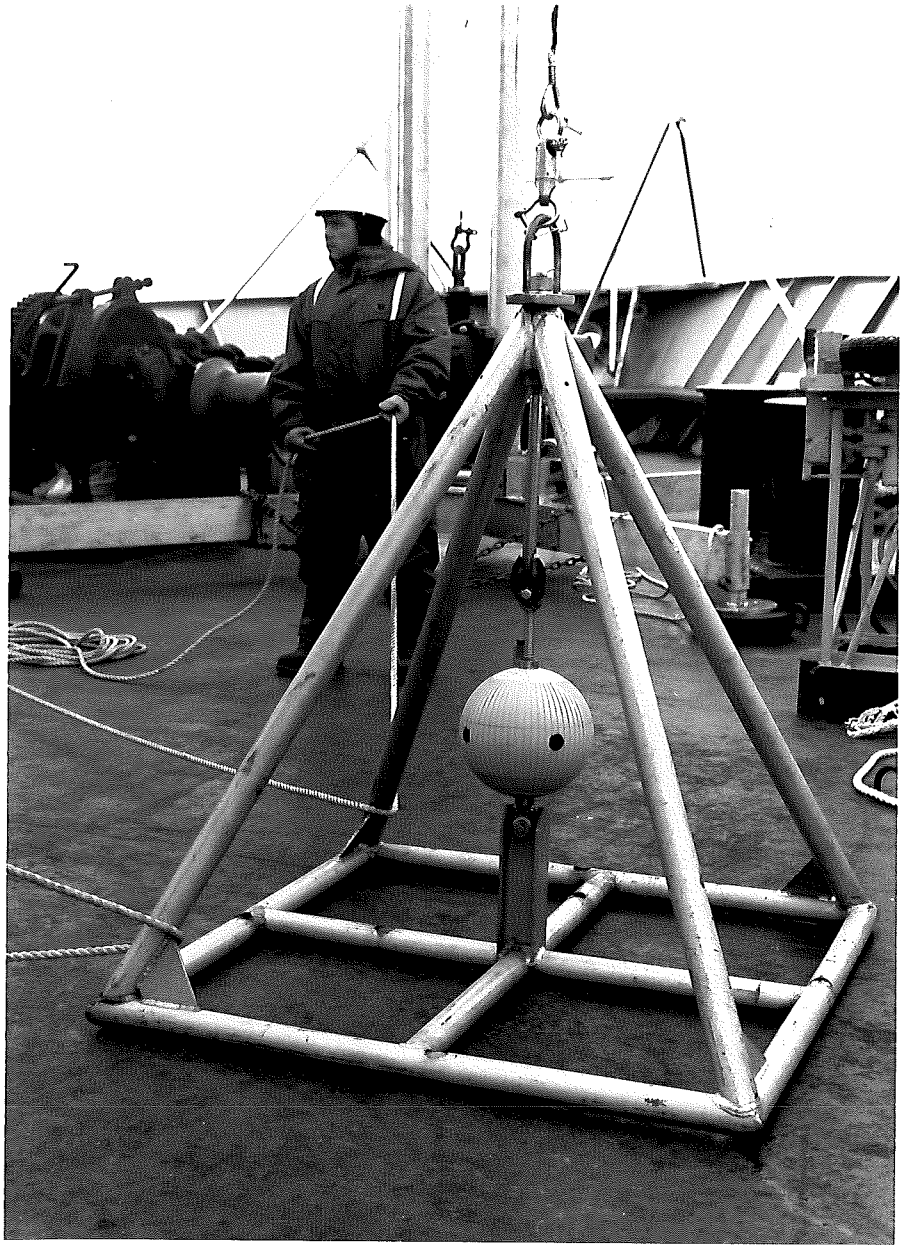


Figure 5 S4 directional wave-current meter.

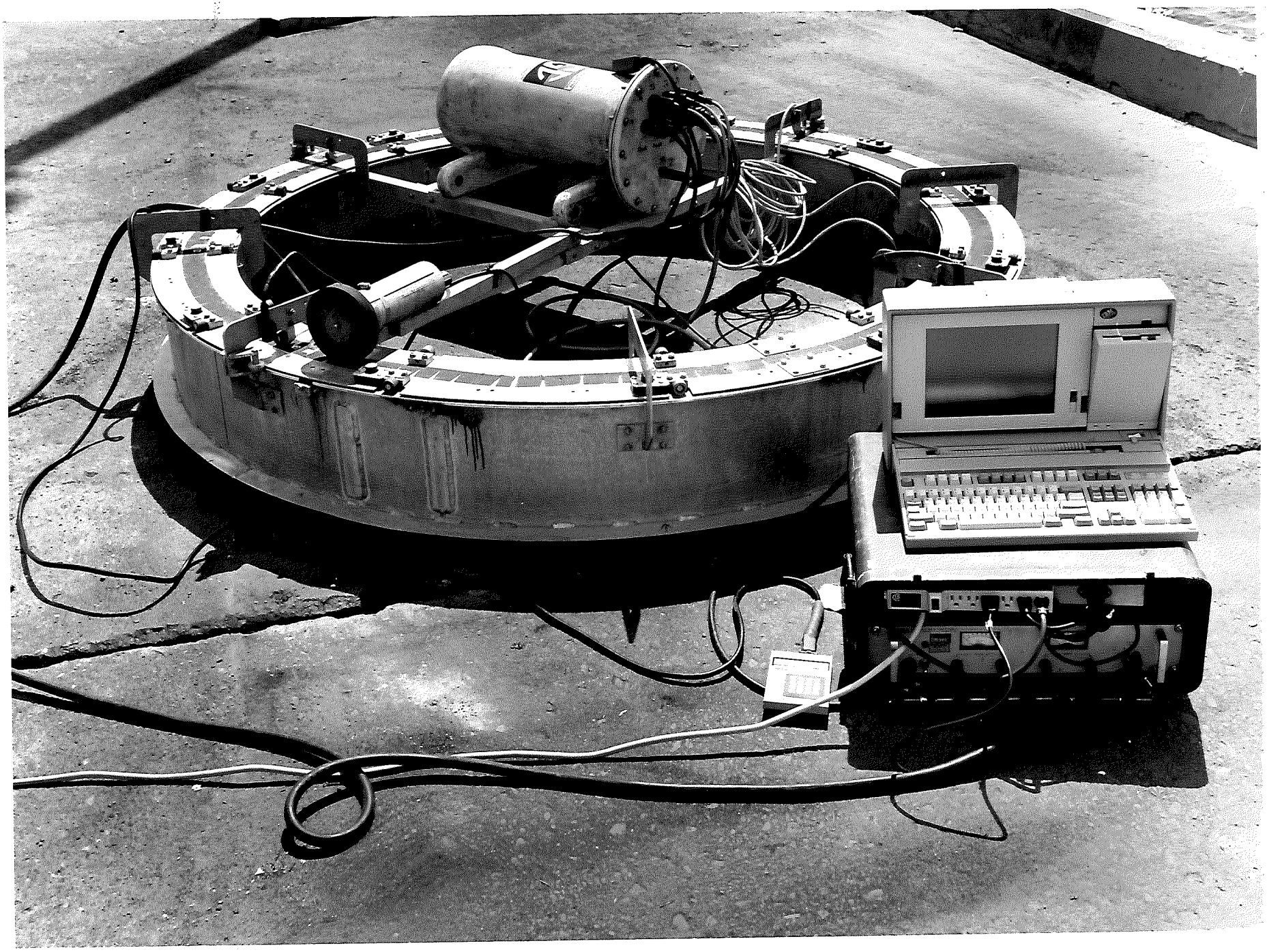
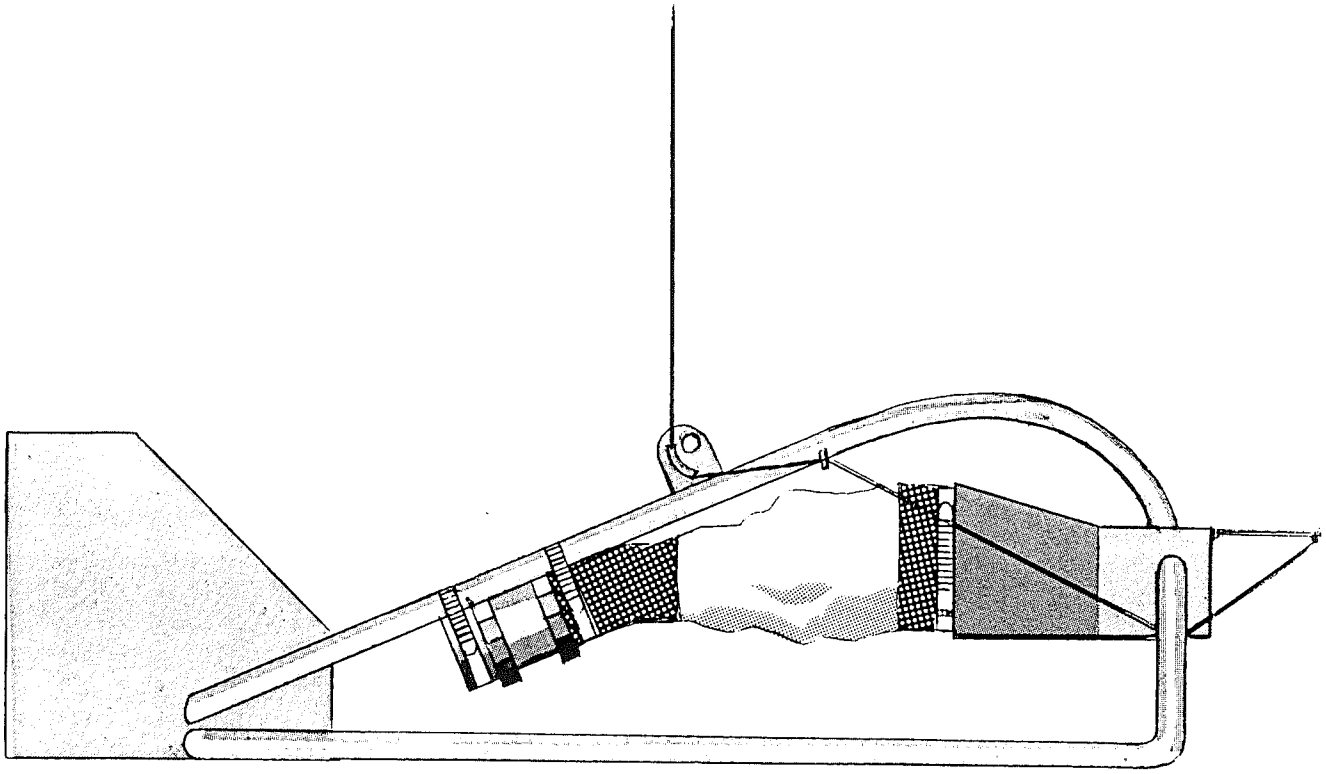


Figure 6 AGC benthic annular flume, Sea Carousel.

Figure 7 The modified Helley-Smith sediment trap.



to monitor seabed responses. The two S4 current meters continuously recorded 15-second averages of depth, mean current velocity and current direction at a height about 50 cm off the bed. A Van Veen grab sampler and plastic-tube sediment traps (installed on SOBS) were also used to sample the bottom and suspended sediments respectively.

A total of 343 time series were recorded by RALPH during the period from 17 January to 14 February, 1993. Each time series comprised water elevation, instantaneous velocity in the x and y directions at 50 cm and 100 cm above the seafloor, and suspended sediment concentrations (in percent transmission) at 33 cm and 68 cm off the seabed.

Martec Limited was contracted to process the raw data recorded by RALPH (Martec Ltd., 1994a). For each time series, the following burst-averaged parameters were obtained first: mean depth (h), mean current velocity 100 cm above the bottom (u_{100}), mean current velocity 50 cm above the bottom (u_{50}), mean water attenuance at 33 cm (SSC1) and 68 cm (SSC2) above seabed respectively. The depth record was then de-meaned to obtain wave height time series, and spectral analysis was then performed to compute the significant wave height (H_s) and spectral peak wave period (T_p) for each time series. For each velocity time series, the mean value was removed from each record. The x and y components of the maximum orbital velocities were then plotted in a scatter plot and the mean wave direction (W_{dir}) was obtained by a least-square fitting of a straight line to the data.

Time series of burst-averaged mean depth, mean velocity (u_{100}), significant wave height (H_s) and transmission % are plotted in Figure 8 to provide an overview of the site 1 data. One neap tide and two spring tides occurred during the experiment. The tide range was 0.5 m during the neap tide and increased to 1.5 m during the spring tide. The peak tidal current velocity was around 35 cm/s during the spring tide, but reached only about 10 cm/s during the neap tide. The dominant direction of the peak tidal flows was to the north, north-east and south, south-west. One major storm and two less intense storms occurred during the experiment period. The significant wave height reached 4.0 m and spectral peak wave period was about 15 s during the major storm, with the maximum wave height reaching 6.0 m. Significant wave heights and wave periods also reached 2.5 m and circa 14 s respectively during the less intense storms. Two non-storm periods occurred around January 23 and February 11, 1993, during which H_s was smaller than 0.5 m and T_p was about 8 s. Three significant sand resuspension events occurred at the beginning, on the 12th day and at the end of the deployment respectively. These closely correspond with the three

Figure 8 Overview of site 1 data showing the time series of water depth, mean velocity (u_{100}), significant wave height (H_s), spectral peak wave period (T_p) and transmission % at 33 cm above the seabed.

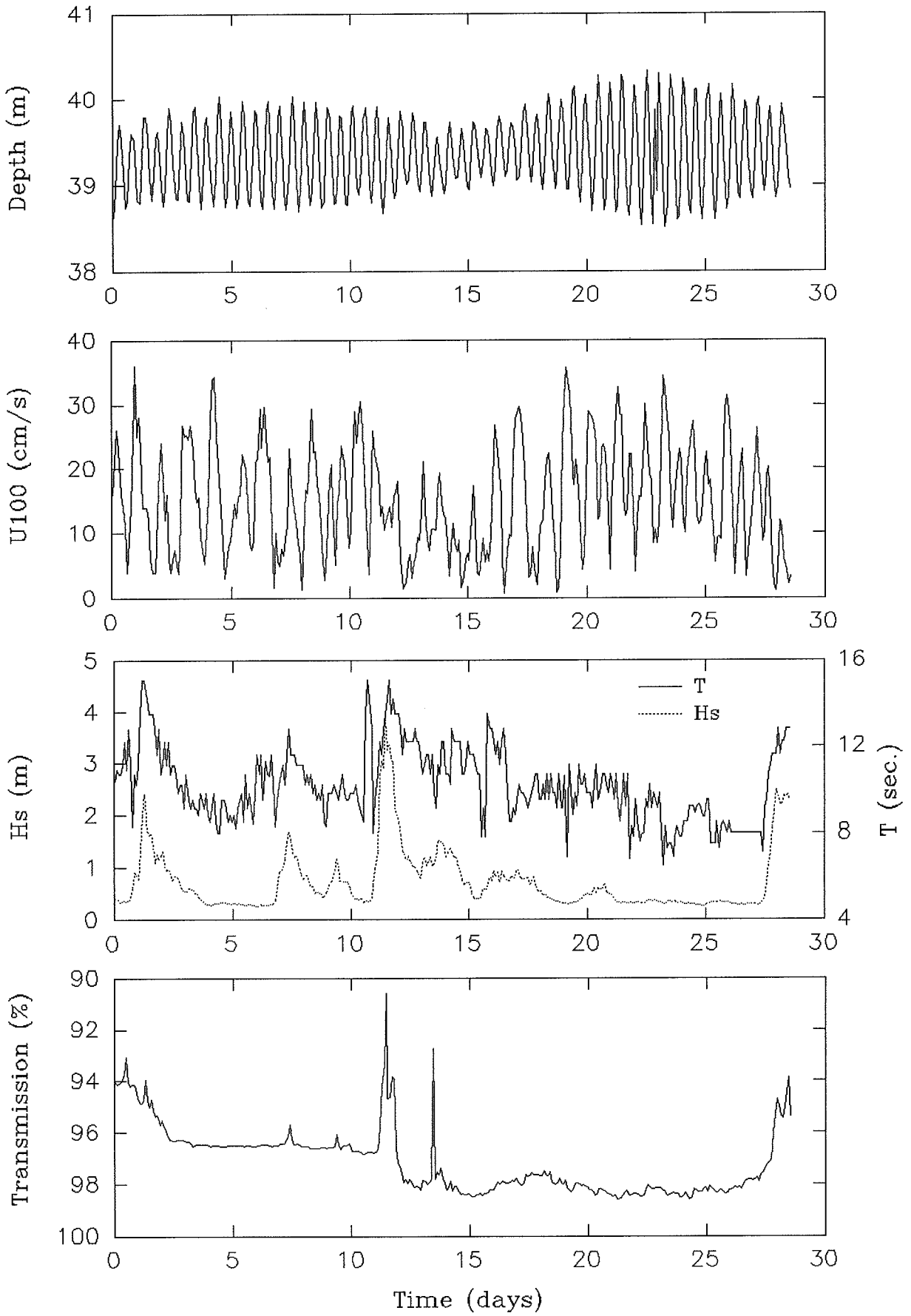

Depth (m)
41
40
39
38
0
5
10
15
20
25
30
U100 (cm/s)
40
30
20
10
0
Hs (m)
5
4
3
2
1
0
T
Hs
T (sec.)
16
12
8
4
Transmission (%)
90
92
94
96
98
100
Time (days)

Figure 8

storms, indicating that storms control sediment transport on the Scotian shelf. The report on RALPH data prepared by Martec Limited (1994a) gives the detailed methodology, time series plots of burst-averaged wave, current and attenuance data for the entire deployment, tabulated burst averages of wave, current and attenuance data and the time series plots of wave, current and transmissivity for each burst.

The continuous-mode S4 current meter at Site 1 recorded data from January 15 to 27, 1993 and the control site S4 worked from January 15 to 28, 1993. The report prepared by Martec Limited (Martec Ltd., 1994b) includes the following plots and tabulated S4 data:

a. plots of time-averaged mean and peak current velocities every 15 minutes;
b. tabulated current magnitude, direction and water depth for the first 18 minutes of every other hour (for correlation with RALPH data);
c. time series plots of current magnitude and direction in six-hour segments for the entire deployment.

Three S4 current meters were deployed at site 2 (43^0 39.97' N, 60^0 49.91' W) from 24 February 1993 to 30 April 1993. Data from these measurements were processed by Martec Limited (Martec Ltd., 1994c) in a similar manner to the site 1 S4 data.

4. INPUT/OUTPUT DATA OF SEDTRANS92

An important aspect to studying bottom boundary layer dynamics and seabed stability is the application of the AGC continental shelf sediment transport model SEDTRANS92 (Li and Amos, 1993). For a given input of wave, current and seabed conditions, this Fortran 77 numerical model applies the combined wave-current bottom boundary layer theory to predict wave-enhanced bed shear stresses, velocity profiles and sediment transport rate and direction. The measurements of bedform geometry, bedform migration rates, suspended sediment concentrations and wave/current dynamics collected in this study provide valuable data for the calibration of this model.

RALPH and S4 data were combined to produce 343 bursts of input data to run SEDTRANS92. The input data for each burst included:

h	-	mean water depth (m)
u	-	mean current velocity at the reference height (m/s)
z	-	reference height (m)
C_{dir}	-	mean current direction (degree)
H_s	-	significant wave height (m)
T_p	-	spectral peak wave period (s)
W_{dir}	-	wave direction (degree)
D	-	mean grain size of the bottom sediment (m)
k_{br}	-	bottom roughness height (m)
F	-	grain size class fraction (=1)
Rhos	-	sediment density (kg/m^3)
Rhow	-	fluid density (kg/m^3)

The actual input data are listed in Appendix 1.

The output data are divided into two parts, one part related with the parameters that define the bottom boundary dynamics, and the second that determines the sediment transport. The bottom boundary layer dynamics parameters are:

u_b	-	near-bed maximum wave orbital velocity (cm/s)
A_b	-	near-bed wave orbital amplitude (cm)
f_{cw}	-	combined wave-current friction factor
u_{*cs}	-	skin friction current shear velocity (cm/s)
u_{*ws}	-	skin friction wave shear velocity (cm/s)
u_{*cws}	-	skin friction combined wave-current shear velocity (cm/s)
u_{*c}	-	total current shear velocity (cm/s)
u_{*w}	-	total wave shear velocity (cm/s)
u_{*cw}	-	total combined wave-current shear velocity (cm/s)
d_{cw}	-	thickness of the wave-current boundary layer (cm)
z_o	-	inner layer bottom roughness (cm)
z_{oc}	-	apparent bottom roughness above the wave boundary layer (cm)

The sediment transport parameters are:

q_{EH} - time-averaged mass sediment transport rate of Engelund-Hansen method (kg/m/s)
D-EH - sediment transport direction of Engelund-Hansen method (degree)
q_{EB} - time-averaged mass sediment transport rate of Einstein-Brown method (kg/m/s)
D-EB - sediment transport direction of Einstein-Brown method (degree)
q_{BGN} - time-averaged mass sediment transport rate of Bagnold method (kg/m/s)
D-BG - sediment transport direction of Bagnold method (degree)
q_{YL} - time-averaged mass sediment transport rate of Yalin method (kg/m/s)
D-YL - sediment transport direction of Yalin method (degree)

These SEDTRANS92 output data are listed in Appendix 2 of this report.

5. SEABED PHOTOGRAPHY DATA

The Ralph camera film was digitized using a computer-controlled film advancing system, a photo enlarger and a Sony video camera. The photo enlarger projected each frame of image directly onto the CCD of the video camera and the video signal was digitized using a Matrox frame-grabber on a PC. The digitized images were then analyzed in the public-domain GIS image-processing software package GRASS for seabed state classification, ripple geometry and ripple migration rate measurements. For each image, ripple wavelength L_r was directly measured by referencing to the scales on the shadow bar. Ripple height H_r was calculated by knowing the light-shadow bar geometry and measuring the horizontal distances between the shadow and shadow bar for the ripple crest and trough respectively. The ripple crest lines were traced (digitized) in Grass and each pair of these digitized vector files was overlain to obtain the ripple migration rate M_r. The ripple migration rate was then converted to bedform mass sediment transport rate from:

$$q_r = 0.5\rho_b H_r M_r$$

where ρ_b is the bottom sediment bulk density. The general deterioration of image clarity marks the initiation of saltation/suspension, while the combination of strong image blurring and clearly-recognized

flat bed indicates the upper-plane bed sheet flow conditions.

The results of seabed image analysis are given in Appendix 3 which lists the following parameters for each time series:

film number

date and time

bed - classification of bed states

C_r - current ripple crest orientation (degree)

W_r - wave ripple crest orientation (degree)

H_r - ripple height (cm)

L_r - ripple wave length (cm)

M_r - ripple migration rate (cm/minute)

M_{dir} - ripple migration direction (degree)

q_r - bedform-derived mass transport rate (kg/m/s)

The following types of bed states are used in Appendix 3 of this report:

NM no motion

LPB lower plane bed

C current ripples: C_s, straight-crested; C_l, linguoid

C_w current-dominant ripples with secondary wave ripples

W/C wave and current ripples of equal magnitude

W_c wave-dominant ripples with secondary current ripples

W wave ripples

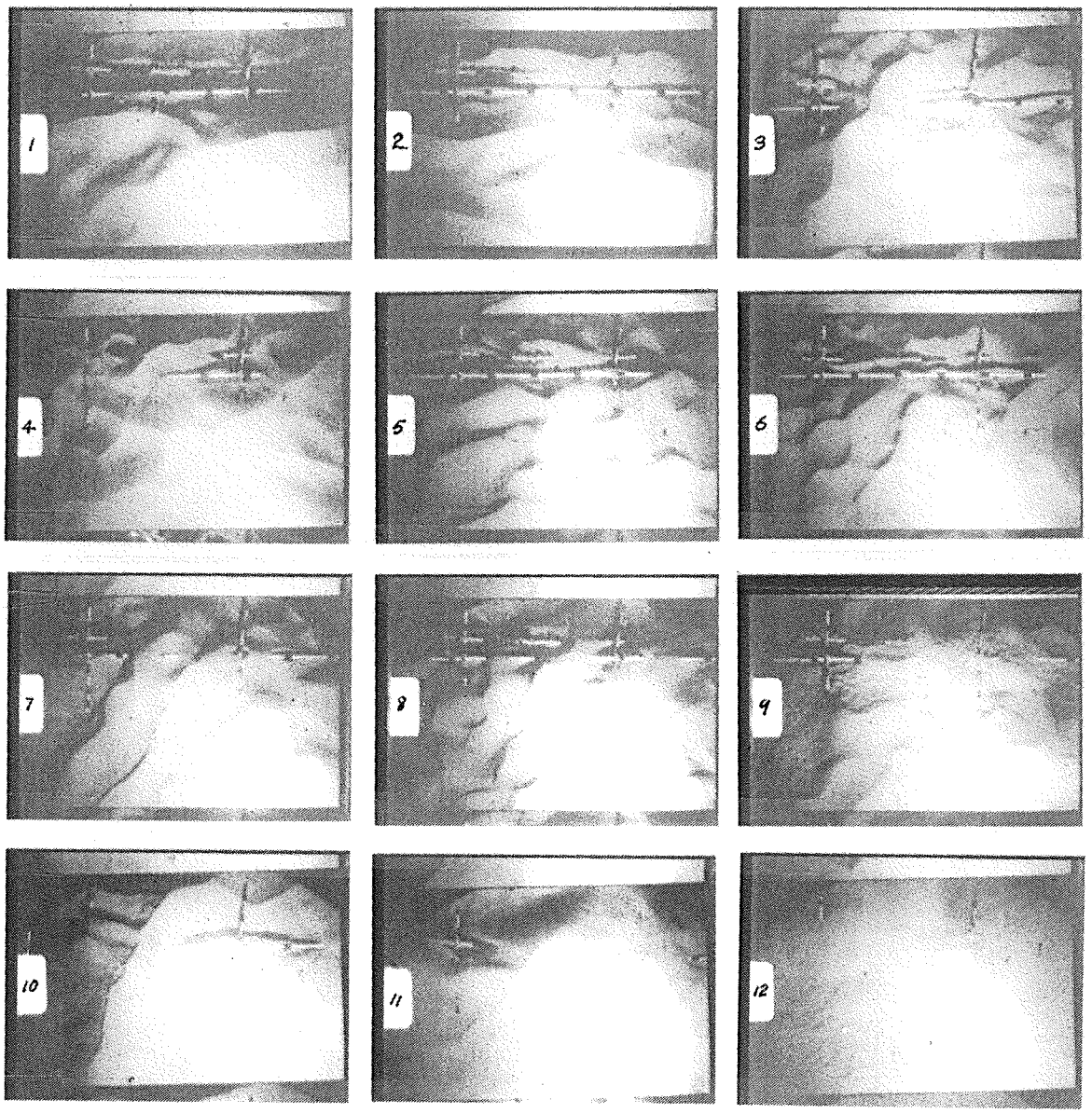
SS saltation/suspension

LWR large wave ripples

UPB upper plane bed/sheet flow

Figure 9 shows some of the representative bed states, which are (1, 2) wave ripples (W), (3) wave-dominant ripple (W_c), (4, 5) combined wave-current ripples (W/C), (6) current-dominant ripple (C_w), (7) straight-crested current ripple (C_s), (8) linguoid current ripple (C_l), (9) no motion (NM), (10) large wave

Figure 9 Representative bed states observed at site 1 on the Sable Island Bank. (1, 2), wave ripples; (3), wave-dominant ripple; (4, 5) combined wave-current ripples; (6) current-dominant ripple; (7) straight-crested current ripple; (8) linguoid current ripple; (9) no motion; (10) large wave ripple; (11), saltation/suspension and (12), upper plane bed/sheet flow.


1
2
3
4
5
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7
8
9
10
11
12

ripple (LWR), (11) saltation/suspension (SS) and (12) upper plane bed/sheet flow (UPB).

6. BOTTOM AND TRAP SEDIMENT SAMPLE DATA

Bottom sediment samples were collected using an 8" Van Veen grab sampler, one sample at site 1 and one at the control site. These samples were named as 93-500-1 and 93-500-control respectively. The tabulated and graphical results of grain size analysis performed using the settling tube in the AGC SED-LAB are given in Appendix 4. These samples show that the bottom sediment at site 1 was well-sorted medium sand with a mean grain size of 0.34 mm.

Five sediment traps were installed on SOBS to collect suspended sediment samples during site 2 deployment. These sediment traps were at heights of 15, 30, 53, 86 and 137 cm above the seabed. They were made out of 6.6 cm diameter plastic tubes. The lower most trap had an opening area of 5.06 cm^2 and the rest of the traps each had an opening area of 20.27 cm^2. The grain size analysis results and plots of grain size and sedimentation flux variation with heights are also included in Appendix 4 of this report. During the deployment from 24 February, 1993 to 30 April, 1993, the volumes of sediment collected by these traps ranged from 137 cm^3 to 513 cm^3. These samples showed several correlated layers which possibly indicated strong sediment transport/resuspension events during storms. The mean grain size and vertical sedimentation flux are plotted in Figures A4-1 and A4-2 in Appendix 4. The mean grain size is found to decrease from about 0.15 mm at 15 cm height to less than 0.03 mm at 137 cm height. This grain size decrease is minimum above 1 m, suggesting that 1 m could be the height limit of sand resuspension during the storms encountered during the deployment period at this site. The resuspension is strongest near the bed, 1.65 cm/storm-day, and decreases rapidly to 0.15 cm/storm-day at 137 cm above the seabed.

7. LASMO WAVE CLIMATE DATA

As part of the joint project, AGC also obtained hourly wind and wave data for the Panuke/Cohasset region from LASMO via contracts to Oceanroutes Seimac. These data include wind speed (knots), wind direction (degree true north), wave height (m), wave period (s), swell wave height (m), swell wave period (s) and swell direction (degree true north). These data are available from AGC and

cover a duration from January 1, 1993 to March 2, 1994.

8. CSS HUDSON CRUISE

A multi-disciplinary survey of the Cohasset/Panuke development region was conducted on board of CSS Hudson from 10 June to 17 June, 1993 as phase 2 of this joint project (Amos et al., 1994). The overall objectives of the survey were to collect geological and geophysical data sets in the Cohasset/Panuke region for setting up the numerical model for the region. During this cruise, we recovered RALPH, SOBS and two S4 current meters. A total of 45 IKU and Van Veen grab samples were collected and there were also 20 camera stations, 4 vibrocore stations and 3 anchor stations. Forty one hours of 3.5 kHZ sub-bottom profiling/Huntec DTS surveying and 36 hours of side scan sonar survey were also conducted. Sea Carousel were successfully deployed in five stations to obtain good quality data on bedload transport, the generation of various bedforms and the saltation/suspension transport. The details of the CSS Hudson cruise can be found in the AGC Open File Report by Amos et al. (1994).

9. SUMMARY

In summary, 10 cruises have been completed to date in this hydrodynamics and seabed stability joint project between AGC and LASMO. AGC instrumented tripods RALPH and SOBS, S4 current meters, SEA CAROUSEL and Helley-Smith sediment traps were deployed in these cruises. Three high-quality data sets have been collected on waves, currents, suspended sediment concentrations and seabed responses. Data collected at site 1 has been analyzed and used to run/calibrate the AGC sediment transport model SEDTRANS92. Continuous wave climate data were also acquired and compiled for the Panuke/Cohasset region. A total of 62 bottom/trap sediment samples were obtained and 24 camera/vibrocore stations were occupied. Seventy one hours of seismic profiling/sidescan sonar survey were conducted. All these data collected during the 1993/94 period provide us valuable data to understand the free stream bottom boundary layer dynamics and sediment transport pattern at the LASMO production site, and to improve our modelling and predictive ability for storm sediment transport and scouring on an exposed high-energy continental shelf. Only with these improved understandings of free stream wave-current dynamics and sediment transport, we will be able to begin assessing and predicting the more

complex flow dynamics and seabed scouring/infilling around the structure.

Acknowledgements

We would like to thank all the shorebase personnel and ship crews of LASMO for their corporation during this joint project. The effort of CSS Hudson crew was also appreciated. Special thanks go to Bob Courtney for his help in using GRASS in the analysis of seabed photos, and to Don Clattenburg for sediment grain size analysis. The reviews of the manuscript by Harold Christian and Gary Sonnichsen have improved the final version of this open file report.

References

Amos, C.L., Bowen, A.J., Huntley, D.A. and Lewis, C.F.M., 1988. Ripple generation under the combined influences of waves and currents on the Canadian continental shelf. Cont. Shelf Res., 8: 1129-1153.

Amos, C.L., Grant, J., Daborn, G.R. and Black, K., 1992. Sea Carouse - a benthic annular flume. Estuarine, Coastal and Shelf Science 34: 557-577.

Amos, C.L., Bentham, K., Chung, K.S., Currie, R., Muschenheim, K., Sutherland, T. and Zenvenhuizen, J., 1994. CSS Hudson Cruise 93016 - Sable Island Bank, Scotian Shelf, A multi-disciplinary survey of the Cohasset development region. Geological Survey of Canada Open File Report 2897.

Amos, C.L., Bowen, A.J., Huntley, D.A., Judge, J.T.and Li, M.Z., (in review). Ripple migration and sand transport under combined flows on the Scotian shelf. Cont. Shelf Res.

Davidson, S. and Amos, C.L., 1985. A re-evaluation of SED1D and SED2D: sediment transport models for the continental shelf. Geological Survey of Canada Open File Report 1705, Section 3, 54pp.

Grant, W.D. and Madsen, O.S., 1979. Combined wave and current interaction with a rough bottom. J. Geophys. Res., 84: 1797-1808.

Grant, W.D. and O.S.Madsen, 1986. The continental shelf bottom boundary layer. Annu. Rev. Fluid Mech., 18: 265-305.

Hammond, T.M. and Collins, M.B., 1979. On the threshold of transport of sand-sized sediment under the combined influence of unidirectional and oscillatory flow. Sedimentology, 26: 795-812.

Heffler, D.E., 1984. RALPH - An instrument to monitor seabed sediments. Current Research Part B, Geological Survey of Canada Paper 84-1b, 47-52.

Li, M.Z. and Amos, C.L., 1993. SEDTRANS92: Re-evaluation and upgrade of the AGC sediment transport model. Geological Survey of Canada Open File Report 2769, 42pp.

Li, M.Z., 1994. Direct skin friction measurements and stress partitioning over movable sand ripples. J. Geophys. Res., 99: 791-799.

Li, M.Z., Wright, L.D. and Amos, C.L., (in review) Predicting ripple roughness and sand resuspension under combined flows in a shoreface environment. Mar. Geology.

Martec Ltd., 1984. SED1D: A sediment transport model for the continental shelf. Unpublished report submitted to the Geological Survey of Canada, DSS Contract IOSC. 23420-3-M753, 63pp.

Martec Ltd., 1987. Upgrading of AGC sediment transport model. Geological Survey of Canada Open File Report 1705, Section 10: C.14p.

Martec Ltd., 1994a. AGC/LASMO hydrodynamical and seabed stability project, Sable Island Bank - Site 1 Ralph time series data. Martec Report No. TR-94-01.

Martec Ltd., 1994b. AGC/LASMO hydrodynamical and seabed stability project, Sable Island Bank - Site 1 S4 time series data. Martec Report No. TR-94-01.

Martec Ltd., 1994c. AGC/LASMO hydrodynamical and seabed stability project, Sable Island Bank - Site 2 S4 time series data. Martec Report No. TR-94-01.

Smith, J.D., 1977. Modelling of sediment transport on continental shelves. In: The Sea, Vol. 6, E.D. Goldberg et al., eds., Wiley-Interscience, New York, pp. 539-577.

Vincent, C.E., Hanes, D.M. and Bowen, A.J., 1991. Acoustic measurements of suspended sand on the shoreface and the control of concentration by bed roughness. Mar. Geol., 96: 1-18.

Wiberg, P.L. and Nelson, J.M., 1992. Unidirectional flow over asymmetric and symmetric ripples. J. Geophys. Res., 97: 12,745-12,761.

Zevenhuizen, J. and Li, M.Z., 1994. Seabed Stability monitoring at the Cohasset-Panuke Development Region, Sable Island Bank, Scotian Shelf Field Activities During 1993 and 1994. Geological Survey of Canada, Open File Report xxxx.

Appendix 1

List of the input data for the AGC continental shelf sediment transport model SEDTRANS92.

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
1	38.63	0.137	0.5	298	0.4	10.4	350	0.00034	0.02	1	2650	1025
2	38.92	0.181	0.5	5	0.4	10.9	350	0.00034	0.02	1	2650	1025
3	39.5	0.228	0.5	48	0.36	10.7	320	0.00034	0.02	1	2650	1025
4	39.71	0.206	0.5	85	0.34	10.7	330	0.00034	0.02	1	2650	1025
5	39.52	0.141	0.5	114	0.35	11.1	340	0.00034	0.02	1	2650	1025
6	39.15	0.124	0.5	142	0.37	12.2	350	0.00034	0.02	1	2650	1025
7	38.74	0.098	0.5	183	0.36	10.9	350	0.00034	0.02	1	2650	1025
8	38.81	0.033	0.5	298	0.37	12.8	310	0.00034	0.02	1	2650	1025
9	39.33	0.078	0.5	316	0.44	11.1	310	0.00034	0.02	1	2650	1025
10	39.6	0.125	0.5	268	0.62	8.3	270	0.00034	0.02	1	2650	1025
11	39.52	0.217	0.5	274	0.91	10.7	260	0.00034	0.02	1	2650	1025
12	39.12	0.315	0.5	281	0.88	10.2	260	0.00034	0.02	1	2650	1025
13	38.82	0.218	0.5	299	0.78	11.1	260	0.00034	0.02	1	2650	1025
14	38.79	0.232	0.5	324	1.32	13.5	300	0.00034	0.02	1	2650	1025
15	39.33	0.184	0.5	10	2.01	15.1	340	0.00034	0.02	1	2650	1025
16	39.8	0.113	0.5	57	2.42	15.1	20	0.00034	0.02	1	2650	1025
17	39.8	0.109	0.5	117	1.69	14.2	20	0.00034	0.02	1	2650	1025
18	39.55	0.115	0.5	147	1.62	13.5	30	0.00034	0.02	1	2650	1025
19	39.09	0.092	0.5	174	1.65	13.5	40	0.00034	0.02	1	2650	1025
20	38.82	0.044	0.5	219	1.38	13.5	40	0.00034	0.02	1	2650	1025
21	39.11	0.029	0.5	270	1.1	12.8	40	0.00034	0.02	1	2650	1025
22	39.55	0.034	0.5	241	1.27	11.6	40	0.00034	0.02	1	2650	1025
23	39.62	0.107	0.5	212	1.16	12.8	40	0.00034	0.02	1	2650	1025
24	39.31	0.169	0.5	217	1.25	10.7	40	0.00034	0.02	1	2650	1025
25	38.97	0.204	0.5	233	1.32	11.1	50	0.00034	0.02	1	2650	1025
26	38.76	0.155	0.5	259	1.04	12.2	50	0.00034	0.02	1	2650	1025
27	38.97	0.104	0.5	337	0.96	11.1	60	0.00034	0.02	1	2650	1025
28	39.59	0.133	0.5	19	0.97	12.2	70	0.00034	0.02	1	2650	1025
29	39.9	0.052	0.5	99	0.91	10.7	70	0.00034	0.02	1	2650	1025
30	39.72	0.029	0.5	142	0.77	11.1	70	0.00034	0.02	1	2650	1025
31	39.25	0.052	0.5	180	0.85	11.1	70	0.00034	0.02	1	2650	1025
32	38.85	0.074	1	218	0.84	10.7	94	0.00034	0.02	1	2650	1025
33	38.83	0.051	1	258	0.82	9.8	97	0.00034	0.02	1	2650	1025
34	39.31	0.038	1	290	0.7	10.2	99	0.00034	0.02	1	2650	1025
35	39.74	0.118	1	225	0.58	10.2	94	0.00034	0.02	1	2650	1025
36	39.56	0.267	1	233	0.57	9.1	97	0.00034	0.02	1	2650	1025
37	39.15	0.25	1	256	0.54	10.7	97	0.00034	0.02	1	2650	1025
38	38.82	0.253	1	293	0.61	9.5	113	0.00034	0.02	1	2650	1025
39	38.81	0.246	1	338	0.6	9.1	123	0.00034	0.02	1	2650	1025
40	39.32	0.268	1	13	0.59	9.5	117	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
41	39.87	0.23	1	47	0.52	9.1	113	0.00034	0.02	1	2650	1025
42	39.91	0.168	1	98	0.52	9.1	111	0.00034	0.02	1	2650	1025
43	39.49	0.148	1	149	0.44	8.8	105	0.00034	0.02	1	2650	1025
44	38.99	0.156	1	198	0.4	9.8	97	0.00034	0.02	1	2650	1025
45	38.73	0.093	1	253	0.37	9.5	97	0.00034	0.02	1	2650	1025
46	39.08	0.073	1	337	0.34	9.1	104	0.00034	0.02	1	2650	1025
47	39.72	0.053	1	292	0.31	9.8	97	0.00034	0.02	1	2650	1025
48	39.8	0.103	1	254	0.29	8.8	86	0.00034	0.02	1	2650	1025
49	39.4	0.156	1	250	0.3	8.5	77	0.00034	0.02	1	2650	1025
50	38.96	0.277	1	297	0.28	9.2	73	0.00034	0.02	1	2650	1025
51	38.76	0.34	1	327	0.31	9.8	22	0.00034	0.02	1	2650	1025
52	39.09	0.343	1	2.6	0.32	8.5	48	0.00034	0.02	1	2650	1025
53	39.77	0.25	1	35	0.31	8	96	0.00034	0.02	1	2650	1025
54	40.03	0.206	1	75	0.32	8	94	0.00034	0.02	1	2650	1025
55	39.7	0.158	1	121	0.34	9.5	90	0.00034	0.02	1	2650	1025
56	39.12	0.086	1	176	0.36	9.5	79	0.00034	0.02	1	2650	1025
57	38.75	0.031	1	217	0.32	9.1	86	0.00034	0.02	1	2650	1025
58	38.89	0.056	1	17	0.32	8.5	79	0.00034	0.02	1	2650	1025
59	39.52	0.08	1	49	0.31	8.8	88	0.00034	0.02	1	2650	1025
60	39.86	0.089	1	145	0.29	8.5	63	0.00034	0.02	1	2650	1025
61	39.61	0.116	1	210	0.32	8.8	73	0.00034	0.02	1	2650	1025
62	39.09	0.145	1	250	0.32	8.2	104	0.00034	0.02	1	2650	1025
63	38.74	0.124	1	290	0.3	9.1	71	0.00034	0.02	1	2650	1025
64	38.88	0.157	1	357	0.32	9.5	91	0.00034	0.02	1	2650	1025
65	39.51	0.159	1	41	0.28	9.8	61	0.00034	0.02	1	2650	1025
66	39.98	0.222	1	88	0.3	8.5	70	0.00034	0.02	1	2650	1025
67	39.83	0.21	1	136	0.27	10.7	95	0.00034	0.02	1	2650	1025
68	39.29	0.201	1	173	0.29	9.1	62	0.00034	0.02	1	2650	1025
69	38.81	0.147	1	214	0.3	9.8	50	0.00034	0.02	1	2650	1025
70	38.76	0.085	1	272	0.29	9.1	41	0.00034	0.02	1	2650	1025
71	39.32	0.074	1	321	0.28	8.4	64	0.00034	0.02	1	2650	1025
72	39.87	0.089	1	271	0.28	9.8	13	0.00034	0.02	1	2650	1025
73	39.82	0.21	1	243	0.26	11.6	19	0.00034	0.02	1	2650	1025
74	39.3	0.216	1	269	0.28	10.7	358	0.00034	0.02	1	2650	1025
75	38.81	0.294	1	302	0.3	11.6	31	0.00034	0.02	1	2650	1025
76	38.73	0.232	1	348	0.28	9.5	356	0.00034	0.02	1	2650	1025
77	39.26	0.297	1	22	0.3	11.3	33	0.00034	0.02	1	2650	1025
78	39.87	0.25	1	54	0.28	10.7	27	0.00034	0.02	1	2650	1025
79	39.98	0.21	1	91	0.28	10.6	2.3	0.00034	0.02	1	2650	1025
80	39.48	0.218	1	126	0.29	11.6	2.3	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
81	38.9	0.103	1	157	0.3	10.3	16	0.00034	0.02	1	2650	1025
82	38.73	0.016	1	6.4	0.38	8.3	68	0.00034	0.02	1	2650	1025
83	39.13	0.1	1	24	0.6	9.5	87	0.00034	0.02	1	2650	1025
84	39.79	0.056	1	48	0.92	10.2	89	0.00034	0.02	1	2650	1025
85	39.93	0.049	1	230	0.96	10.7	80	0.00034	0.02	1	2650	1025
86	39.46	0.076	1	213	1.01	11.1	72	0.00034	0.02	1	2650	1025
87	38.91	0.066	1	296	1.18	10.2	65	0.00034	0.02	1	2650	1025
88	38.71	0.091	1	357	1.49	11.6	68	0.00034	0.02	1	2650	1025
89	39.08	0.112	1	27	1.7	12.8	74	0.00034	0.02	1	2650	1025
90	39.74	0.231	1	59	1.51	11.6	78	0.00034	0.02	1	2650	1025
91	40.03	0.176	1	103	1.3	11.6	70	0.00034	0.02	1	2650	1025
92	39.67	0.136	1	151	1.21	11.6	74	0.00034	0.02	1	2650	1025
93	39.03	0.117	1	188	1.24	11.1	61	0.00034	0.02	1	2650	1025
94	38.69	0.084	1	229	1.06	11.1	67	0.00034	0.02	1	2650	1025
95	38.94	0.068	1	290	0.88	11.1	70	0.00034	0.02	1	2650	1025
96	39.61	0.013	1	287	0.79	11.1	72	0.00034	0.02	1	2650	1025
97	39.97	0.093	1	211	0.84	10.2	68	0.00034	0.02	1	2650	1025
98	39.65	0.167	1	233	0.87	10.7	73	0.00034	0.02	1	2650	1025
99	39.09	0.162	1	265	0.76	10.2	66	0.00034	0.02	1	2650	1025
100	38.77	0.227	1	318	0.63	10.7	73	0.00034	0.02	1	2650	1025
101	38.95	0.294	1	359	0.64	9.8	79	0.00034	0.02	1	2650	1025
102	39.5	0.225	1	25	0.52	10.2	75	0.00034	0.02	1	2650	1025
103	39.97	0.227	1	88	0.55	9.5	65	0.00034	0.02	1	2650	1025
104	39.72	0.174	1	145	0.49	9.8	69	0.00034	0.02	1	2650	1025
105	39.13	0.159	1	181	0.51	9.5	61	0.00034	0.02	1	2650	1025
106	38.74	0.112	1	222	0.44	10.2	54	0.00034	0.02	1	2650	1025
107	38.81	0.056	1	259	0.45	8.5	75	0.00034	0.02	1	2650	1025
108	39.41	0.028	1	1.8	0.53	8.3	85	0.00034	0.02	1	2650	1025
109	39.9	0.072	1	212	0.58	9.8	92	0.00034	0.02	1	2650	1025
110	39.77	0.188	1	214	0.71	9.8	88	0.00034	0.02	1	2650	1025
111	39.19	0.207	1	235	0.73	9.8	91	0.00034	0.02	1	2650	1025
112	38.78	0.135	1	282	0.88	10.2	103	0.00034	0.02	1	2650	1025
113	38.79	0.051	1	347	1.17	9.8	114	0.00034	0.02	1	2650	1025
114	39.21	0.145	1	36	1.04	9.5	114	0.00034	0.02	1	2650	1025
115	39.81	0.165	1	81	0.76	9.8	110	0.00034	0.02	1	2650	1025
116	39.78	0.236	1	145	0.76	10.7	105	0.00034	0.02	1	2650	1025
117	39.21	0.219	1	189	0.72	9.8	106	0.00034	0.02	1	2650	1025
118	38.78	0.197	1	214	0.75	9.5	102	0.00034	0.02	1	2650	1025
119	38.77	0.14	1	216	0.71	9.5	108	0.00034	0.02	1	2650	1025
120	39.25	0.077	1	260	0.61	9.8	107	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
121	39.85	0.106	1	242	0.48	9.8	102	0.00034	0.02	1	2650	1025
122	39.93	0.214	1	232	0.43	9.8	100	0.00034	0.02	1	2650	1025
123	39.43	0.29	1	249	0.39	10.2	102	0.00034	0.02	1	2650	1025
124	38.97	0.24	1	289	0.41	9.5	106	0.00034	0.02	1	2650	1025
125	38.89	0.28	1	329	0.39	9.1	82	0.00034	0.02	1	2650	1025
126	39.21	0.305	1	359	0.43	8.8	98	0.00034	0.02	1	2650	1025
127	39.77	0.258	1	32	0.34	8.5	76	0.00034	0.02	1	2650	1025
128	39.9	0.156	1	69	0.36	13.5	40	0.00034	0.02	1	2650	1025
129	39.48	0.088	1	119	0.37	15.1	349	0.00034	0.02	1	2650	1025
130	38.99	0.036	1	319	0.36	14.2	330	0.00034	0.02	1	2650	1025
131	38.79	0.143	1	341	0.43	12.8	328	0.00034	0.02	1	2650	1025
132	39.12	0.259	1	359	0.67	8	346	0.00034	0.02	1	2650	1025
133	39.75	0.222	1	29	0.98	9.5	8.1	0.00034	0.02	1	2650	1025
134	39.91	0.207	1	66	1.31	10.7	17	0.00034	0.02	1	2650	1025
135	39.42	0.194	1	88	2.78	12.2	35	0.00034	0.02	1	2650	1025
136	38.89	0.127	1	86	3.05	11.6	36	0.00034	0.02	1	2650	1025
137	38.67	0.141	1	102	2.91	12.8	51	0.00034	0.02	1	2650	1025
138	38.91	0.104	1	117	3.93	13.5	57	0.00034	0.02	1	2650	1025
139	39.45	0.119	1	133	3.25	14.2	55	0.00034	0.02	1	2650	1025
140	39.78	0.131	1	177	3.37	15.1	55	0.00034	0.02	1	2650	1025
141	39.52	0.141	1	215	3.12	13.5	59	0.00034	0.02	1	2650	1025
142	39.08	0.109	1	254	3.01	14.2	63	0.00034	0.02	1	2650	1025
143	38.85	0.158	1	276	2.15	13.5	56	0.00034	0.02	1	2650	1025
144	38.94	0.164	1	319	2.02	13.5	58	0.00034	0.02	1	2650	1025
145	39.43	0.18	1	356	1.85	13.5	56	0.00034	0.02	1	2650	1025
146	39.86	0.058	1	26	1.63	12.8	54	0.00034	0.02	1	2650	1025
147	39.65	0.031	1	111	1.31	11.6	50	0.00034	0.02	1	2650	1025
148	39.23	0.014	1	81	1.27	12.8	62	0.00034	0.02	1	2650	1025
149	39.01	0.025	1	344	1.15	12.2	45	0.00034	0.02	1	2650	1025
150	39.06	0.054	1	358	1.23	12.2	57	0.00034	0.02	1	2650	1025
151	39.45	0.067	1	27	1.12	12.2	44	0.00034	0.02	1	2650	1025
152	39.84	0.031	1	86	1.03	12.2	61	0.00034	0.02	1	2650	1025
153	39.73	0.056	1	228	1.03	12.8	42	0.00034	0.02	1	2650	1025
154	39.31	0.064	1	258	0.94	12.2	52	0.00034	0.02	1	2650	1025
155	39	0.093	1	307	0.89	12.2	46	0.00034	0.02	1	2650	1025
156	38.92	0.089	1	356	0.79	11.6	43	0.00034	0.02	1	2650	1025
157	39.24	0.132	1	25	1.1	10.7	48	0.00034	0.02	1	2650	1025
158	39.73	0.21	1	66	1.2	11.1	45	0.00034	0.02	1	2650	1025
159	39.73	0.136	1	109	1.02	11.6	56	0.00034	0.02	1	2650	1025
160	39.35	0.09	1	133	1.13	11.6	65	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
161	39.03	0.072	1	158	1.2	10.7	64	0.00034	0.02	1	2650	1025
162	38.87	0.105	1	158	1.05	11.6	72	0.00034	0.02	1	2650	1025
163	39.13	0.106	1	143	1.07	9.8	81	0.00034	0.02	1	2650	1025
164	39.54	0.104	1	144	1.18	9.1	91	0.00034	0.02	1	2650	1025
165	39.55	0.171	1	176	1.51	11.1	91	0.00034	0.02	1	2650	1025
166	39.28	0.194	1	214	1.52	10.7	91	0.00034	0.02	1	2650	1025
167	39.05	0.145	1	232	1.47	12.2	83	0.00034	0.02	1	2650	1025
168	38.9	0.13	1	271	1.44	12.2	83	0.00034	0.02	1	2650	1025
169	39.03	0.122	1	306	1.2	10.7	86	0.00034	0.02	1	2650	1025
170	39.57	0.084	1	353	1.33	10.7	95	0.00034	0.02	1	2650	1025
171	39.73	0.034	1	222	1.38	10.2	102	0.00034	0.02	1	2650	1025
172	39.49	0.083	1	208	1.3	12.8	105	0.00034	0.02	1	2650	1025
173	39.24	0.115	1	236	1.21	12.2	107	0.00034	0.02	1	2650	1025
174	39.07	0.083	1	271	1.2	12.2	102	0.00034	0.02	1	2650	1025
175	39.08	0.071	1	326	1.01	12.2	96	0.00034	0.02	1	2650	1025
176	39.4	0.089	1	358	0.93	12.2	96	0.00034	0.02	1	2650	1025
177	39.65	0.016	1	354	0.77	10.7	95	0.00034	0.02	1	2650	1025
178	39.48	0.025	1	256	0.68	10.7	97	0.00034	0.02	1	2650	1025
179	39.2	0.06	1	267	0.69	11.1	92	0.00034	0.02	1	2650	1025
180	38.98	0.069	1	288	0.74	12.2	89	0.00034	0.02	1	2650	1025
181	38.94	0.059	1	354	0.7	11.6	87	0.00034	0.02	1	2650	1025
182	39.37	0.122	1	23	0.52	11.6	81	0.00034	0.02	1	2650	1025
183	39.73	0.173	1	42	0.43	11.6	78	0.00034	0.02	1	2650	1025
184	39.7	0.106	1	51	0.39	11.1	66	0.00034	0.02	1	2650	1025
185	39.48	0.038	1	20	0.4	10.7	24	0.00034	0.02	1	2650	1025
186	39.24	0.035	1	307	0.41	10.7	344	0.00034	0.02	1	2650	1025
187	39.09	0.064	1	325	0.48	7.8	332	0.00034	0.02	1	2650	1025
188	39.35	0.092	1	360	0.6	9.1	342	0.00034	0.02	1	2650	1025
189	39.65	0.055	1	354	0.57	7.8	330	0.00034	0.02	1	2650	1025
190	39.63	0.072	1	307	0.62	13.5	32	0.00034	0.02	1	2650	1025
191	39.43	0.057	1	301	0.83	12.8	45	0.00034	0.02	1	2650	1025
192	39.14	0.095	1	310	0.76	12.8	51	0.00034	0.02	1	2650	1025
193	38.99	0.181	1	336	0.95	12.2	54	0.00034	0.02	1	2650	1025
194	39.21	0.268	1	2	0.82	11.6	56	0.00034	0.02	1	2650	1025
195	39.65	0.239	1	26	0.92	12.2	40	0.00034	0.02	1	2650	1025
196	39.8	0.209	1	52	0.72	11.1	34	0.00034	0.02	1	2650	1025
197	39.7	0.156	1	78	0.94	12.2	25	0.00034	0.02	1	2650	1025
198	39.36	0.059	1	95	0.85	12.8	32	0.00034	0.02	1	2650	1025
199	39.1	0.007	1	39	0.79	11.6	358	0.00034	0.02	1	2650	1025
200	39.16	0.072	1	341	0.75	9.8	346	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
201	39.51	0.097	1	340	0.76	8.5	327	0.00034	0.02	1	2650	1025
202	39.72	0.094	1	301	0.84	8.5	310	0.00034	0.02	1	2650	1025
203	39.69	0.215	1	288	0.79	9.1	302	0.00034	0.02	1	2650	1025
204	39.39	0.278	1	296	0.85	8.8	295	0.00034	0.02	1	2650	1025
205	39.05	0.287	1	309	0.97	9.5	295	0.00034	0.02	1	2650	1025
206	39.1	0.297	1	336	0.9	10.2	295	0.00034	0.02	1	2650	1025
207	39.47	0.282	1	7	0.78	9.8	311	0.00034	0.02	1	2650	1025
208	39.84	0.246	1	34	0.79	9.8	303	0.00034	0.02	1	2650	1025
209	39.94	0.199	1	58	0.78	9.5	305	0.00034	0.02	1	2650	1025
210	39.65	0.124	1	72	0.83	9.1	299	0.00034	0.02	1	2650	1025
211	39.25	0.032	1	75	0.68	9.5	308	0.00034	0.02	1	2650	1025
212	39.03	0.035	1	25	0.73	9.8	314	0.00034	0.02	1	2650	1025
213	39.28	0.079	1	21	0.83	10.2	314	0.00034	0.02	1	2650	1025
214	39.7	0.045	1	26	0.64	10.7	312	0.00034	0.02	1	2650	1025
215	39.82	0.02	1	224	0.56	10.7	311	0.00034	0.02	1	2650	1025
216	39.6	0.088	1	240	0.54	9.5	302	0.00034	0.02	1	2650	1025
217	39.14	0.111	1	267	0.57	9.5	306	0.00034	0.02	1	2650	1025
218	38.95	0.12	1	320	0.46	10.2	306	0.00034	0.02	1	2650	1025
219	39.19	0.18	1	14	0.5	9.5	313	0.00034	0.02	1	2650	1025
220	39.73	0.215	1	44	0.43	10.7	312	0.00034	0.02	1	2650	1025
221	40.06	0.224	1	72	0.42	9.5	306	0.00034	0.02	1	2650	1025
222	39.88	0.182	1	107	0.41	10.7	304	0.00034	0.02	1	2650	1025
223	39.36	0.13	1	146	0.39	9.8	318	0.00034	0.02	1	2650	1025
224	38.96	0.09	1	177	0.37	9.8	320	0.00034	0.02	1	2650	1025
225	39.02	0.009	1	230	0.36	9.1	330	0.00034	0.02	1	2650	1025
226	39.53	0.013	1	9	0.36	10.7	331	0.00034	0.02	1	2650	1025
227	39.99	0.076	1	208	0.3	9.1	347	0.00034	0.02	1	2650	1025
228	39.86	0.238	1	231	0.31	9.1	45	0.00034	0.02	1	2650	1025
229	39.35	0.312	1	251	0.32	10.6	282	0.00034	0.02	1	2650	1025
230	38.94	0.357	1	284	0.32	6.9	243	0.00034	0.02	1	2650	1025
231	38.95	0.336	1	332	0.3	11.1	28	0.00034	0.02	1	2650	1025
232	39.49	0.317	1	5	0.31	9.9	49	0.00034	0.02	1	2650	1025
233	40.09	0.191	1	41	0.31	8.8	146	0.00034	0.02	1	2650	1025
234	40.14	0.174	1	90	0.34	9.8	64	0.00034	0.02	1	2650	1025
235	39.66	0.213	1	137	0.34	9.2	58	0.00034	0.02	1	2650	1025
236	39.01	0.167	1	184	0.37	11.1	63	0.00034	0.02	1	2650	1025
237	38.79	0.097	1	226	0.39	10.2	76	0.00034	0.02	1	2650	1025
238	39.24	0.044	1	283	0.45	10.2	82	0.00034	0.02	1	2650	1025
239	39.91	0.069	1	215	0.48	10.7	81	0.00034	0.02	1	2650	1025
240	40.05	0.177	1	217	0.48	9.8	88	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
241	39.62	0.29	1	231	0.49	9.8	94	0.00034	0.02	1	2650	1025
242	38.99	0.284	1	257	0.46	9.8	89	0.00034	0.02	1	2650	1025
243	38.69	0.28	1	303	0.54	9.1	93	0.00034	0.02	1	2650	1025
244	39.13	0.267	1	350	0.6	10.2	85	0.00034	0.02	1	2650	1025
245	39.88	0.238	1	30	0.51	11.1	85	0.00034	0.02	1	2650	1025
246	40.27	0.12	1	74	0.6	9.5	84	0.00034	0.02	1	2650	1025
247	39.93	0.125	1	166	0.59	9.8	87	0.00034	0.02	1	2650	1025
248	39.18	0.232	1	216	0.59	10.7	83	0.00034	0.02	1	2650	1025
249	38.7	0.237	1	254	0.69	10.7	91	0.00034	0.02	1	2650	1025
250	38.86	0.222	1	302	0.54	10.2	86	0.00034	0.02	1	2650	1025
251	39.68	0.134	1	345	0.52	9.8	93	0.00034	0.02	1	2650	1025
252	40.19	0.043	1	287	0.49	10.7	93	0.00034	0.02	1	2650	1025
253	39.89	0.144	1	252	0.45	10.2	83	0.00034	0.02	1	2650	1025
254	39.24	0.22	1	280	0.38	9.5	84	0.00034	0.02	1	2650	1025
255	38.68	0.292	1	308	0.35	10.7	79	0.00034	0.02	1	2650	1025
256	38.75	0.327	1	352	0.34	9.2	47	0.00034	0.02	1	2650	1025
257	39.55	0.285	1	23	0.34	8.5	87	0.00034	0.02	1	2650	1025
258	40.28	0.284	1	61	0.31	9.5	3	0.00034	0.02	1	2650	1025
259	40.19	0.153	1	106	0.34	10.7	359	0.00034	0.02	1	2650	1025
260	39.47	0.126	1	185	0.34	9.2	44	0.00034	0.02	1	2650	1025
261	38.79	0.138	1	257	0.32	10.7	311	0.00034	0.02	1	2650	1025
262	38.64	0.222	1	309	0.32	6.8	301	0.00034	0.02	1	2650	1025
263	39.34	0.222	1	351	0.34	8.3	333	0.00034	0.02	1	2650	1025
264	40.15	0.134	1	19	0.31	7.8	304	0.00034	0.02	1	2650	1025
265	40.13	0.041	1	195	0.31	9.5	339	0.00034	0.02	1	2650	1025
266	39.5	0.123	1	241	0.36	8.5	20	0.00034	0.02	1	2650	1025
267	38.78	0.157	1	281	0.32	7.6	311	0.00034	0.02	1	2650	1025
268	38.53	0.155	1	343	0.31	7.9	345	0.00034	0.02	1	2650	1025
269	39.08	0.241	1	22	0.3	8	303	0.00034	0.02	1	2650	1025
270	40	0.301	1	59	0.34	9.5	334	0.00034	0.02	1	2650	1025
271	40.33	0.253	1	106	0.36	9.1	307	0.00034	0.02	1	2650	1025
272	39.68	0.19	1	153	0.39	10.2	318	0.00034	0.02	1	2650	1025
273	38.91	0.181	1	189	0.36	9.1	306	0.00034	0.02	1	2650	1025
274	38.54	0.085	1	261	0.36	9.8	299	0.00034	0.02	1	2650	1025
275	39.87	0.104	1	353	0.37	9.5	315	0.00034	0.02	1	2650	1025
276	38.92	0.085	1	51	0.36	9.1	318	0.00034	0.02	1	2650	1025
277	40.3	0.117	1	181	0.32	9.8	7	0.00034	0.02	1	2650	1025
278	39.83	0.223	1	215	0.33	8	26	0.00034	0.02	1	2650	1025
279	39.03	0.345	1	241	0.32	6.5	93	0.00034	0.02	1	2650	1025
280	38.51	0.324	1	281	0.3	8.3	119	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
281	38.76	0.279	1	336	0.34	7.3	118	0.00034	0.02	1	2650	1025
282	39.64	0.251	1	10	0.37	7.5	121	0.00034	0.02	1	2650	1025
283	40.27	0.15	1	53	0.33	7.5	126	0.00034	0.02	1	2650	1025
284	39.98	0.108	1	173	0.36	6.9	142	0.00034	0.02	1	2650	1025
285	39.19	0.157	1	227	0.35	7.8	110	0.00034	0.02	1	2650	1025
286	38.59	0.191	1	275	0.29	8.3	132	0.00034	0.02	1	2650	1025
287	38.63	0.229	1	329	0.33	7.8	109	0.00034	0.02	1	2650	1025
288	39.48	0.21	1	10	0.33	7.8	53	0.00034	0.02	1	2650	1025
289	40.23	0.118	1	57	0.31	8.5	96	0.00034	0.02	1	2650	1025
290	40.09	0.101	1	188	0.29	8.5	82	0.00034	0.02	1	2650	1025
291	39.4	0.197	1	238	0.3	8.5	94	0.00034	0.02	1	2650	1025
292	38.77	0.224	1	276	0.31	9.2	293	0.00034	0.02	1	2650	1025
293	38.66	0.256	1	319	0.28	9.2	34	0.00034	0.02	1	2650	1025
294	39.29	0.273	1	5	0.31	9.2	104	0.00034	0.02	1	2650	1025
295	40.1	0.216	1	43	0.28	8.9	98	0.00034	0.02	1	2650	1025
296	40.11	0.125	1	117	0.28	9.2	45	0.00034	0.02	1	2650	1025
297	39.46	0.113	1	208	0.28	9.3	67	0.00034	0.02	1	2650	1025
298	38.79	0.118	1	251	0.28	9.1	66	0.00034	0.02	1	2650	1025
299	38.59	0.146	1	316	0.27	8.7	6	0.00034	0.02	1	2650	1025
300	39.09	0.202	1	8	0.27	8.7	29	0.00034	0.02	1	2650	1025
301	39.96	0.225	1	46	0.29	9.5	57	0.00034	0.02	1	2650	1025
302	40.16	0.174	1	107	0.31	9.5	360	0.00034	0.02	1	2650	1025
303	39.65	0.181	1	153	0.31	7.5	72	0.00034	0.02	1	2650	1025
304	38.95	0.131	1	195	0.34	7.5	50	0.00034	0.02	1	2650	1025
305	38.6	0.056	1	261	0.32	7.5	66	0.00034	0.02	1	2650	1025
306	38.87	0.092	1	351	0.34	8.5	57	0.00034	0.02	1	2650	1025
307	39.68	0.094	1	42	0.35	7.3	57	0.00034	0.02	1	2650	1025
308	40.06	0.09	1	179	0.35	8.3	67	0.00034	0.02	1	2650	1025
309	39.71	0.191	1	227	0.33	8.5	91	0.00034	0.02	1	2650	1025
310	39.11	0.293	1	249	0.33	8.3	72	0.00034	0.02	1	2650	1025
311	38.71	0.314	1	283	0.34	8	85	0.00034	0.02	1	2650	1025
312	38.87	0.292	1	328	0.34	8.5	68	0.00034	0.02	1	2650	1025
313	39.59	0.249	1	3	0.31	8	71	0.00034	0.02	1	2650	1025
314	40.16	0.13	1	36	0.29	8	50	0.00034	0.02	1	2650	1025
315	39.93	0.037	1	158	0.3	8	36	0.00034	0.02	1	2650	1025
316	39.33	0.098	1	234	0.3	8	51	0.00034	0.02	1	2650	1025
317	38.9	0.159	1	290	0.28	8	14	0.00034	0.02	1	2650	1025
318	38.84	0.204	1	331	0.28	8	54	0.00034	0.02	1	2650	1025
319	39.41	0.229	1	9	0.3	8	11	0.00034	0.02	1	2650	1025
320	39.97	0.123	1	35	0.28	8	355	0.00034	0.02	1	2650	1025

BT#	h	u	z	Cdir	Hs	Tp	Wdir	D	Kbr	F	RHOS	RHOW
321	39.88	0.034	1	150	0.28	8	18	0.00034	0.02	1	2650	1025
322	39.37	0.071	1	273	0.29	8	78	0.00034	0.02	1	2650	1025
323	38.93	0.117	1	299	0.29	8	9	0.00034	0.02	1	2650	1025
324	38.84	0.15	1	342	0.28	8	3	0.00034	0.02	1	2650	1025
325	39.25	0.208	1	18	0.32	8	45	0.00034	0.02	1	2650	1025
326	39.93	0.263	1	48	0.28	8	59	0.00034	0.02	1	2650	1025
327	40.01	0.2	1	87	0.28	8	312	0.00034	0.02	1	2650	1025
328	39.59	0.165	1	106	0.32	8	359	0.00034	0.02	1	2650	1025
329	39.16	0.087	1	81	0.37	7.1	359	0.00034	0.02	1	2650	1025
330	38.92	0.102	1	48	0.44	9.1	13	0.00034	0.02	1	2650	1025
331	39.12	0.191	1	39	0.73	9.5	21	0.00034	0.02	1	2650	1025
332	39.7	0.202	1	56	1.08	10.7	27	0.00034	0.02	1	2650	1025
333	39.9	0.139	1	94	1.29	11.1	24	0.00034	0.02	1	2650	1025
334	39.58	0.06	1	112	1.76	11.6	28	0.00034	0.02	1	2650	1025
335	39.08	0.02	1	335	2.08	11.6	24	0.00034	0.02	1	2650	1025
336	38.85	0.012	1	334	2.49	11.6	33	0.00034	0.02	1	2650	1025
337	38.99	0.045	1	16	2.36	12.8	20	0.00034	0.02	1	2650	1025
338	39.57	0.119	1	71	2.21	11.6	26	0.00034	0.02	1	2650	1025
339	39.94	0.107	1	101	2.21	12.2	26	0.00034	0.02	1	2650	1025
340	39.75	0.06	1	105	2.37	12.2	17	0.00034	0.02	1	2650	1025
341	39.41	0.042	1	83	2.35	12.8	33	0.00034	0.02	1	2650	1025
342	39.08	0.022	1	5	2.41	12.8	43	0.00034	0.02	1	2650	1025
343	38.96	0.033	1	277	2.28	12.8	34	0.00034	0.02	1	2650	1025

Appendix 2

(A) List of the bottom boundary layer dynamics output data and (b) the sediment transport output data of the AGC continental shelf sediment transport model SEDTRANS92.

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
1	5.3	8.77	0.0166	0.66	0.65	0.88	1.19	1.62	1.92	2.54	0.19	0.50
2	5.64	9.79	0.0147	0.87	0.74	1.14	1.56	1.76	2.34	3.25	0.19	0.48
3	4.85	8.25	0.0155	0.97	0.66	1.02	1.74	1.56	1.98	2.7	0.19	0.26
4	4.55	7.74	0.0154	0.91	0.64	1.04	1.64	1.52	2.05	2.8	0.19	0.33
5	4.98	8.79	0.0161	0.68	0.63	0.89	1.22	1.54	1.89	2.67	0.19	0.48
6	5.97	11.6	0.0152	0.63	0.7	0.93	1.14	1.69	2.01	3.12	0.19	0.64
7	5.11	8.86	0.017	0.51	0.61	0.8	0.91	1.55	1.79	2.48	0.19	0.67
8	6.32	12.87	0.0172	0.23	0.62	0.66	0.38	1.63	1.67	2.72	0.19	1.49
9	6.29	11.12	0.0167	0.44	0.69	0.82	0.78	1.74	1.91	2.69	0.19	0.91
10	4.48	5.92	0.0185	0.62	0.61	0.87	1.09	1.56	1.91	2.01	0.19	0.52
11	12.25	20.85	0.0126	1.15	1.3	1.73	2.07	2.96	3.6	4.91	0.19	0.75
12	11.07	17.97	0.0121	1.54	1.32	2.01	2.76	2.94	4	5.19	0.19	0.52
13	11.33	20.01	0.0128	1.12	1.2	1.6	2.02	2.76	3.33	4.71	0.19	0.67
14	23.61	50.73	0.0103	1.4	2.03	2.44	2.52	4.4	5.03	8.65	0.19	1.26
15	38.43	92.35	0.0091	1.35	2.85	3.12	2.45	5.99	6.42	12.34	0.19	2.49
16	45.82	110.13	0.0089	1.02	3.19	3.32	1.84	6.71	6.91	13.28	0.19	4.28
17	30.71	69.41	0.0103	0.84	2.24	2.27	1.51	4.97	5.01	9.05	0.19	2.80
18	28.47	61.17	0.0106	0.86	2.15	2.24	1.55	4.79	4.91	8.45	0.19	2.55
19	29.31	62.97	0.0105	0.75	2.21	2.3	1.33	4.9	5.03	8.64	0.19	3.14
20	24.67	53	0.0111	0.42	1.88	1.93	0.7	4.28	4.34	7.46	0.19	4.10
21	18.65	37.99	0.0124	0.27	1.49	1.5	0.45	3.52	3.54	5.76	0.19	3.74
22	19.13	35.32	0.0126	0.31	1.55	1.58	0.51	3.69	3.72	5.49	0.19	3.46
23	19.42	39.56	0.0117	0.75	1.63	1.79	1.32	3.72	3.94	6.43	0.19	1.96
24	16.94	28.84	0.0122	1.01	1.58	1.87	1.82	3.61	4.04	5.51	0.19	1.21
25	19.09	33.72	0.0115	1.21	1.76	2.13	2.17	3.94	4.5	6.36	0.19	1.16
26	16.96	32.93	0.0119	0.94	1.52	1.77	1.69	3.47	3.82	5.94	0.19	1.28
27	13.88	24.52	0.0141	0.63	1.2	1.24	1.14	2.96	3	4.25	0.19	1.30
28	15.48	30.05	0.0126	0.81	1.37	1.53	1.45	3.2	3.42	5.31	0.19	1.28
29	12.09	20.6	0.0148	0.38	1.09	1.15	0.64	2.72	2.79	3.8	0.19	1.91
30	10.88	19.22	0.0155	0.23	0.97	0.98	0.37	2.48	2.48	3.51	0.19	2.26
31	12.18	21.53	0.0148	0.37	1.07	1.1	0.64	2.69	2.72	3.84	0.19	1.90
32	11.55	19.68	0.015	0.44	1.05	1.11	0.72	2.63	2.69	3.66	0.19	1.65
33	9.66	15.07	0.0164	0.32	0.92	0.97	0.5	2.38	2.42	3.03	0.19	1.70
34	8.75	14.2	0.0169	0.25	0.84	0.87	0.38	2.18	2.21	2.88	0.19	1.80
35	7.14	11.59	0.0165	0.58	0.77	0.92	0.98	1.94	2.11	2.74	0.19	0.79
36	5.49	7.95	0.0148	1.12	0.79	1.33	1.91	1.85	2.56	2.97	0.19	0.38
37	7.35	12.52	0.0135	1.11	0.93	1.44	1.89	2.13	2.83	3.85	0.19	0.51
38	6.73	10.18	0.0142	1.12	0.9	1.44	1.9	2.09	2.82	3.41	0.19	0.48
39	5.98	8.66	0.0149	1.06	0.82	1.31	1.81	1.93	2.58	2.99	0.19	0.43
40	6.38	9.64	0.015	1.1	0.83	1.23	1.88	1.94	2.4	2.9	0.19	0.34

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
41	4.93	7.15	0.0161	0.95	0.69	1.09	1.62	1.66	2.12	2.46	0.19	0.34
42	4.93	7.13	0.0167	0.75	0.67	1	1.27	1.64	2.07	2.4	0.19	0.50
43	3.87	5.42	0.0185	0.64	0.55	0.81	1.09	1.39	1.7	1.91	0.19	0.43
44	4.68	7.31	0.0181	0.65	0.59	0.77	1.13	1.48	1.66	2.07	0.19	0.40
45	4.1	6.2	0.0195	0.44	0.52	0.67	0.73	1.37	1.54	1.86	0.19	0.62
46	3.35	4.85	0.0224	0.34	0.43	0.52	0.57	1.18	1.27	1.47	0.19	0.58
47	3.53	5.5	0.0219	0.27	0.43	0.51	0.43	1.19	1.27	1.58	0.19	0.76
48	2.51	3.52	0.0213	0.45	0.39	0.6	0.76	1.03	1.28	1.43	0.19	0.43
49	2.38	3.22	0.0192	0.65	0.43	0.78	1.1	1.06	1.53	1.66	0.19	0.35
50	2.85	4.17	0.0153	1.11	0.55	1.21	1.88	1.27	2.19	2.57	0.19	0.27
51	3.66	5.71	0.0139	1.36	0.67	1.46	2.29	1.49	2.6	3.25	0.19	0.26
52	2.58	3.49	0.0148	1.36	0.57	1.44	2.29	1.28	2.55	2.76	0.19	0.25
53	1.92	2.45	0.0174	0.98	0.43	1.03	1.65	1.02	1.83	1.87	0.19	0.24
54	1.95	2.48	0.0182	0.83	0.42	0.93	1.4	1.01	1.72	1.75	0.19	0.28
55	3.62	5.47	0.0175	0.68	0.54	0.85	1.15	1.33	1.73	2.09	0.19	0.42
56	3.92	5.93	0.0219	0.38	0.46	0.52	0.66	1.28	1.32	1.6	0.19	0.55
57	3.2	4.63	0.0252	0.17	0.38	0.41	0.26	1.12	1.14	1.32	0.19	0.85
58	2.61	3.53	0.0262	0.26	0.35	0.4	0.43	1	1.05	1.14	0.19	0.55
59	2.72	3.81	0.0229	0.36	0.39	0.51	0.6	1.05	1.19	1.33	0.19	0.49
60	2.24	3.03	0.0255	0.37	0.33	0.43	0.63	0.91	0.99	1.07	0.19	0.35
61	2.8	3.92	0.0207	0.5	0.42	0.63	0.84	1.1	1.34	1.51	0.19	0.41
62	2.28	2.97	0.0203	0.6	0.4	0.71	1.02	1.03	1.41	1.48	0.19	0.33
63	3	4.34	0.0198	0.53	0.45	0.68	0.9	1.15	1.43	1.65	0.19	0.42
64	3.52	5.33	0.0192	0.63	0.49	0.69	1.09	1.24	1.41	1.71	0.19	0.31
65	3.21	5.01	0.0174	0.68	0.5	0.84	1.15	1.23	1.67	2.08	0.19	0.40
66	2.31	3.12	0.0171	0.9	0.46	1.01	1.52	1.11	1.87	2.03	0.19	0.29
67	3.6	6.12	0.0155	0.87	0.57	1.01	1.48	1.33	1.93	2.63	0.19	0.35
68	2.83	4.09	0.0177	0.8	0.48	0.87	1.36	1.16	1.63	1.89	0.19	0.27
69	3.54	5.52	0.0176	0.64	0.52	0.82	1.08	1.29	1.68	2.09	0.19	0.44
70	2.9	4.19	0.0223	0.38	0.4	0.52	0.64	1.08	1.21	1.4	0.19	0.49
71	2.14	2.87	0.0269	0.31	0.31	0.39	0.53	0.89	0.94	1.01	0.19	0.39
72	3.17	4.94	0.0222	0.38	0.41	0.49	0.66	1.11	1.18	1.47	0.19	0.46
73	3.89	7.17	0.015	0.88	0.59	1.02	1.49	1.36	1.95	2.87	0.19	0.36
74	3.79	6.46	0.0164	0.85	0.55	0.89	1.45	1.31	1.65	2.25	0.19	0.25
75	4.62	8.52	0.0141	1.14	0.68	1.18	1.94	1.52	2.11	3.12	0.19	0.24
76	3.1	4.69	0.0157	0.96	0.55	1.11	1.62	1.29	2.07	2.51	0.19	0.33
77	4.41	7.92	0.0133	1.24	0.72	1.43	2.1	1.6	2.63	3.78	0.19	0.34
78	3.72	6.34	0.0145	1.04	0.62	1.19	1.76	1.41	2.22	3.03	0.19	0.34
79	3.66	6.17	0.0167	0.82	0.54	0.86	1.41	1.28	1.61	2.17	0.19	0.25
80	4.38	8.08	0.0148	0.91	0.63	1.04	1.54	1.46	2	2.95	0.19	0.35

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
81	3.87	6.34	0.0189	0.47	0.5	0.67	0.79	1.29	1.48	1.94	0.19	0.55
82	2.89	3.81	0.0284	0.09	0.35	0.36	0.14	1.07	1.07	1.13	0.19	0.90
83	6.54	9.88	0.018	0.49	0.7	0.8	0.83	1.84	1.94	2.34	0.19	0.80
84	11.3	18.35	0.0154	0.36	1.04	1.08	0.56	2.62	2.67	3.46	0.19	1.87
85	12.75	21.71	0.0146	0.33	1.13	1.17	0.52	2.81	2.86	3.89	0.19	2.25
86	14.39	25.41	0.0137	0.48	1.26	1.33	0.78	3.05	3.13	4.43	0.19	2.02
87	14.96	24.28	0.0141	0.43	1.3	1.35	0.69	3.2	3.25	4.22	0.19	2.18
88	22.99	42.44	0.0119	0.62	1.81	1.85	1.01	4.22	4.26	6.3	0.19	2.74
89	28.84	58.75	0.0107	0.78	2.2	2.3	1.29	4.9	5.02	8.18	0.19	3.10
90	22.62	41.76	0.011	1.28	1.98	2.34	2.17	4.37	4.85	7.17	0.19	1.41
91	19.32	35.66	0.0118	0.99	1.69	1.93	1.67	3.83	4.13	6.11	0.19	1.49
92	18.16	33.53	0.0127	0.77	1.51	1.57	1.31	3.57	3.63	5.37	0.19	1.60
93	17.9	31.61	0.0127	0.7	1.52	1.63	1.17	3.59	3.71	5.24	0.19	1.83
94	15.46	27.31	0.0133	0.53	1.35	1.45	0.86	3.23	3.34	4.72	0.19	2.05
95	12.74	22.5	0.0143	0.43	1.14	1.2	0.69	2.79	2.86	4.04	0.19	1.93
96	11.2	19.79	0.0154	0.11	0.99	0.99	0.15	2.53	2.53	3.57	0.19	3.01
97	10.25	16.64	0.0153	0.52	0.99	1.1	0.86	2.48	2.59	3.37	0.19	1.30
98	11.66	19.85	0.0135	0.86	1.18	1.44	1.45	2.76	3.1	4.22	0.19	0.99
99	9.57	15.54	0.0143	0.8	1.02	1.29	1.36	2.44	2.78	3.61	0.19	0.85
100	8.69	14.79	0.0141	1	0.97	1.28	1.73	2.27	2.64	3.59	0.19	0.52
101	7.51	11.71	0.0144	1.2	0.92	1.34	2.07	2.14	2.6	3.25	0.19	0.34
102	6.45	10.48	0.0147	0.98	0.82	1.21	1.67	1.93	2.43	3.15	0.19	0.45
103	5.79	8.75	0.0149	0.99	0.79	1.26	1.69	1.86	2.49	3.01	0.19	0.46
104	5.58	8.7	0.017	0.74	0.68	0.89	1.28	1.68	1.89	2.36	0.19	0.43
105	5.56	8.4	0.0171	0.7	0.68	0.91	1.2	1.7	1.96	2.37	0.19	0.50
106	5.61	9.11	0.017	0.54	0.66	0.85	0.91	1.67	1.9	2.47	0.19	0.72
107	3.69	4.99	0.0227	0.28	0.46	0.54	0.46	1.28	1.36	1.47	0.19	0.74
108	3.87	5.11	0.0253	0.16	0.44	0.45	0.24	1.31	1.31	1.38	0.19	0.96
109	6.56	10.23	0.0184	0.38	0.68	0.74	0.63	1.81	1.87	2.34	0.19	1.00
110	8.07	12.58	0.0151	0.86	0.91	1.18	1.47	2.19	2.52	3.14	0.19	0.60
111	8.48	13.23	0.0144	0.96	0.98	1.33	1.63	2.32	2.77	3.46	0.19	0.62
112	11.21	18.19	0.0142	0.72	1.12	1.33	1.2	2.69	2.94	3.82	0.19	1.12
113	13.81	21.54	0.0148	0.35	1.22	1.25	0.54	3.05	3.08	3.84	0.19	2.27
114	11.29	17.08	0.0154	0.72	1.07	1.17	1.24	2.69	2.78	3.36	0.19	0.93
115	8.62	13.45	0.0149	0.8	0.95	1.22	1.35	2.3	2.63	3.29	0.19	0.76
116	10.14	17.27	0.0132	1.09	1.12	1.52	1.87	2.57	3.09	4.21	0.19	0.64
117	8.36	13.04	0.0154	0.93	0.91	1.13	1.63	2.21	2.41	3.01	0.19	0.46
118	8.29	12.54	0.0154	0.88	0.92	1.16	1.52	2.23	2.5	3.02	0.19	0.56
119	7.85	11.87	0.0167	0.65	0.83	0.96	1.13	2.1	2.23	2.69	0.19	0.70
120	7.07	11.03	0.0174	0.41	0.75	0.84	0.68	1.93	2.04	2.54	0.19	1.07

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
121	5.44	8.48	0.0179	0.51	0.64	0.79	0.85	1.64	1.81	2.26	0.19	0.70
122	4.85	7.57	0.0156	0.91	0.68	1.09	1.55	1.62	2.14	2.67	0.19	0.39
123	4.85	7.88	0.0139	1.21	0.75	1.4	2.05	1.71	2.62	3.4	0.19	0.35
124	4.5	6.8	0.015	1.02	0.69	1.24	1.73	1.62	2.37	2.87	0.19	0.39
125	3.87	5.61	0.0154	1.12	0.64	1.21	1.9	1.49	2.21	2.57	0.19	0.27
126	3.84	5.37	0.0155	1.19	0.65	1.24	2.02	1.49	2.22	2.49	0.19	0.24
127	2.64	3.58	0.0163	1.04	0.52	1.13	1.75	1.22	2.06	2.23	0.19	0.27
128	6.28	13.49	0.0142	0.72	0.73	1.01	1.23	1.71	2.08	3.57	0.19	0.63
129	7.05	16.95	0.0149	0.45	0.7	0.8	0.77	1.71	1.82	3.51	0.19	1.02
130	6.66	15.05	0.0163	0.22	0.64	0.67	0.35	1.64	1.68	3.03	0.19	1.69
131	7.35	14.97	0.0142	0.69	0.81	1.06	1.18	1.92	2.24	3.66	0.19	0.77
132	4.33	5.52	0.0158	1.09	0.71	1.3	1.85	1.67	2.48	2.53	0.19	0.37
133	10.41	15.73	0.0137	1.06	1.16	1.55	1.8	2.7	3.22	3.9	0.19	0.72
134	17.4	29.64	0.0123	1.08	1.59	1.84	1.85	3.64	3.96	5.4	0.19	1.13
135	44.56	86.51	0.0095	1.32	3.23	3.41	2.23	6.92	7.14	11.09	0.19	3.10
136	46.81	86.43	0.0096	0.99	3.34	3.44	1.63	7.21	7.33	10.83	0.19	4.40
137	49.87	101.59	0.0092	1.09	3.49	3.6	1.82	7.4	7.54	12.29	0.19	4.49
138	70.1	150.61	0.0083	0.99	4.58	4.64	1.62	9.45	9.52	16.36	0.19	7.65
139	59.51	134.49	0.0086	1.02	3.94	3.97	1.7	8.21	8.25	14.92	0.19	6.06
140	63.84	153.42	0.0083	1.13	4.19	4.27	1.9	8.59	8.71	16.74	0.19	6.30
141	54.87	117.9	0.0088	1.14	3.79	3.94	1.89	7.89	8.1	13.92	0.19	5.09
142	55.56	125.57	0.0087	0.95	3.77	3.89	1.57	7.85	8	14.47	0.19	6.18
143	38.4	82.51	0.0096	1.1	2.82	2.98	1.85	6.04	6.26	10.75	0.19	3.26
144	36.01	77.36	0.01	1.08	2.6	2.65	1.83	5.68	5.74	9.87	0.19	2.79
145	32.6	70.05	0.0101	1.14	2.45	2.6	1.93	5.33	5.52	9.49	0.19	2.40
146	27.13	55.26	0.011	0.47	2.06	2.11	0.74	4.65	4.71	7.67	0.19	4.29
147	19.68	36.33	0.0126	0.26	1.57	1.58	0.38	3.75	3.76	5.56	0.19	3.93
148	21.46	43.73	0.012	0.13	1.66	1.67	0.19	3.89	3.9	6.35	0.19	5.35
149	18.63	36.18	0.0127	0.21	1.49	1.5	0.31	3.56	3.56	5.53	0.19	4.11
150	19.9	38.64	0.0123	0.4	1.59	1.62	0.63	3.74	3.77	5.86	0.19	3.29
151	17.94	34.83	0.0125	0.47	1.48	1.55	0.74	3.49	3.56	5.54	0.19	2.73
152	16.33	31.7	0.0131	0.25	1.34	1.36	0.37	3.23	3.25	5.05	0.19	3.48
153	17.2	35.03	0.0125	0.4	1.41	1.47	0.63	3.33	3.39	5.53	0.19	2.94
154	15.11	29.34	0.0132	0.43	1.29	1.35	0.69	3.08	3.15	4.89	0.19	2.40
155	14.42	28.01	0.0136	0.55	1.22	1.25	0.92	2.96	2.99	4.64	0.19	1.73
156	12.11	22.37	0.0141	0.52	1.1	1.18	0.86	2.68	2.77	4.1	0.19	1.58
157	14.94	25.44	0.0131	0.75	1.37	1.55	1.25	3.23	3.44	4.69	0.19	1.46
158	16.95	29.95	0.012	1.11	1.59	1.92	1.88	3.59	4.03	5.69	0.19	1.16
159	15.29	28.22	0.0129	0.76	1.35	1.49	1.28	3.19	3.35	4.95	0.19	1.42
160	17.12	31.6	0.013	0.56	1.43	1.47	0.93	3.41	3.46	5.11	0.19	2.10

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
161	16.41	27.94	0.0137	0.47	1.37	1.38	0.76	3.36	3.37	4.59	0.19	2.23
162	16.12	29.77	0.0134	0.61	1.34	1.37	1.03	3.25	3.27	4.83	0.19	1.73
163	12.46	19.44	0.0149	0.59	1.15	1.23	0.99	2.86	2.94	3.67	0.19	1.36
164	11.37	16.47	0.0155	0.57	1.09	1.19	0.95	2.74	2.85	3.3	0.19	1.26
165	21.45	37.89	0.0123	0.94	1.74	1.79	1.63	4.06	4.12	5.82	0.19	1.50
166	20.61	35.11	0.012	1.06	1.77	1.97	1.81	4.07	4.3	5.86	0.19	1.38
167	23.79	46.2	0.0112	0.9	1.94	2.12	1.51	4.35	4.58	7.11	0.19	2.14
168	23.4	45.43	0.0112	0.83	1.91	2.08	1.38	4.3	4.51	7.01	0.19	2.31
169	16.41	27.94	0.013	0.71	1.45	1.58	1.19	3.43	3.58	4.88	0.19	1.65
170	17.87	30.43	0.0133	0.54	1.48	1.51	0.88	3.58	3.61	4.91	0.19	2.21
171	16.99	27.58	0.0138	0.26	1.42	1.43	0.39	3.49	3.5	4.55	0.19	3.18
172	21.83	44.47	0.0118	0.57	1.7	1.73	0.93	3.95	3.98	6.49	0.19	2.83
173	19.49	37.83	0.012	0.71	1.61	1.71	1.18	3.73	3.85	5.98	0.19	2.06
174	19.41	37.69	0.0121	0.56	1.6	1.69	0.91	3.71	3.82	5.93	0.19	2.60
175	16.33	31.71	0.0129	0.47	1.36	1.42	0.76	3.25	3.31	5.14	0.19	2.40
176	14.91	28.96	0.0135	0.53	1.25	1.27	0.89	3.03	3.05	4.75	0.19	1.85
177	10.32	17.57	0.0161	0.12	0.93	0.93	0.18	2.41	2.41	3.28	0.19	2.66
178	9.16	15.6	0.0166	0.18	0.85	0.87	0.26	2.22	2.23	3.04	0.19	2.19
179	9.91	17.5	0.0154	0.37	0.93	1	0.59	2.34	2.41	3.41	0.19	1.68
180	12	23.3	0.014	0.43	1.08	1.16	0.7	2.62	2.7	4.2	0.19	1.89
181	10.73	19.81	0.0154	0.36	0.95	0.96	0.58	2.42	2.42	3.58	0.19	1.76
182	7.87	14.53	0.0154	0.6	0.81	0.95	1.02	2	2.15	3.18	0.19	0.83
183	6.44	11.9	0.0147	0.79	0.77	1.07	1.34	1.82	2.21	3.27	0.19	0.58
184	5.51	9.74	0.0167	0.51	0.64	0.82	0.86	1.61	1.82	2.57	0.19	0.74
185	5.39	9.18	0.0193	0.22	0.57	0.61	0.35	1.54	1.58	2.15	0.19	1.25
186	5.57	9.48	0.0193	0.21	0.58	0.61	0.32	1.57	1.59	2.17	0.19	1.32
187	2.8	3.47	0.0247	0.3	0.39	0.49	0.49	1.1	1.21	1.2	0.19	0.56
188	5.83	8.45	0.0183	0.46	0.67	0.81	0.77	1.75	1.9	2.2	0.19	0.82
189	3.19	3.96	0.0248	0.27	0.42	0.49	0.44	1.19	1.26	1.26	0.19	0.65
190	10.88	23.37	0.0145	0.42	0.94	0.96	0.7	2.34	2.36	4.05	0.19	1.63
191	13.96	28.44	0.0136	0.38	1.17	1.19	0.61	2.85	2.87	4.67	0.19	2.36
192	12.87	26.23	0.0138	0.54	1.11	1.14	0.91	2.7	2.73	4.46	0.19	1.55
193	15.4	29.9	0.0128	0.91	1.34	1.46	1.58	3.15	3.27	5.08	0.19	1.03
194	12.47	23.02	0.0124	1.24	1.28	1.68	2.13	2.9	3.41	5.04	0.19	0.65
195	14.66	28.46	0.0117	1.2	1.45	1.87	2.04	3.22	3.8	5.9	0.19	0.93
196	10.15	17.93	0.0132	1	1.11	1.48	1.71	2.54	3.05	4.31	0.19	0.74
197	14.96	29.04	0.0126	0.84	1.34	1.51	1.42	3.12	3.32	5.16	0.19	1.25
198	14.32	29.17	0.0134	0.39	1.2	1.23	0.63	2.91	2.94	4.79	0.19	2.39
199	12.05	22.25	0.0149	0.06	1.04	1.04	0.08	2.63	2.63	3.88	0.19	3.52
200	8.73	13.61	0.0164	0.41	0.87	0.97	0.67	2.23	2.33	2.9	0.19	1.33

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
201	5.99	8.11	0.0185	0.49	0.7	0.85	0.8	1.82	1.99	2.15	0.19	0.80
202	6.55	8.86	0.0181	0.48	0.74	0.88	0.79	1.93	2.08	2.25	0.19	0.87
203	7.56	10.95	0.0147	0.98	0.94	1.35	1.67	2.22	2.76	3.2	0.19	0.58
204	7.51	10.52	0.014	1.23	1	1.58	2.09	2.31	3.11	3.49	0.19	0.49
205	10.6	16.03	0.013	1.32	1.24	1.81	2.25	2.82	3.59	4.35	0.19	0.61
206	11.33	18.4	0.0127	1.35	1.27	1.79	2.31	2.87	3.57	4.64	0.19	0.58
207	8.97	13.98	0.0137	1.23	1.06	1.53	2.11	2.45	3.04	3.79	0.19	0.47
208	8.95	13.96	0.0151	1.02	0.96	1.19	1.79	2.31	2.5	3.12	0.19	0.42
209	8.22	12.42	0.0154	0.89	0.92	1.16	1.53	2.22	2.5	3.02	0.19	0.55
210	7.96	11.52	0.0166	0.61	0.86	1.01	1.04	2.17	2.34	2.71	0.19	0.83
211	7.37	11.15	0.0186	0.2	0.73	0.75	0.31	1.97	1.98	2.4	0.19	1.61
212	8.54	13.31	0.0176	0.23	0.81	0.82	0.35	2.16	2.17	2.71	0.19	1.77
213	10.38	16.86	0.0158	0.45	0.97	1.02	0.74	2.47	2.52	3.27	0.19	1.41
214	8.56	14.58	0.017	0.28	0.8	0.82	0.44	2.11	2.13	2.9	0.19	1.65
215	7.46	12.71	0.018	0.14	0.71	0.71	0.2	1.91	1.91	2.6	0.19	1.97
216	5.77	8.72	0.0189	0.43	0.63	0.72	0.73	1.69	1.77	2.14	0.19	0.79
217	6.21	9.39	0.0174	0.54	0.71	0.87	0.91	1.81	1.99	2.4	0.19	0.75
218	5.82	9.45	0.0167	0.58	0.69	0.9	0.97	1.72	1.97	2.56	0.19	0.71
219	5.43	8.22	0.0166	0.78	0.69	0.96	1.33	1.7	2.01	2.43	0.19	0.45
220	5.75	9.79	0.0159	0.87	0.7	0.95	1.51	1.68	1.92	2.61	0.19	0.33
221	4.4	6.66	0.0159	0.93	0.65	1.08	1.59	1.54	2.09	2.53	0.19	0.35
222	5.45	9.29	0.0151	0.81	0.71	1.08	1.38	1.7	2.18	2.97	0.19	0.51
223	4.5	7.02	0.0174	0.59	0.59	0.84	1	1.48	1.79	2.23	0.19	0.56
224	4.34	6.77	0.0193	0.43	0.53	0.67	0.72	1.4	1.54	1.92	0.19	0.65
225	3.55	5.15	0.0254	0.06	0.4	0.4	0.08	1.2	1.2	1.39	0.19	1.21
226	4.84	8.25	0.021	0.09	0.5	0.51	0.13	1.41	1.42	1.93	0.19	1.57
227	2.83	4.1	0.0227	0.35	0.39	0.5	0.58	1.06	1.18	1.37	0.19	0.52
228	2.94	4.26	0.0159	0.98	0.54	1.12	1.66	1.27	2.09	2.42	0.19	0.32
229	4.27	7.2	0.0135	1.28	0.71	1.45	2.17	1.59	2.65	3.58	0.19	0.32
230	0.96	1.05	0.0162	1.38	0.35	1.42	2.31	0.81	2.42	2.13	0.19	0.21
231	4.34	7.67	0.0132	1.35	0.72	1.47	2.29	1.59	2.64	3.73	0.19	0.28
232	3.64	5.73	0.0141	1.28	0.65	1.4	2.16	1.47	2.53	3.19	0.19	0.28
233	2.65	3.71	0.0185	0.76	0.45	0.81	1.29	1.11	1.52	1.7	0.19	0.26
234	3.81	5.94	0.0167	0.75	0.57	0.93	1.27	1.38	1.85	2.31	0.19	0.41
235	3.35	4.91	0.0173	0.84	0.53	0.9	1.44	1.28	1.69	1.98	0.19	0.27
236	5.34	9.44	0.0159	0.73	0.66	0.92	1.25	1.6	1.9	2.69	0.19	0.47
237	4.97	8.06	0.0181	0.47	0.59	0.74	0.78	1.52	1.69	2.2	0.19	0.70
238	5.64	9.15	0.0192	0.25	0.6	0.65	0.4	1.61	1.66	2.15	0.19	1.20
239	6.38	10.86	0.0177	0.37	0.67	0.74	0.61	1.74	1.82	2.47	0.19	1.05
240	5.39	8.41	0.0163	0.77	0.69	0.99	1.32	1.69	2.04	2.55	0.19	0.47

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
241	5.6	8.73	0.014	1.22	0.82	1.42	2.07	1.86	2.68	3.35	0.19	0.36
242	5.39	8.4	0.0139	1.21	0.81	1.45	2.05	1.84	2.75	3.43	0.19	0.39
243	5.41	7.84	0.0145	1.19	0.81	1.41	2.01	1.86	2.7	3.12	0.19	0.38
244	7.55	12.25	0.0147	1.09	0.89	1.22	1.89	2.08	2.42	3.14	0.19	0.35
245	7.17	12.67	0.014	1.03	0.87	1.27	1.77	2.02	2.53	3.58	0.19	0.46
246	6.23	9.43	0.0169	0.58	0.73	0.93	0.98	1.84	2.08	2.51	0.19	0.74
247	6.66	10.39	0.0177	0.57	0.71	0.81	0.99	1.84	1.93	2.41	0.19	0.65
248	8.03	13.67	0.0139	1.03	0.95	1.34	1.77	2.2	2.71	3.69	0.19	0.53
249	9.54	16.24	0.0131	1.1	1.09	1.54	1.88	2.5	3.11	4.24	0.19	0.64
250	6.86	11.13	0.0144	0.98	0.86	1.28	1.68	2.02	2.56	3.33	0.19	0.51
251	5.93	9.25	0.0177	0.6	0.67	0.81	1.04	1.72	1.86	2.32	0.19	0.57
252	6.45	10.99	0.0181	0.25	0.66	0.7	0.4	1.74	1.79	2.44	0.19	1.37
253	5.51	8.94	0.0162	0.67	0.69	0.96	1.13	1.69	2.03	2.63	0.19	0.61
254	4.12	6.23	0.0156	0.94	0.64	1.13	1.58	1.51	2.18	2.64	0.19	0.39
255	4.84	8.24	0.0138	1.2	0.74	1.36	2.04	1.67	2.52	3.43	0.19	0.33
256	3.49	5.11	0.0145	1.31	0.65	1.4	2.2	1.46	2.52	2.95	0.19	0.26
257	2.67	3.62	0.016	1.12	0.53	1.19	1.89	1.24	2.12	2.29	0.19	0.24
258	3.22	4.87	0.0151	1.13	0.58	1.22	1.92	1.34	2.21	2.67	0.19	0.27
259	4.48	7.62	0.0174	0.64	0.57	0.77	1.11	1.41	1.62	2.21	0.19	0.41
260	3.38	4.95	0.0192	0.55	0.49	0.71	0.93	1.24	1.51	1.77	0.19	0.44
261	4.41	7.51	0.0173	0.6	0.57	0.78	1.03	1.41	1.66	2.26	0.19	0.48
262	0.89	0.97	0.0197	0.87	0.29	0.92	1.46	0.7	1.62	1.4	0.19	0.23
263	2.49	3.29	0.0172	0.91	0.49	1.03	1.53	1.17	1.91	2.02	0.19	0.30
264	1.68	2.08	0.0231	0.53	0.32	0.57	0.9	0.83	1.09	1.08	0.19	0.26
265	3.24	4.9	0.0238	0.21	0.39	0.44	0.34	1.12	1.16	1.41	0.19	0.78
266	2.84	3.84	0.0206	0.53	0.44	0.66	0.89	1.13	1.4	1.51	0.19	0.40
267	1.69	2.05	0.0209	0.64	0.35	0.72	1.07	0.89	1.37	1.33	0.19	0.29
268	1.98	2.49	0.0202	0.64	0.39	0.75	1.08	0.97	1.45	1.46	0.19	0.32
269	1.94	2.48	0.0179	0.94	0.42	0.96	1.57	1	1.69	1.72	0.19	0.22
270	3.57	5.4	0.0152	1.17	0.61	1.2	1.98	1.4	2.12	2.57	0.19	0.23
271	3.34	4.84	0.0155	1.04	0.59	1.19	1.76	1.38	2.22	2.58	0.19	0.32
272	4.81	7.81	0.0155	0.83	0.67	1.07	1.41	1.6	2.12	2.76	0.19	0.46
273	3.57	5.17	0.0178	0.75	0.54	0.86	1.27	1.32	1.69	1.96	0.19	0.34
274	4.29	6.69	0.0196	0.41	0.52	0.64	0.68	1.38	1.51	1.89	0.19	0.67
275	3.91	5.91	0.0194	0.47	0.51	0.68	0.8	1.33	1.52	1.84	0.19	0.55
276	3.57	5.17	0.0231	0.37	0.43	0.49	0.64	1.21	1.24	1.44	0.19	0.50
277	3.56	5.55	0.0186	0.53	0.5	0.72	0.89	1.27	1.54	1.93	0.19	0.51
278	2.04	2.59	0.0176	0.9	0.44	1	1.52	1.05	1.84	1.88	0.19	0.28
279	0.6	0.62	0.0169	1.33	0.27	1.36	2.23	0.64	2.3	1.91	0.19	0.20
280	2.31	3.05	0.0151	1.29	0.53	1.39	2.18	1.21	2.48	2.62	0.19	0.26

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
281	1.47	1.7	0.0173	1.1	0.4	1.15	1.84	0.93	2.03	1.88	0.19	0.23
282	1.72	2.05	0.018	0.98	0.41	1.01	1.64	0.97	1.78	1.7	0.19	0.22
283	1.46	1.74	0.0226	0.59	0.31	0.62	0.99	0.79	1.15	1.09	0.19	0.24
284	0.97	1.07	0.0265	0.44	0.23	0.49	0.73	0.62	0.94	0.83	0.19	0.26
285	2.02	2.51	0.021	0.63	0.38	0.69	1.07	0.96	1.33	1.32	0.19	0.28
286	2.22	2.93	0.0184	0.78	0.43	0.87	1.31	1.05	1.64	1.73	0.19	0.29
287	1.98	2.46	0.0179	0.92	0.43	0.99	1.54	1.04	1.81	1.8	0.19	0.26
288	1.87	2.32	0.0186	0.84	0.41	0.91	1.41	0.99	1.67	1.66	0.19	0.26
289	2.35	3.18	0.0214	0.5	0.39	0.61	0.84	1	1.27	1.38	0.19	0.37
290	2.22	3	0.024	0.42	0.34	0.48	0.71	0.92	1.05	1.14	0.19	0.34
291	2.38	3.22	0.0179	0.8	0.45	0.9	1.36	1.1	1.7	1.84	0.19	0.30
292	3.18	4.66	0.0161	0.93	0.55	1.08	1.57	1.31	2.04	2.39	0.19	0.34
293	2.89	4.23	0.0162	1.01	0.52	1.06	1.7	1.22	1.89	2.22	0.19	0.24
294	3.11	4.55	0.0159	1.07	0.55	1.1	1.8	1.28	1.96	2.3	0.19	0.23
295	2.47	3.5	0.0173	0.87	0.47	0.94	1.46	1.11	1.74	1.97	0.19	0.27
296	2.71	3.96	0.0209	0.51	0.4	0.59	0.88	1.05	1.24	1.45	0.19	0.34
297	2.86	4.24	0.0202	0.49	0.43	0.63	0.83	1.1	1.34	1.59	0.19	0.43
298	2.79	4.04	0.0199	0.52	0.43	0.67	0.87	1.11	1.41	1.63	0.19	0.43
299	2.4	3.33	0.0199	0.6	0.41	0.7	1.02	1.03	1.38	1.53	0.19	0.33
300	2.34	3.24	0.0175	0.83	0.45	0.94	1.39	1.09	1.76	1.95	0.19	0.30
301	3.05	4.62	0.0159	0.93	0.54	1.08	1.58	1.27	2.02	2.45	0.19	0.33
302	3.24	4.89	0.0182	0.7	0.49	0.78	1.2	1.21	1.53	1.85	0.19	0.31
303	1.44	1.71	0.021	0.7	0.33	0.72	1.18	0.81	1.28	1.22	0.19	0.22
304	1.66	1.99	0.0226	0.54	0.33	0.62	0.9	0.86	1.22	1.16	0.19	0.30
305	1.61	1.92	0.0296	0.25	0.27	0.36	0.41	0.77	0.87	0.83	0.19	0.41
306	2.78	3.76	0.0234	0.4	0.39	0.51	0.67	1.07	1.18	1.28	0.19	0.43
307	1.4	1.62	0.026	0.39	0.28	0.48	0.65	0.75	0.99	0.92	0.19	0.32
308	2.46	3.25	0.0244	0.38	0.36	0.48	0.65	0.99	1.1	1.16	0.19	0.39
309	2.57	3.48	0.0181	0.78	0.47	0.88	1.32	1.14	1.68	1.82	0.19	0.30
310	2.45	3.24	0.0156	1.18	0.53	1.29	1.99	1.23	2.33	2.47	0.19	0.28
311	2.26	2.87	0.0155	1.25	0.52	1.35	2.11	1.2	2.41	2.46	0.19	0.26
312	2.78	3.76	0.0161	1.14	0.54	1.17	1.91	1.25	2.05	2.22	0.19	0.22
313	1.94	2.48	0.0175	0.97	0.43	1.02	1.64	1.02	1.79	1.83	0.19	0.23
314	1.75	2.23	0.0216	0.54	0.34	0.64	0.91	0.88	1.26	1.28	0.19	0.32
315	1.84	2.34	0.0318	0.17	0.26	0.3	0.28	0.8	0.83	0.84	0.19	0.51
316	1.91	2.44	0.0235	0.42	0.33	0.54	0.7	0.89	1.13	1.15	0.19	0.37
317	1.84	2.34	0.0215	0.62	0.35	0.64	1.05	0.88	1.19	1.21	0.19	0.23
318	1.84	2.35	0.0193	0.79	0.38	0.81	1.33	0.93	1.44	1.47	0.19	0.22
319	1.9	2.42	0.0175	0.92	0.43	1.02	1.55	1.02	1.86	1.89	0.19	0.27
320	1.71	2.18	0.0225	0.51	0.33	0.59	0.85	0.85	1.16	1.19	0.19	0.31

BT	ub	Ab	fcw	u*cs	u*ws	u*cws	u*c	u*w	u*cw	dcw	z0	z0c
321	1.72	2.19	0.0325	0.16	0.25	0.29	0.26	0.76	0.79	0.81	0.19	0.50
322	1.84	2.35	0.0261	0.31	0.3	0.43	0.52	0.84	0.98	1	0.19	0.41
323	1.9	2.42	0.0236	0.47	0.33	0.53	0.8	0.87	1.07	1.09	0.19	0.29
324	1.84	2.35	0.0205	0.62	0.36	0.71	1.04	0.92	1.38	1.4	0.19	0.31
325	2.05	2.61	0.0182	0.84	0.43	0.94	1.42	1.04	1.73	1.77	0.19	0.28
326	1.72	2.19	0.0168	1.05	0.42	1.13	1.76	0.99	2.02	2.05	0.19	0.25
327	1.71	2.18	0.0188	0.8	0.38	0.86	1.34	0.92	1.57	1.6	0.19	0.26
328	2.01	2.56	0.0207	0.65	0.38	0.7	1.11	0.95	1.31	1.33	0.19	0.25
329	1.31	1.48	0.03	0.34	0.25	0.37	0.59	0.68	0.78	0.71	0.19	0.26
330	4.36	6.32	0.0194	0.48	0.55	0.71	0.8	1.44	1.62	1.88	0.19	0.60
331	7.96	12.03	0.0148	0.89	0.94	1.29	1.52	2.24	2.69	3.25	0.19	0.65
332	14.45	24.6	0.0126	1.04	1.41	1.72	1.76	3.23	3.64	4.95	0.19	1.02
333	18.13	32.03	0.0127	0.79	1.53	1.62	1.34	3.62	3.71	5.25	0.19	1.58
334	26.49	48.9	0.0115	0.47	2.02	2.03	0.74	4.67	4.67	6.9	0.19	3.90
335	31.75	58.62	0.0109	0.2	2.35	2.36	0.29	5.34	5.35	7.9	0.19	6.44
336	38.26	70.64	0.0104	0.13	2.76	2.76	0.19	6.14	6.14	9.07	0.19	8.04
337	40.12	81.74	0.0099	0.43	2.85	2.89	0.67	6.23	6.26	10.21	0.19	6.68
338	33.27	61.42	0.0106	0.85	2.52	2.62	1.4	5.59	5.71	8.44	0.19	3.32
339	34.94	67.84	0.0104	0.79	2.56	2.59	1.3	5.68	5.73	8.89	0.19	3.71
340	37.66	73.12	0.0103	0.52	2.7	2.7	0.82	5.99	5.99	9.31	0.19	5.44
341	39.54	80.56	0.0099	0.41	2.81	2.83	0.62	6.15	6.17	10.06	0.19	6.73
342	40.88	83.29	0.0099	0.24	2.88	2.89	0.35	6.3	6.31	10.29	0.19	8.23
343	38.79	79.03	0.01	0.33	2.76	2.76	0.5	6.06	6.07	9.89	0.19	7.13

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
1	0.000000	0	0.000000	0	0.000000	0	0.000000	0
2	0.000094	350	0.000118	350	0.000090	359	0.000078	359
3	0.000035	46	0.000125	47	0.000059	23	0.000002	29
4	0.000009	97	0.000051	100	0.000064	105	0.000010	104
5	0.000000	0	0.000000	0	0.000000	0	0.000000	0
6	0.000000	0	0.000000	0	0.000000	0	0.000000	0
7	0.000000	0	0.000000	0	0.000000	0	0.000000	0
8	0.000000	0	0.000000	0	0.000000	0	0.000000	0
9	0.000000	0	0.000000	0	0.000000	0	0.000000	0
10	0.000000	0	0.000000	0	0.000000	0	0.000000	0
11	0.000799	260	0.000564	260	0.000667	267	0.001723	267
12	0.002648	260	0.002307	261	0.004189	272	0.006358	273
13	0.000320	260	0.000353	265	0.000399	280	0.000979	282
14	0.003390	300	0.001348	300	0.005719	310	0.007287	311
15	0.008203	340	0.001306	340	0.026640	349	0.014554	350
16	0.007355	20	0.000437	20	0.015989	28	0.012782	30
17	0.000124	198	0.000025	175	0.000237	180	0.000581	148
18	0.000441	209	0.000091	204	0.000374	193	0.001295	189
19	0.000725	219	0.000085	218	0.000410	208	0.001780	207
20	0.000265	220	0.000013	219	0.000064	219	0.000457	219
21	0.000028	220	0.000001	220	0.000010	227	0.000007	227
22	0.000062	220	0.000003	220	0.000017	223	0.000043	223
23	0.000346	219	0.000086	219	0.000174	217	0.000634	217
24	0.000776	220	0.000330	219	0.000542	218	0.001589	218
25	0.001858	229	0.000765	230	0.001789	231	0.003834	231
26	0.000398	230	0.000194	230	0.000299	241	0.000874	242
27	0.000000	0	0.000000	0	0.000000	0	0.000000	0
28	0.000093	69	0.000063	66	0.000098	50	0.000165	49
29	0.000000	0	0.000000	0	0.000000	0	0.000000	0
30	0.000000	0	0.000000	0	0.000000	0	0.000000	0
31	0.000000	0	0.000000	0	0.000000	0	0.000000	0
32	0.000000	0	0.000000	0	0.000000	0	0.000000	0
33	0.000000	0	0.000000	0	0.000000	0	0.000000	0
34	0.000000	0	0.000000	0	0.000000	0	0.000000	0
35	0.000000	0	0.000000	0	0.000000	0	0.000000	0
36	0.000100	273	0.000235	262	0.000196	248	0.000342	246
37	0.000298	276	0.000339	276	0.000263	264	0.000584	263
38	0.000377	293	0.000395	293	0.000280	293	0.000637	293
39	0.000129	303	0.000212	308	0.000169	324	0.000278	325
40	0.000040	6	0.000157	9	0.000111	347	0.000084	349

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
41	0.000009	65	0.000048	66	0.000064	69	0.000011	68
42	0.000022	110	0.000025	110	0.000038	103	0.000001	103
43	0.000000	0	0.000000	0	0.000000	0	0.000000	0
44	0.000000	0	0.000000	0	0.000000	0	0.000000	0
45	0.000000	0	0.000000	0	0.000000	0	0.000000	0
46	0.000000	0	0.000000	0	0.000000	0	0.000000	0
47	0.000000	0	0.000000	0	0.000000	0	0.000000	0
48	0.000000	0	0.000000	0	0.000000	0	0.000000	0
49	0.000000	0	0.000000	0	0.000000	0	0.000000	0
50	0.000057	260	0.000207	273	0.000144	285	0.000180	287
51	0.000153	332	0.000752	333	0.000398	340	0.001025	337
52	0.000155	24	0.000716	8	0.000403	12	0.001059	9
53	0.000010	40	0.000063	38	0.000063	48	0.000006	47
54	0.000012	93	0.000025	93	0.000042	80	0.000000	80
55	0.000000	0	0.000000	0	0.000000	0	0.000000	0
56	0.000000	0	0.000000	0	0.000000	0	0.000000	0
57	0.000000	0	0.000000	0	0.000000	0	0.000000	0
58	0.000000	0	0.000000	0	0.000000	0	0.000000	0
59	0.000000	0	0.000000	0	0.000000	0	0.000000	0
60	0.000000	0	0.000000	0	0.000000	0	0.000000	0
61	0.000000	0	0.000000	0	0.000000	0	0.000000	0
62	0.000000	0	0.000000	0	0.000000	0	0.000000	0
63	0.000000	0	0.000000	0	0.000000	0	0.000000	0
64	0.000000	0	0.000000	0	0.000000	0	0.000000	0
65	0.000000	0	0.000000	0	0.000000	0	0.000000	0
66	0.000043	70	0.000084	70	0.000061	83	0.000011	83
67	0.000017	96	0.000043	104	0.000052	122	0.000004	123
68	0.000000	0	0.000000	0	0.000000	0	0.000000	0
69	0.000000	0	0.000000	0	0.000000	0	0.000000	0
70	0.000000	0	0.000000	0	0.000000	0	0.000000	0
71	0.000000	0	0.000000	0	0.000000	0	0.000000	0
72	0.000000	0	0.000000	0	0.000000	0	0.000000	0
73	0.000015	201	0.000041	210	0.000053	228	0.000005	228
74	0.000000	0	0.000000	0	0.000000	0	0.000000	0
75	0.000185	302	0.000581	302	0.000100	324	0.000098	303
76	0.000095	355	0.000154	355	0.000090	350	0.000060	350
77	0.000465	32	0.000661	32	0.000366	25	0.000867	24
78	0.000106	27	0.000201	29	0.000126	45	0.000145	46
79	0.000000	0	0.000000	0	0.000000	0	0.000000	0
80	0.000009	167	0.000038	154	0.000055	144	0.000005	144

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
81	0.000000	0	0.000000	0	0.000000	0	0.000000	0
82	0.000000	0	0.000000	0	0.000000	0	0.000000	0
83	0.000000	0	0.000000	0	0.000000	0	0.000000	0
84	0.000000	0	0.000000	0	0.000000	0	0.000000	0
85	0.000000	0	0.000000	0	0.000000	0	0.000000	0
86	0.000026	251	0.000006	251	0.000021	241	0.000006	241
87	0.000017	245	0.000003	245	0.000016	257	0.000002	257
88	0.000089	67	0.000014	63	0.000065	51	0.000190	49
89	0.000733	73	0.000082	72	0.000407	62	0.001825	61
90	0.002192	77	0.000746	77	0.002429	70	0.004706	69
91	0.000511	70	0.000200	70	0.000380	82	0.001197	82
92	0.000033	74	0.000022	83	0.000055	98	0.000045	98
93	0.000096	240	0.000034	239	0.000071	224	0.000149	224
94	0.000071	246	0.000014	246	0.000036	241	0.000054	241
95	0.000000	0	0.000000	0	0.000000	0	0.000000	0
96	0.000000	0	0.000000	0	0.000000	0	0.000000	0
97	0.000000	0	0.000000	0	0.000000	0	0.000000	0
98	0.000148	252	0.000093	252	0.000110	244	0.000202	243
99	0.000085	246	0.000063	246	0.000072	254	0.000074	255
100	0.000023	271	0.000077	284	0.000098	290	0.000078	291
101	0.000169	7	0.000558	3	0.000167	26	0.000241	16
102	0.000039	71	0.000092	60	0.000097	44	0.000080	43
103	0.000132	65	0.000176	66	0.000130	79	0.000180	79
104	0.000000	0	0.000000	0	0.000000	0	0.000000	0
105	0.000000	0	0.000000	0	0.000000	0	0.000000	0
106	0.000000	0	0.000000	0	0.000000	0	0.000000	0
107	0.000000	0	0.000000	0	0.000000	0	0.000000	0
108	0.000000	0	0.000000	0	0.000000	0	0.000000	0
109	0.000000	0	0.000000	0	0.000000	0	0.000000	0
110	0.000023	265	0.000042	256	0.000059	239	0.000020	238
111	0.000104	270	0.000124	267	0.000122	251	0.000176	250
112	0.000079	283	0.000040	282	0.000057	282	0.000058	282
113	0.000000	0	0.000000	0	0.000000	0	0.000000	0
114	0.000000	0	0.000000	0	0.000000	0	0.000000	0
115	0.000056	109	0.000051	108	0.000061	95	0.000038	95
116	0.000198	105	0.000237	110	0.000249	126	0.000548	127
117	0.000006	175	0.000026	164	0.000051	154	0.000002	155
118	0.000009	267	0.000029	255	0.000053	244	0.000007	244
119	0.000000	0	0.000000	0	0.000000	0	0.000000	0
120	0.000000	0	0.000000	0	0.000000	0	0.000000	0

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
121	0.000000	0	0.000000	0	0.000000	0	0.000000	0
122	0.000021	276	0.000056	266	0.000065	249	0.000018	248
123	0.000230	281	0.000434	275	0.000300	259	0.000660	258
124	0.000178	286	0.000237	286	0.000141	287	0.000201	288
125	0.000046	316	0.000204	326	0.000124	310	0.000119	313
126	0.000214	350	0.000674	352	0.000137	339	0.000189	349
127	0.000037	69	0.000133	57	0.000101	43	0.000073	42
128	0.000010	40	0.000011	41	0.000032	55	0.000000	55
129	0.000000	0	0.000000	0	0.000000	0	0.000000	0
130	0.000000	0	0.000000	0	0.000000	0	0.000000	0
131	0.000021	328	0.000017	328	0.000033	334	0.000001	334
132	0.000239	346	0.000335	346	0.000196	354	0.000358	355
133	0.000335	8	0.000271	8	0.000272	18	0.000668	19
134	0.000316	17	0.000219	21	0.000357	37	0.000956	38
135	0.007497	35	0.000782	39	0.029766	49	0.014608	54
136	0.006446	36	0.000281	37	0.013582	46	0.011568	51
137	0.008784	51	0.000410	53	0.029200	62	0.014835	67
138	0.022171	57	0.000270	58	0.410791	66	0.024368	80
139	0.004340	55	0.000114	64	0.025479	68	0.009218	102
140	0.017933	234	0.000441	232	0.209559	223	0.023242	213
141	0.022817	238	0.000748	238	0.197519	233	0.028265	232
142	0.019272	243	0.000396	243	0.096989	245	0.024226	245
143	0.004431	236	0.000427	237	0.006770	246	0.009048	248
144	0.000430	239	0.000083	265	0.000910	259	0.001979	288
145	0.001314	55	0.000278	49	0.001718	37	0.003898	34
146	0.000384	53	0.000015	53	0.000100	48	0.000802	48
147	0.000033	50	0.000001	50	0.000009	57	0.000011	57
148	0.000041	61	0.000000	62	0.000005	63	0.000027	63
149	0.000017	44	0.000000	44	0.000006	38	0.000002	38
150	0.000052	56	0.000005	56	0.000021	46	0.000038	45
151	0.000090	43	0.000010	43	0.000033	39	0.000086	39
152	0.000014	61	0.000001	61	0.000007	64	0.000001	64
153	0.000059	221	0.000005	222	0.000021	223	0.000036	223
154	0.000032	232	0.000005	232	0.000018	238	0.000008	238
155	0.000000	0	0.000000	0	0.000000	0	0.000000	0
156	0.000000	0	0.000000	0	0.000000	0	0.000000	0
157	0.000147	47	0.000056	47	0.000091	39	0.000205	39
158	0.000755	45	0.000359	45	0.000598	53	0.001687	54
159	0.000062	56	0.000036	58	0.000064	74	0.000077	75
160	0.000028	65	0.000009	67	0.000028	82	0.000013	83

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
161	0.000000	0	0.000000	0	0.000000	0	0.000000	0
162	0.000002	72	0.000001	76	0.000020	95	0.000000	95
163	0.000003	81	0.000002	83	0.000021	101	0.000000	101
164	0.000000	0	0.000000	0	0.000000	0	0.000000	0
165	0.000028	98	0.000027	139	0.000109	118	0.000141	144
166	0.000317	270	0.000188	265	0.000361	250	0.000998	248
167	0.000774	262	0.000165	262	0.000479	253	0.001777	252
168	0.000822	263	0.000137	263	0.000414	265	0.001710	265
169	0.000116	266	0.000041	266	0.000078	278	0.000171	279
170	0.000022	275	0.000006	277	0.000024	293	0.000007	293
171	0.000012	281	0.000001	281	0.000007	273	0.000000	273
172	0.000041	284	0.000007	279	0.000040	268	0.000067	264
173	0.000137	286	0.000040	285	0.000089	271	0.000248	271
174	0.000183	281	0.000024	281	0.000068	279	0.000271	279
175	0.000032	276	0.000006	276	0.000021	288	0.000011	288
176	0.000000	0	0.000000	0	0.000000	0	0.000000	0
177	0.000000	0	0.000000	0	0.000000	0	0.000000	0
178	0.000000	0	0.000000	0	0.000000	0	0.000000	0
179	0.000000	0	0.000000	0	0.000000	0	0.000000	0
180	0.000000	0	0.000000	0	0.000000	0	0.000000	0
181	0.000000	0	0.000000	0	0.000000	0	0.000000	0
182	0.000000	0	0.000000	0	0.000000	0	0.000000	0
183	0.000022	77	0.000031	75	0.000044	58	0.000005	57
184	0.000000	0	0.000000	0	0.000000	0	0.000000	0
185	0.000000	0	0.000000	0	0.000000	0	0.000000	0
186	0.000000	0	0.000000	0	0.000000	0	0.000000	0
187	0.000000	0	0.000000	0	0.000000	0	0.000000	0
188	0.000000	0	0.000000	0	0.000000	0	0.000000	0
189	0.000000	0	0.000000	0	0.000000	0	0.000000	0
190	0.000000	0	0.000000	0	0.000000	0	0.000000	0
191	0.000000	0	0.000000	0	0.000000	0	0.000000	0
192	0.000000	0	0.000000	0	0.000000	0	0.000000	0
193	0.000023	48	0.000040	36	0.000071	21	0.000044	20
194	0.000210	52	0.000328	39	0.000436	27	0.001031	24
195	0.000916	39	0.000529	39	0.000761	33	0.001984	32
196	0.000256	34	0.000206	34	0.000199	43	0.000446	43
197	0.000076	25	0.000055	28	0.000086	45	0.000123	46
198	0.000000	0	0.000000	0	0.000000	0	0.000000	0
199	0.000000	0	0.000000	0	0.000000	0	0.000000	0
200	0.000000	0	0.000000	0	0.000000	0	0.000000	0

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
201	0.000000	0	0.000000	0	0.000000	0	0.000000	0
202	0.000000	0	0.000000	0	0.000000	0	0.000000	0
203	0.000194	301	0.000190	301	0.000155	294	0.000279	293
204	0.000683	294	0.000662	295	0.000530	295	0.001334	295
205	0.001114	295	0.000890	295	0.001041	302	0.002470	303
206	0.000566	295	0.000675	302	0.000899	318	0.002128	320
207	0.000116	323	0.000299	339	0.000331	344	0.000727	346
208	0.000032	34	0.000120	34	0.000068	69	0.000014	42
209	0.000010	111	0.000032	98	0.000056	88	0.000010	87
210	0.000000	0	0.000000	0	0.000000	0	0.000000	0
211	0.000000	0	0.000000	0	0.000000	0	0.000000	0
212	0.000000	0	0.000000	0	0.000000	0	0.000000	0
213	0.000000	0	0.000000	0	0.000000	0	0.000000	0
214	0.000000	0	0.000000	0	0.000000	0	0.000000	0
215	0.000000	0	0.000000	0	0.000000	0	0.000000	0
216	0.000000	0	0.000000	0	0.000000	0	0.000000	0
217	0.000000	0	0.000000	0	0.000000	0	0.000000	0
218	0.000000	0	0.000000	0	0.000000	0	0.000000	0
219	0.000000	0	0.000000	0	0.000000	0	0.000000	0
220	0.000000	0	0.000000	0	0.000000	0	0.000000	0
221	0.000015	114	0.000054	101	0.000066	90	0.000016	89
222	0.000043	123	0.000052	123	0.000053	114	0.000013	113
223	0.000000	0	0.000000	0	0.000000	0	0.000000	0
224	0.000000	0	0.000000	0	0.000000	0	0.000000	0
225	0.000000	0	0.000000	0	0.000000	0	0.000000	0
226	0.000000	0	0.000000	0	0.000000	0	0.000000	0
227	0.000000	0	0.000000	0	0.000000	0	0.000000	0
228	0.000108	225	0.000177	225	0.000097	229	0.000076	229
229	0.000317	281	0.000618	275	0.000398	259	0.000960	258
230	0.000170	259	0.000842	273	0.000364	277	0.001083	280
231	0.000154	336	0.000731	338	0.000403	346	0.001016	343
232	0.000139	39	0.000466	24	0.000325	16	0.000747	14
233	0.000000	0	0.000000	0	0.000000	0	0.000000	0
234	0.000000	0	0.000000	0	0.000000	0	0.000000	0
235	0.000000	0	0.000000	0	0.000000	0	0.000000	0
236	0.000000	0	0.000000	0	0.000000	0	0.000000	0
237	0.000000	0	0.000000	0	0.000000	0	0.000000	0
238	0.000000	0	0.000000	0	0.000000	0	0.000000	0
239	0.000000	0	0.000000	0	0.000000	0	0.000000	0
240	0.000000	0	0.000000	0	0.000000	0	0.000000	0

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
241	0.000156	270	0.000361	258	0.000298	245	0.000647	243
242	0.000454	268	0.000578	268	0.000364	261	0.000863	260
243	0.000257	273	0.000418	277	0.000297	292	0.000654	293
244	0.000072	346	0.000254	348	0.000094	320	0.000049	330
245	0.000041	76	0.000113	62	0.000121	51	0.000133	50
246	0.000000	0	0.000000	0	0.000000	0	0.000000	0
247	0.000000	0	0.000000	0	0.000000	0	0.000000	0
248	0.000081	261	0.000145	252	0.000146	235	0.000217	234
249	0.000390	270	0.000342	270	0.000313	261	0.000770	261
250	0.000093	266	0.000139	270	0.000123	287	0.000158	288
251	0.000000	0	0.000000	0	0.000000	0	0.000000	0
252	0.000000	0	0.000000	0	0.000000	0	0.000000	0
253	0.000000	0	0.000000	0	0.000000	0	0.000000	0
254	0.000086	264	0.000127	264	0.000087	274	0.000062	274
255	0.000088	271	0.000297	286	0.000242	293	0.000471	295
256	0.000122	357	0.000619	358	0.000315	5	0.000737	2
257	0.000048	39	0.000225	28	0.000121	37	0.000112	35
258	0.000037	59	0.000205	56	0.000141	46	0.000167	48
259	0.000000	0	0.000000	0	0.000000	0	0.000000	0
260	0.000000	0	0.000000	0	0.000000	0	0.000000	0
261	0.000000	0	0.000000	0	0.000000	0	0.000000	0
262	0.000012	301	0.000026	301	0.000044	307	0.000000	307
263	0.000048	333	0.000090	333	0.000064	345	0.000015	346
264	0.000000	0	0.000000	0	0.000000	0	0.000000	0
265	0.000000	0	0.000000	0	0.000000	0	0.000000	0
266	0.000000	0	0.000000	0	0.000000	0	0.000000	0
267	0.000000	0	0.000000	0	0.000000	0	0.000000	0
268	0.000000	0	0.000000	0	0.000000	0	0.000000	0
269	0.000000	0	0.000000	0	0.000000	0	0.000000	0
270	0.000208	54	0.000647	55	0.000114	39	0.000132	53
271	0.000129	126	0.000230	125	0.000131	112	0.000159	111
272	0.000046	138	0.000060	138	0.000056	147	0.000015	147
273	0.000000	0	0.000000	0	0.000000	0	0.000000	0
274	0.000000	0	0.000000	0	0.000000	0	0.000000	0
275	0.000000	0	0.000000	0	0.000000	0	0.000000	0
276	0.000000	0	0.000000	0	0.000000	0	0.000000	0
277	0.000000	0	0.000000	0	0.000000	0	0.000000	0
278	0.000048	206	0.000089	206	0.000061	212	0.000010	212
279	0.000230	270	0.000854	259	0.000285	245	0.000764	243
280	0.000424	298	0.000827	297	0.000358	285	0.000868	284

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
281	0.000058	301	0.000213	312	0.000121	328	0.000116	329
282	0.000012	354	0.000056	6	0.000056	355	0.000002	356
283	0.000000	0	0.000000	0	0.000000	0	0.000000	0
284	0.000000	0	0.000000	0	0.000000	0	0.000000	0
285	0.000000	0	0.000000	0	0.000000	0	0.000000	0
286	0.000000	0	0.000000	0	0.000000	0	0.000000	0
287	0.000016	291	0.000053	300	0.000056	318	0.000004	319
288	0.000000	0	0.000000	0	0.000000	0	0.000000	0
289	0.000000	0	0.000000	0	0.000000	0	0.000000	0
290	0.000000	0	0.000000	0	0.000000	0	0.000000	0
291	0.000000	0	0.000000	0	0.000000	0	0.000000	0
292	0.000068	292	0.000116	292	0.000077	281	0.000036	280
293	0.000020	331	0.000083	321	0.000064	337	0.000006	336
294	0.000062	356	0.000219	359	0.000077	345	0.000018	347
295	0.000000	0	0.000000	0	0.000000	0	0.000000	0
296	0.000000	0	0.000000	0	0.000000	0	0.000000	0
297	0.000000	0	0.000000	0	0.000000	0	0.000000	0
298	0.000000	0	0.000000	0	0.000000	0	0.000000	0
299	0.000000	0	0.000000	0	0.000000	0	0.000000	0
300	0.000013	28	0.000026	27	0.000042	14	0.000000	14
301	0.000075	56	0.000123	56	0.000078	49	0.000037	49
302	0.000000	0	0.000000	0	0.000000	0	0.000000	0
303	0.000000	0	0.000000	0	0.000000	0	0.000000	0
304	0.000000	0	0.000000	0	0.000000	0	0.000000	0
305	0.000000	0	0.000000	0	0.000000	0	0.000000	0
306	0.000000	0	0.000000	0	0.000000	0	0.000000	0
307	0.000000	0	0.000000	0	0.000000	0	0.000000	0
308	0.000000	0	0.000000	0	0.000000	0	0.000000	0
309	0.000000	0	0.000000	0	0.000000	0	0.000000	0
310	0.000319	251	0.000546	251	0.000230	249	0.000451	249
311	0.000355	265	0.000696	266	0.000301	278	0.000682	279
312	0.000162	318	0.000537	320	0.000103	310	0.000075	317
313	0.000011	17	0.000054	5	0.000057	17	0.000002	17
314	0.000000	0	0.000000	0	0.000000	0	0.000000	0
315	0.000000	0	0.000000	0	0.000000	0	0.000000	0
316	0.000000	0	0.000000	0	0.000000	0	0.000000	0
317	0.000000	0	0.000000	0	0.000000	0	0.000000	0
318	0.000000	0	0.000000	0	0.000000	0	0.000000	0
319	0.000059	11	0.000108	10	0.000066	9	0.000015	9
320	0.000000	0	0.000000	0	0.000000	0	0.000000	0

BT#	qEH	DirE	qEB	DirEB	qBG	DirB	qYL	DirYL
321	0.000000	0	0.000000	0	0.000000	0	0.000000	0
322	0.000000	0	0.000000	0	0.000000	0	0.000000	0
323	0.000000	0	0.000000	0	0.000000	0	0.000000	0
324	0.000000	0	0.000000	0	0.000000	0	0.000000	0
325	0.000011	44	0.000025	42	0.000043	25	0.000000	25
326	0.000126	58	0.000254	58	0.000112	50	0.000099	50
327	0.000000	0	0.000000	0	0.000000	0	0.000000	0
328	0.000000	0	0.000000	0	0.000000	0	0.000000	0
329	0.000000	0	0.000000	0	0.000000	0	0.000000	0
330	0.000000	0	0.000000	0	0.000000	0	0.000000	0
331	0.000117	21	0.000110	21	0.000101	30	0.000130	30
332	0.000379	27	0.000232	27	0.000311	39	0.000850	40
333	0.000058	24	0.000036	29	0.000071	46	0.000095	47
334	0.000035	28	0.000002	37	0.000045	40	0.000111	73
335	0.000206	23	0.000001	23	0.000035	20	0.000471	15
336	0.000235	32	0.000000	32	0.000047	30	0.000525	18
337	0.001897	20	0.000017	19	0.000567	19	0.003821	19
338	0.001594	26	0.000135	27	0.001120	36	0.003765	38
339	0.000485	26	0.000037	34	0.000462	41	0.001505	58
340	0.000056	17	0.000001	42	0.000205	27	0.000619	94
341	0.001003	33	0.000009	33	0.000316	38	0.002191	44
342	0.000812	42	0.000002	42	0.000161	40	0.001700	35
343	0.000515	214	0.000003	214	0.000165	219	0.001185	231

Appendix 3

The results of Site 1 seabed image analysis including bed classification, ripple geometry, ripple migration rate and bedform sediment transport rate.

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
1	1701	52	Wc	20		11.9	1.60	0.00000		0.000000
2	1703	54	WC	20		12.4	1.63	0.03310	30	0.000081
3	1705	56	Cw	10	110	13.8	1.96	0.00000		0.000000
4	1707	58	Cw	10	130	7.3	1.37	0.02000	4	0.000041
5	1709	60	Cw	10	150	7.1		0.00000		0.000000
6	1711	62	Cw	10	150	6.8		0.00000		0.000000
7	1713	64	WC	10	150	12.5		0.00000		0.000000
8	1715	66	WC	10	150	12.7		0.00000		0.000000
9	1717	68	WC	10	150	12.6	0.90	0.00000		0.000000
10	1719	70	Wc	15		12.8	1.10	0.00000		0.000000
11	1721	72	Wc	5		10.9	1.25	0.08420	270	0.000158
12	1723	74	Cw	20	120	7.5	1.40	0.13900	220	0.000292
13	1801	85	WC		150	8.7	1.35	0.08692	192	0.000176
14	1803	87	Wc/SS				1.35	0.13800	250	0.000279
15	1805	89	UPB							0.000000
16	1807	91	W	100		10.3	1.38	0.00000		0.000000
17	1809	93	W/SS	100		15.3		0.00000		0.000000
18	1811	95	LWR	120		50	6.00	0.00000		0.000000
19	1813	97	LWR/SS	130		60	6.00	0.07940	210	0.000715
20	1815	99	W/SS	110		19.5		0.00000		0.000000
21	1817	101	W	100		31.4		0.00000		0.000000
22	1819	103	W	100		33.8		0.00000		0.000000
23	1821	105	W	95		6.7	0.87	0.06580	230	0.000086
24	1823	107	Wc	140	30	6.9	0.90	0.14300	210	0.000192
25	1901	119	Wc/SS	150	120	12.1	1.04	0.26600	240	0.000415
26	1903	121	Wc	110		8.9	1.42	0.26800	200	0.000571
27	1905	123	Wc	120		13.5				0.000000
28	1907	125	Wc	125		11.4	1.60	0.04300	30	0.000103
29	1909	127	W	125		15.3	1.13			0.000000
30	1911	129	W	130		11.9				0.000000
31	1913	131	Wc	135	120	15.6				0.000000
32	1915	133	Wc	140	90	15.8				0.000000
33	1917	135	Wc	135		12.9				0.000000
34	1919	137	Wc	135		12.7				0.000000
35	1921	139	Wc	135		11.5				0.000000
36	1923	141	WC	130		10.7	1.31	0.04950	210	0.000097
37	2001	144	WC	140		11.4	1.40	0.04580	200	0.000096
38	2003	146	WC	140	10	12	1.40	0.06370	240	0.000134
39	2005	148	Cl	150	40	5.6	0.73	0.10400	280	0.000114
40	2007	150	WC	150	110	8.3	0.91	0.08170	0	0.000112

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
41	2009	152	WC	150	120	9.6	1.05	0.03900	30	0.000061
42	2011	154	WC	140		13	1.23			0.000000
43	2013	156	Wc	150		9.8	0.44			0.000000
44	2015	158	Wc	150		9.6	1.15			0.000000
45	2017	160	Wc	150		11.5	1.12			0.000000
46	2019	162	W	150		10	1.02			0.000000
47	2021	164	W	150		11.5	1.31			0.000000
48	2023	166	W	150		11.4	1.45			0.000000
49	2101	170	W	150		11.4	1.15			0.000000
50	2103	172	Cw		150	11.4	1.15	0.05280	250	0.000091
51	2105	174	Cw		170	11.6	1.24	0.07420	250	0.000138
52	2107	176	C		90					0.000000
53	2109	178	Cl		100	9	1.16	0.07000	20	0.000122
54	2111	180	Cl		110	9	1.04	0.01050	105	0.000016
55	2113	182	Cl		125	7.9	0.90			0.000000
56	2115	184	Cl		120	7.6				0.000000
57	2117	186	Cl		120	7.7				0.000000
58	2119	188	Cl		120	7.6				0.000000
59	2121	190	Cl		120	8				0.000000
60	2123	192	Cl		120	7.8				0.000000
61	2201	197	Cl		110	8.1				0.000000
62	2203	199	Cl		120	8.4				0.000000
63	2205	201	Cl		120	7.8				0.000000
64	2207	203	Cl		120	7.7				0.000000
65	2209	205	Cl		120	7.3				0.000000
66	2211	207	Cs		125	7.7	0.91	0.03700	40	0.000051
67	2213	209	Cl		135	12.1				0.000000
68	2215	211	Cl		140	12.5				0.000000
69	2217	213	Cl		150	14.5				0.000000
70	2219	215	Cl		150	13.4				0.000000
71	2221	217	Cl		150	14.4				0.000000
72	2223	219	Cl		150	13.7				0.000000
73	2301	225	C		150	14.3	1.86	0.02800	210	0.000078
74	2303	227	Cs		130	6.8				0.000000
75	2305	229	Cl		150	14	1.82	0.04750	240	0.000130
76	2307	231	Cs				1.82	0.01300	240	0.000035
77	2309	233	Cl		80	10.7	1.39	0.12220	0	0.000255
78	2311	235	Cl		90	9.9	0.75	0.05000	40	0.000056
79	2313	237	Cl		120					0.000000
80	2315	239	Cl		120					0.000000

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
81	2317	241	Cl		115					0.000000
82	2319	243	Cl		120					0.000000
83	2321	245	WC	120						0.000000
84	2323	247	Wc	115						0.000000
85	2401	254	W	110		13.4	1.18			0.000000
86	2403	256	W	100		14.9	1.45			0.000000
87	2405	258	W	120		10.5	1.08			0.000000
88	2407	260	W	120		14	1.88			0.000000
89	2409	262	W	140		17.1	2.18			0.000000
90	2411	264	Wc		140	11.9	1.39	0.18667	40	0.000389
91	2413	266	Wc	100	150	13.6	1.59	0.11944	70	0.000285
92	2415	268	W	100		15.7				0.000000
93	2417	270	W	110		15.5				0.000000
94	2419	272	W	105		17.9				0.000000
95	2421	274	W	100		14.8				0.000000
96	2423	276	W	105		16.8				0.000000
97	2501	284	W	110		14.3				0.000000
98	2503	286	Wc	115		14.4	1.87	0.06889	180	0.000193
99	2505	288	Wc	110	150	13.2	0.99	0.06611	260	0.000098
100	2507	290	WC	110	150	11.2	1.10	0.07833	270	0.000129
101	2509	292	Cw	140	120	8.6	0.89	0.09111	10	0.000122
102	2511	294	WC		110	13.3	1.33	0.06778	10	0.000135
103	2513	296	Cs		130	12.3	1.21	0.07889	30	0.000143
104	2515	298	Cs		140	12.1	1.07			0.000000
105	2517	300	C		200	9.9				0.000000
106	2519	302	WC		220	9.5				0.000000
107	2521	304	WC		130	6.6				0.000000
108	2523	306	Wc	120		10.1	0.81			0.000000
109	2601	315	W	130		9.5	1.45			0.000000
110	2603	317	WC	110		11.5	1.40	0.05222	200	0.000110
111	2605	319	WC	150	70	11.6	1.71	0.09056	220	0.000232
112	2607	321	Wc	150		12.3	1.47	0.11583	250	0.000255
113	2609	323	W	140		13.5	1.55			0.000000
114	2611	325	Wc	150		13.6	1.45			0.000000
115	2613	327	WC	140	150	11.9	1.87	0.07583	60	0.000213
116	2615	329	WC	140	150	11.6	1.90	0.15139	80	0.000431
117	2617	331	WC	150	160	11.9	0.99			0.000000
118	2619	333	WC	140	160	10.3	1.93	0.09472	190	0.000274
119	2621	335	Wc	150		11.9	1.94			0.000000
120	2623	337	Wc	150		14	2.04			0.000000

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
121	2701	347	Wc	150		15.7	2.18			0.000000
122	2703	349	WC	150	140	15.1	2.25			0.000000
123	2705	351	Cw	140	80	8.4	1.09	0.10861	170	0.000178
124	2707	353	Cw		80	7.9	1.03	0.09125	270	0.000141
125	2709	355	Cw		180	7.5	0.98	0.06972	280	0.000102
126	2711	357	Cw		110	11.2	2.47	0.09917	20	0.000367
127	2713	359	Cl		110	11.8	2.11	0.06722	10	0.000213
128	2715	361	Cs		110	12.2	1.71			0.000000
129	2717	363	Cl		110	12.3	1.70			0.000000
130	2719	365	Cl		110	12.4	1.83			0.000000
131	2721	367	Cl		110	12.5	1.83			0.000000
132	2723	369	Cs		190	10.6	1.38	0.07389	290	0.000153
133	2801	380	WC				2.23	0.23806	10	0.000796
134	2803	382	Wc	90	150	13.9	2.23	0.65625	10	0.002195
135	2805	384	UPB							0.000000
136	2807	386	UPB							0.000000
137	2809	388	UPB							0.000000
138	2811	390	UPB							0.000000
139	2813	392	UPB							0.000000
140	2815	394	UPB							0.000000
141	2817	396	UPB							0.000000
142	2819	398	UPB							0.000000
143	2821	400	Cl/SS		140	14.4	1.66			0.000000
144	2823	402	LWR/SS	80		54	4.20			0.000000
145	2901	414	W/SS	140		9.9	1.29	0.17750	40	0.000343
146	2903	416	W	110		20				0.000000
147	2905	418	Wc	80		70	5.00			0.000000
148	2907	420	Wc	80		11.6				0.000000
149	2909	422	W	100		9.5				0.000000
150	2911	424	W	100		19.2	4.36			0.000000
151	2913	426	Wc	100		12.7	2.22			0.000000
152	2915	428	Wc	120		12.6				0.000000
153	2917	430	W	120		11.8				0.000000
154	2919	432	Wc	80		9.6				0.000000
155	2921	434	W	60		10				0.000000
156	2923	436	Wc	60		10.4				0.000000
157	3001	439	Wc	60	100	11.4	1.75	0.12556	0	0.000330
158	3003	441	Wc	100	110	9.6	1.25	0.23500	20	0.000440
159	3005	443	Wc	90		11.5	1.29	0.05972	180	0.000116
160	3007	445	W	100		12.5	1.51	0.06222	180	0.000141

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
161	3009	447	Wc	100	160	12.3	1.61			0.000000
162	3011	449	Wc	120		11.6	1.87			0.000000
163	3013	451	Wc	110		15.7				0.000000
164	3015	453	Wc	120	180	12.4				0.000000
165	3017	455	Wc	140	70	15.8				0.000000
166	3019	457	LWR	140						0.000000
167	3021	459	Wc/SS	140	130	12.5	1.63	0.12639	210	0.000308
168	3023	461	Wc	130		12.1				0.000000
169	3101	465	Wc	110	100	15.5	1.85	0.11300	190	0.000314
170	3103	467	Wc	130		15.2				0.000000
171	3105	469	W	140		19.7				0.000000
172	3107	471	W	150		16.4				0.000000
173	3109	473	Wc	160		12.2				0.000000
174	3111	475	Wc	150		11.6				0.000000
175	3113	477	Wc	130		16.8				0.000000
176	3115	479	Wc	120		19.6	4.42			0.000000
177	3117	481	W	130		18.5	2.46			0.000000
178	3119	483	W	130		19.3				0.000000
179	3121	485	W	120		20	2.94			0.000000
180	3123	487	W	110		21.8				0.000000
181	3201	492	W	120		22.2				0.000000
182	3203	494	Wc	120	120	22.2				0.000000
183	3205	496	WC	120	120	21.7				0.000000
184	3207	498	WC	120		22.1				0.000000
185	3209	500	Wc	120		22.9				0.000000
186	3211	502	Wc	120		22.5				0.000000
187	3213	504	Wc	120		22.7				0.000000
188	3215	506	Wc	120		22.3				0.000000
189	3217	508	Wc	120		22.5				0.000000
190	3219	510	Wc	120		23				0.000000
191	3221	512	Wc	120		22.5				0.000000
192	3223	514	Wc	120		21.8		0.00000	0	0.000000
193	3301	520	Wc	120	180	22.5	2.17	0.09722	270	0.000316
194	3303	522	WC	130	90	11.8	1.15	0.17583	10	0.000303
195	3305	524	WC	130	120	10.4	1.00	0.25611	0	0.000384
196	3307	526	WC		150	9.3	1.21	0.11667	30	0.000212
197	3309	528	Wc	120		12.8	1.28	0.09333	40	0.000179
198	3311	530	Wc	130		14.3		0.00000	0	0.000000
199	3313	532	Wc	130		15.2		0.00000	0	0.000000
200	3315	534	Wc	130		15.9	2.00	0.00000	0	0.000000

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
201	3317	536	Wc	130	170	17.7		0.00000	0	0.000000
202	3319	538	Wc	130		16.3		0.00000	0	0.000000
203	3321	540	WC	170		15.7	2.04	0.12611	260	0.000386
204	3323	542	WC	130		14.8	1.92	0.24861	270	0.000717
205	3401	549	WC	150	170	14.6	1.90	0.19694	250	0.000561
206	3403	551	WC	180	90	8.3		0.00000	0	0.000000
207	3405	553	Cw		90	8.3	1.08	0.15333	10	0.000248
208	3407	555	WC		140	9.7	1.26	0.11361	50	0.000215
209	3409	557	WC		130	11.1	1.44	0.09389	40	0.000203
210	3411	559	Wc	120	140	13.9		0.00000	0	0.000000
211	3413	561	W	150		11.6		0.00000	0	0.000000
212	3415	563	W	140		12.6		0.00000	0	0.000000
213	3417	565	W	150		13.2		0.00000	0	0.000000
214	3419	567	W	150		14		0.00000	0	0.000000
215	3421	569	W	150		12.4		0.00000	0	0.000000
216	3423	571	W	150		12		0.00000	0	0.000000
217	3501	579	W	150		12.4		0.00000	0	0.000000
218	3503	581	W	150		12		0.00000	0	0.000000
219	3505	583	W	150		13.5		0.00000	0	0.000000
220	3507	585	W	140		16.2		0.00000	0	0.000000
221	3509	587	Cs		140	16.5		0.00000	0	0.000000
222	3511	589	WC		150	15.4	2.00	0.06028	80	0.000181
223	3513	591	W	150		15.1		0.00000	0	0.000000
224	3515	593	W	150		15.3		0.00000	0	0.000000
225	3517	595	W	150		15.4		0.00000	0	0.000000
226	3519	597	W	150		15.3		0.00000	0	0.000000
227	3521	599	W	150		15.3		0.00000	0	0.000000
228	3523	601	Cs		140	15.5		0.00000	0	0.000000
229	3601	610	Cl		110	10.6	1.38	0.11639	200	0.000241
230	3603	612	Cl		130	9.3	1.21	0.12111	240	0.000220
231	3605	614	Cw	30	130	7.9	1.03	0.08306	290	0.000128
232	3607	616	Cl		240	9.3	1.21	0.05333	290	0.000097
233	3609	618	Cs		100	10.8		0.00000	0	0.000000
234	3611	620	Cs		100	10.9		0.00000	0	0.000000
235	3613	622	Cl		130	10.7		0.00000	0	0.000000
236	3615	624	Cl		100	9.5		0.00000	0	0.000000
237	3617	626	LPB			10.7		0.00000	0	0.000000
238	3619	628	LPB			10.6		0.00000	0	0.000000
239	3621	630	LPB			10.9		0.00000	0	0.000000
240	3623	632	Cs		130	10.8		0.00000	0	0.000000

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
241	3701	642	Cl		100	10.5	1.37	0.07111	240	0.000146
242	3703	644	Cl		110	15.3	1.99	0.08833	250	0.000264
243	3705	646	Cl		150	12.6	1.64	0.07278	250	0.000179
244	3707	648	Cw		100	12.5	1.63	0.06306	10	0.000154
245	3709	650	Cs		110	11.8	1.53	0.07389	30	0.000170
246	3711	652	Cs		120	10.8	1.50	0.00000	0	0.000000
247	3713	654	W	115		10.5	1.00	0.00000	0	0.000000
248	3715	656	WC		110	9.9	1.29	0.08306	190	0.000160
249	3717	658	WC		110	10.2	1.33	0.09389	190	0.000187
250	3719	660	WC	140		8.8	1.14	0.06778	300	0.000116
251	3721	662	WC		140	10.8		0.00000	0	0.000000
252	3723	664	WC		130	10.8	1.50	0.00000	0	0.000000
253	3801	675	WC		130	9.9		0.00000	0	0.000000
254	3803	677	Cw		150	11.5		0.00000	0	0.000000
255	3805	679	Cl		0	7.3	0.95	0.07111	290	0.000101
256	3807	681	Cl		10	7.7	1.00	0.10917	280	0.000164
257	3809	683	Cl		90	10.2	1.50	0.11500	350	0.000259
258	3811	685	Cs		100	11	1.43	0.06056	20	0.000130
259	3813	687	Cs		100	11.8		0.00000	0	0.000000
260	3815	689	Cs		110	10.5		0.00000	0	0.000000
261	3817	691	Cs		100	11.2	1.50	0.00000	0	0.000000
262	3819	693	Cs		100	10.7		0.00000	0	0.000000
263	3821	695	Cs		100	11.2		0.00000	0	0.000000
264	3823	697	Cs		90	11		0.00000	0	0.000000
265	3901	709	Cs		90	11.2		0.00000	0	0.000000
266	3903	711	Cs		150	10.8		0.00000	0	0.000000
267	3905	713	Cs		150	11		0.00000	0	0.000000
268	3907	715	Cs		150	11		0.00000	0	0.000000
269	3909	717	Cs		90	11.9	1.50	0.05167	0	0.000116
270	3911	719	Cl		130	13.3	1.70	0.08194	30	0.000209
271	3913	721	Cl		150	12.3	1.60	0.09722	80	0.000233
272	3915	723	Cs		150	12.8	1.66	0.04306	130	0.000107
273	3917	725	Cl		150	11.8		0.00000	0	0.000000
274	3919	727	Cl		150	12.6		0.00000	0	0.000000
275	3921	729	Cl		150	12.7		0.00000	0	0.000000
276	3923	731	Cl		150	13.2		0.00000	0	0.000000
277	4001	734	Cl		130	13.9		0.00000	0	0.000000
278	4003	736	Cl		90	12.2		0.00000	0	0.000000
279	4005	738	Cl		110	12.6	1.64	0.17722	200	0.000435
280	4007	740	Cl		140	10.8	1.40	0.10639	280	0.000224

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
281	4009	742	Cl		170	11.2		0.00000	0	0.000000
282	4011	744	Cl		60	11				0.000000
283	4013	746	Cl		130	13.2		0.00000	0	0.000000
284	4015	748	Cl		130	12.9		0.00000	0	0.000000
285	4017	750	Cl		80	12.8		0.00000	0	0.000000
286	4019	752	Cl		150	11.2		0.00000	0	0.000000
287	4021	754	Cs		150	11.3		0.00000	0	0.000000
288	4023	756	Cs			12.4		0.00000	0	0.000000
289	4101	760	LPB			12.1		0.00000	0	0.000000
290	4103	762	LPB			12.2		0.00000	0	0.000000
291	4105	764	LPB			12.1		0.00000	0	0.000000
292	4107	766	Cs		90	12.5		0.00000	0	0.000000
293	4109	768	Cl		160	10.9		0.00000	0	0.000000
294	4111	770	Cl		10	9.4	1.22	0.04000	10	0.000073
295	4113	772	Cl		100	13.4		0.00000	0	0.000000
296	4115	774	Cs		100	13.6		0.00000	0	0.000000
297	4117	776	Cs		100	13.4	2.00	0.00000	0	0.000000
298	4119	778	Cs		100	13.4		0.00000	0	0.000000
299	4121	780	Cs		100	13.6		0.00000	0	0.000000
300	4123	782	Cs		100	13.4		0.00000	0	0.000000
301	4201	787	Cs		100	13.9	1.81	0.06417	30	0.000174
302	4203	789	Cs		100	13.6		0.00000	0	0.000000
303	4205	791	Cs		170	9.2		0.00000	0	0.000000
304	4207	793	Cs		170	9.4		0.00000	0	0.000000
305	4209	795	Cs		170	9.6		0.00000	0	0.000000
306	4211	797	Cs		170	9.5		0.00000	0	0.000000
307	4213	799	Cs		170	9.6		0.00000	0	0.000000
308	4215	801	Cs		170	9.3		0.00000	0	0.000000
309	4217	803	Cs		110	13.4		0.00000	0	0.000000
310	4219	805	Cl		130	13.3	1.73	0.09528	200	0.000247
311	4221	807	Cl		160	8	1.04	0.21000	280	0.000328
312	4223	809	Cl		170	6.8	0.88	0.06694	300	0.000089
313	4301	816	Cl		70	9.6	1.25	0.08722	0	0.000163
314	4303	818	Cl		70	10.4	1.00	0.00000	0	0.000000
315	4305	820	Cl		70	10.3		0.00000	0	0.000000
316	4307	822	Cl		70	9.9		0.00000	0	0.000000
317	4309	824	Cl		70	10.1		0.00000	0	0.000000
318	4311	826	Cl		70	10.4		0.00000	0	0.000000
319	4313	828	Cl		70	10.2		0.00000	0	0.000000
320	4315	830	LPB			10.4		0.00000	0	0.000000

BT#	D/T	FM#	bed	Wr	Cr	Lr	Hr	Mr	Mdir	Qr
321	4317	832	LPB			10.2		0.00000	0	0.000000
322	4319	834	LPB			10.2		0.00000	0	0.000000
323	4321	836	LPB			10.4		0.00000	0	0.000000
324	4323	838	LPB			10.3		0.00000	0	0.000000
325	4401	845	LPB			12.3		0.00000	0	0.000000
326	4403	847	Cs		100	13.8	1.51	0.12167	0	0.000276
327	4405	849	Cs		110	14.6				0.000000
328	4407	851	Cs		110	14.4				0.000000
329	4409	853	Cs		105	14.6				0.000000
330	4411	855	Wc	100		14.1	2.00	0.00000		0.000000
331	4413	857	WC		70	17.5	2.00	0.02800	50	0.000084
332	4415	859	WC		70	14.3				0.000000
333	4417	861	Wc	60		15				0.000000
334	4419	863	W			9.5				0.000000
335	4421	865	LWR/SS	90						0.000000
336	4423	867								0.000000
337	4501	874	UPB							0.000000
338	4503	876	LWR	70						0.000000
339	4505	878	UPB							0.000000
340	4507	880	LWR/SS	90						0.000000
341	4509	882	UPB							0.000000
342	4511	884	LWR/SS	140		60				0.000000
343	4513	886	LWR/SS	140						0.000000

Appendix 4

Site 1 bottom sediment grain size data and site 2 sediment trap data. For each sediment sample, the tabulated and graphical results of grain size analysis are given. The vertical profiles of grain size and the average flux due to the settling of resuspension are also shown for the site 2 sediment trap samples. Three vertically correlated layers were found in the site 2 sediment trap samples. The bottom layer samples are marked, from bottom to top, (93501-)1-Bottom, 2-Bottom, 3-Lower, 4-Lower and 5-Lower respectively. The top layer samples are similarly marked as 1-Upper, 2-Upper, 3-Upper, 4-Upper and 5-Upper, while the middle layer was only found in the lower two traps and are marked as 1-Middle and 2-Middle respectively.

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Site 1

CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93-500-1,RD008327,
,00107,

Carl Amos
SIB 93

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.26	0.26
.93	0.10	0.02	0.28
.81	0.30	0.35	0.63
.71	0.50	1.37	2.00
.62	0.70	2.95	4.95
.54	0.90	5.27	10.21
.47	1.10	10.61	20.82
.41	1.30	15.99	36.81
.35	1.50	20.83	57.64
.31	1.70	19.38	77.02
.27	1.90	13.02	90.04
.23	2.10	5.36	95.40
.20	2.30	2.14	97.54
.18	2.50	1.03	98.57
.15	2.70	0.32	98.89
.13	2.90	0.17	99.06
.12	3.10	0.04	99.11
.10	3.30	0.00	99.11
.88E-01	3.50	0.01	99.12
.77E-01	3.70	0.02	99.14
.67E-01	3.90	0.00	99.14
.58E-01	4.10	0.00	99.14
.51E-01	4.30	0.00	99.14
.44E-01	4.50	0.00	99.14
.39E-02	8.00	0.86	100.00

GRAIN SIZE BREAKDOWN

% GRAVEL	% SAND	% MUD
0.26	98.88	0.86

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
1.55	0.76	48.40	4.65

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CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93-500-control site,RD008328,
,00107,

Carl Amos
SIB 93

RESULTS

Control Site

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.02	0.02
.93	0.10	0.01	0.03
.81	0.30	0.09	0.12
.71	0.50	0.17	0.29
.62	0.70	0.32	0.61
.54	0.90	0.98	1.59
.47	1.10	2.61	4.20
.41	1.30	6.66	10.86
.35	1.50	16.50	27.36
.31	1.70	31.70	59.07
.27	1.90	25.86	84.92
.23	2.10	9.47	94.39
.20	2.30	3.16	97.56
.18	2.50	0.86	98.41
.15	2.70	0.26	98.67
.13	2.90	0.10	98.77
.12	3.10	0.02	98.79
.10	3.30	0.00	98.79
.88E-01	3.50	0.11	98.90
.77E-01	3.70	0.08	98.98
.67E-01	3.90	0.02	99.01
.58E-01	4.10	0.08	99.09
.51E-01	4.30	0.00	99.09
.44E-01	4.50	0.00	99.09
.39E-02	8.00	0.91	100.00

GRAIN SIZE BREAKDOWN

% GRAVEL	% SAND	% MUD
0.02	98.98	0.99

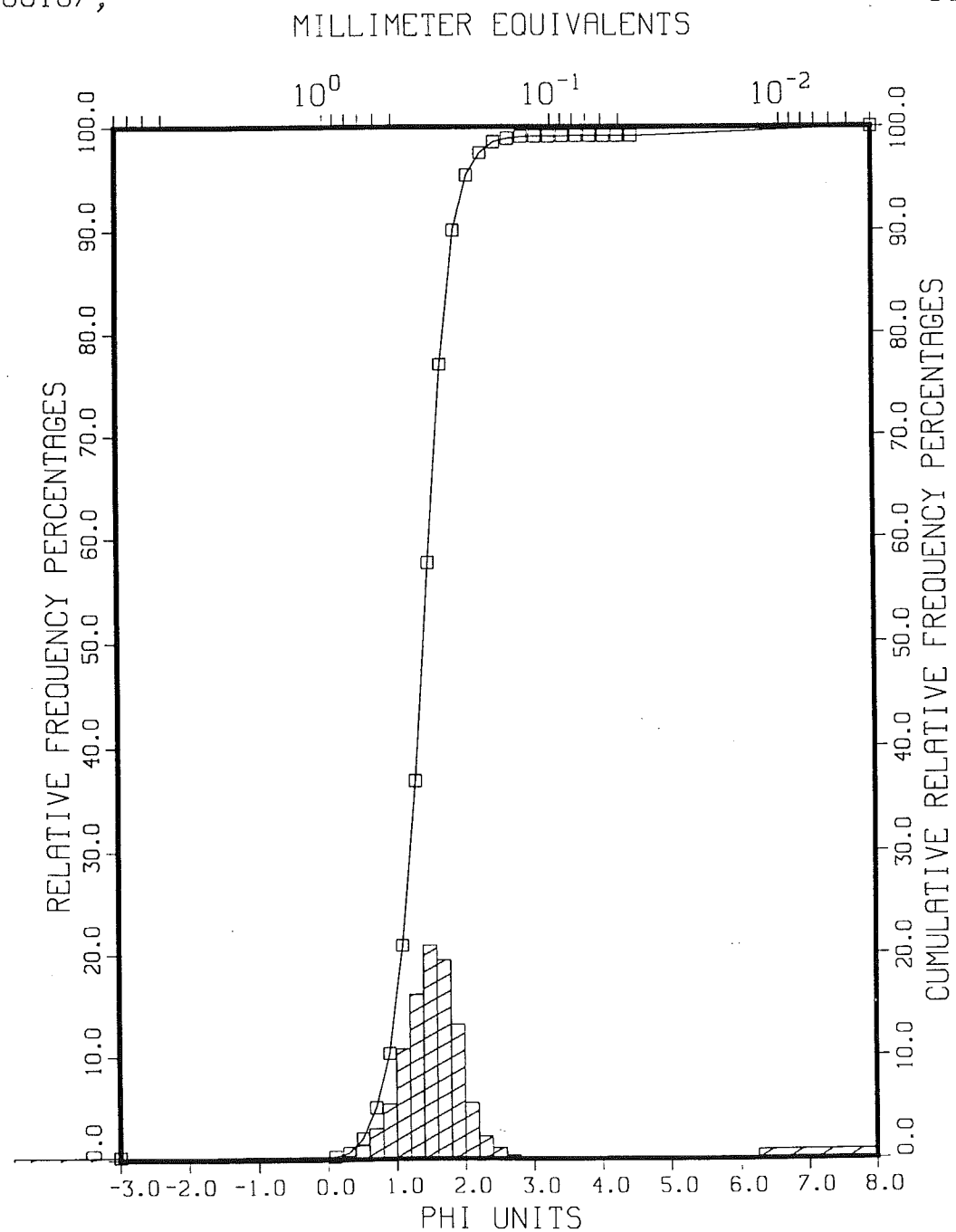
STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
1.79	0.68	65.41	6.96

93-500-1,RD008327,

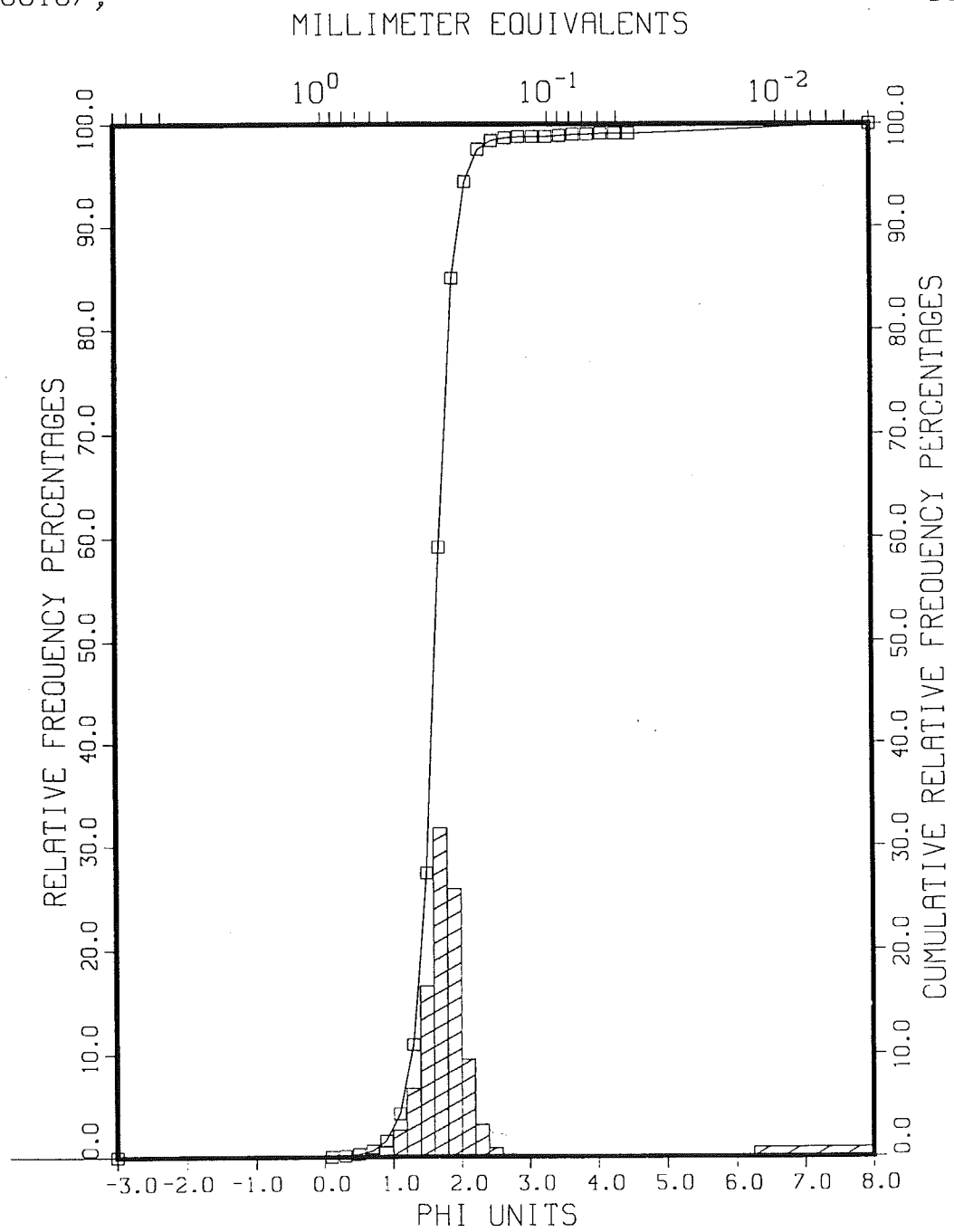
,00107,

Carl Amo
SIB 9



93-500-control site,RD008328,
,00107,

Carl Amo
SIB 9



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-1-BOTTOM,RD008949, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.02	0.02
.81	0.30	0.16	0.17
.71	0.50	0.00	0.17
.62	0.70	0.33	0.51
.54	0.90	1.27	1.78
.47	1.10	3.37	5.15
.41	1.30	5.47	10.62
.35	1.50	6.18	16.81
.31	1.70	7.61	24.42
.27	1.90	10.58	35.00
.23	2.10	17.10	52.10
.20	2.30	25.88	77.98
.18	2.50	13.76	91.74
.15	2.70	4.31	96.05
.13	2.90	1.42	97.48
.12	3.10	1.09	98.56
.10	3.30	0.46	99.02
.88E-01	3.50	0.42	99.44
.77E-01	3.70	0.23	99.67
.67E-01	3.90	0.25	99.93
.58E-01	4.10	0.07	100.00
.51E-01	4.30	0.00	100.00
.44E-01	4.50	0.00	100.00
.38E-01	4.70	0.00	100.00
.33E-01	4.90	0.00	100.00
.29E-01	5.10	0.00	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

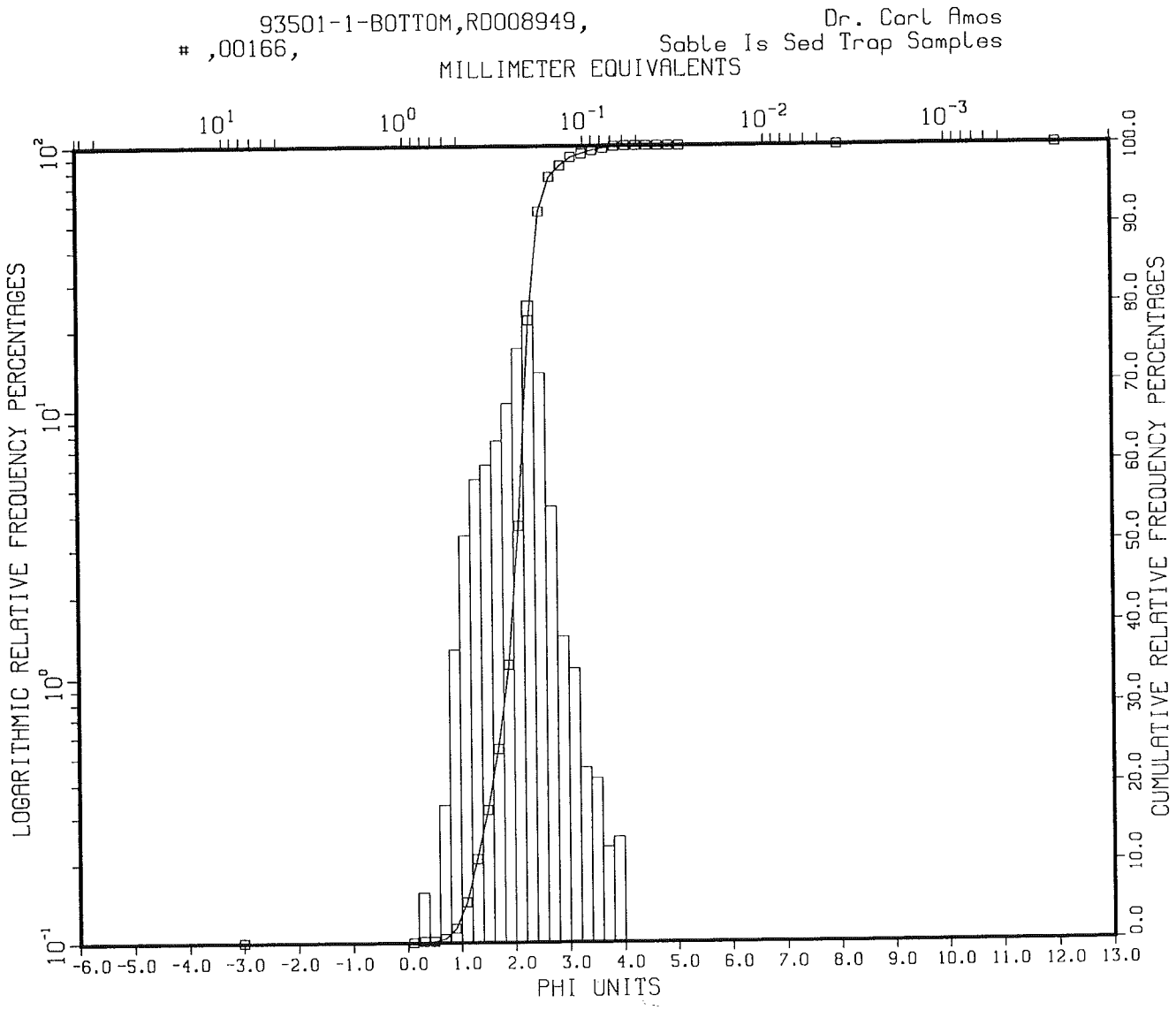
GRAIN SIZE BREAKDOWN

% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	99.93	0.07	0.00	0.07

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.09	0.49	4.05	-0.22

Ø 124 mm


93501-1-BOTTOM,RD008949,
,00166,
Dr. Carl Amos
Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2
10^1
10^0
10^{-1}
CUMULATIVE RELATIVE FREQUENCY PERCENTAGES
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0
PHI UNITS

CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-2-BOTTOM,RD008950, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.17	0.17
.93	0.10	0.00	0.17
.81	0.30	0.02	0.19
.71	0.50	0.02	0.21
.62	0.70	0.75	0.96
.54	0.90	1.65	2.61
.47	1.10	2.94	5.56
.41	1.30	4.34	9.89
.35	1.50	4.93	14.82
.31	1.70	6.15	20.97
.27	1.90	8.51	29.48
.23	2.10	15.72	45.21
.20	2.30	27.93	73.14
.18	2.50	16.96	90.10
.15	2.70	5.04	95.13
.13	2.90	1.93	97.06
.12	3.10	0.74	97.81
.10	3.30	0.88	98.68
.88E-01	3.50	0.73	99.42
.77E-01	3.70	0.20	99.61
.67E-01	3.90	0.29	99.90
.58E-01	4.10	0.10	100.00
.51E-01	4.30	0.00	100.00
.44E-01	4.50	0.00	100.00
.38E-01	4.70	0.00	100.00
.33E-01	4.90	0.00	100.00
.29E-01	5.10	0.00	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

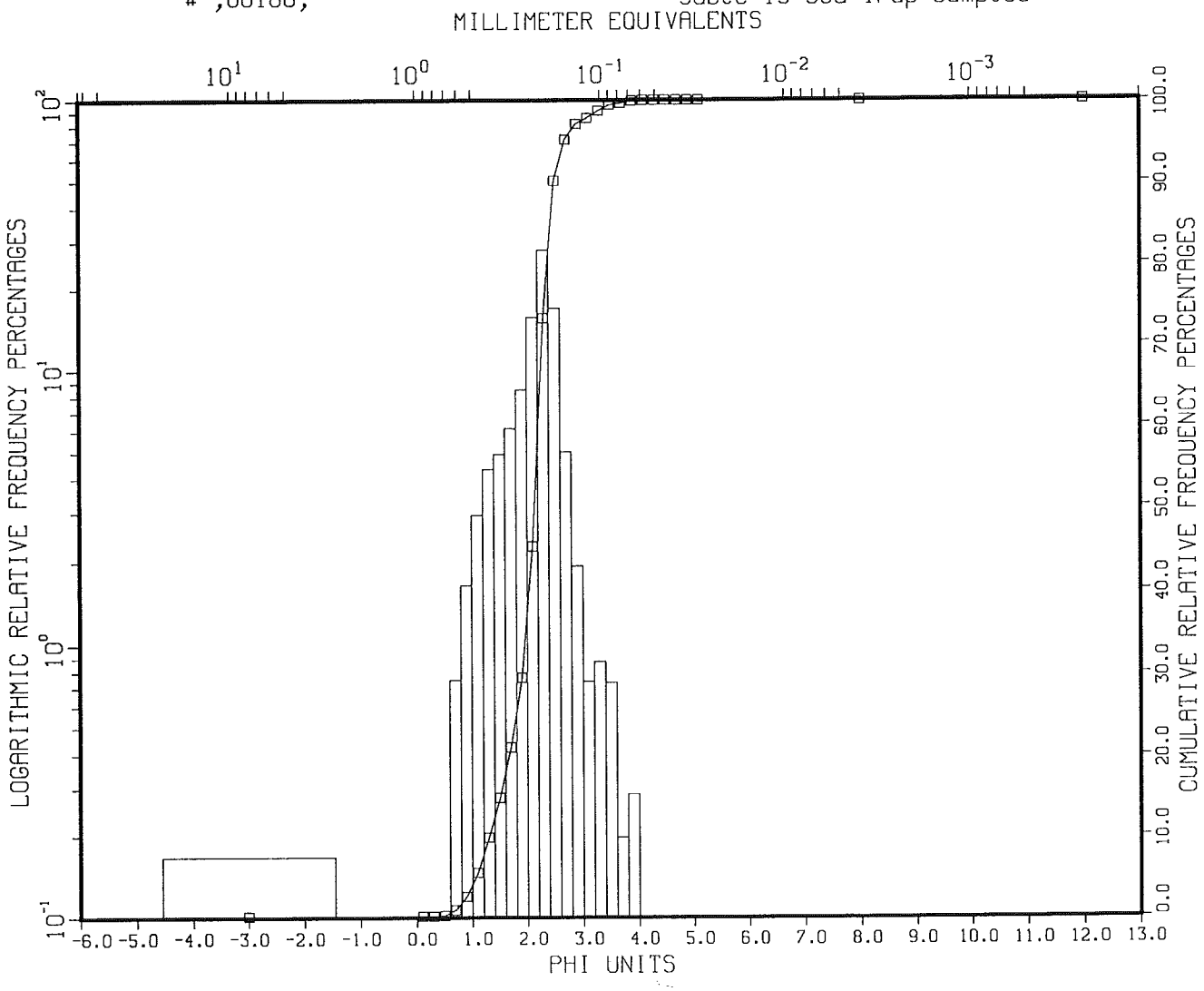
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.17	99.73	0.10	0.00	0.10

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.13	0.54	16.65	-1.65

(0.119mm)

93501-2-BOTTOM,RD008950, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-3-LOWER,RD008951, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.00	0.00
.81	0.30	0.00	0.00
.71	0.50	0.00	0.00
.62	0.70	0.00	0.00
.54	0.90	0.00	0.00
.47	1.10	0.00	0.00
.41	1.30	0.42	0.42
.35	1.50	0.90	1.32
.31	1.70	2.02	3.34
.27	1.90	4.34	7.68
.23	2.10	8.00	15.68
.20	2.30	15.38	31.06
.18	2.50	23.71	54.77
.15	2.70	12.10	66.87
.13	2.90	5.07	71.93
.12	3.10	3.35	75.28
.10	3.30	3.52	78.80
.88E-01	3.50	4.03	82.83
.77E-01	3.70	3.25	86.08
.67E-01	3.90	3.02	89.09
.58E-01	4.10	2.84	91.93
.51E-01	4.30	2.32	94.25
.44E-01	4.50	2.00	96.25
.38E-01	4.70	1.66	97.90
.33E-01	4.90	1.27	99.18
.29E-01	5.10	0.82	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

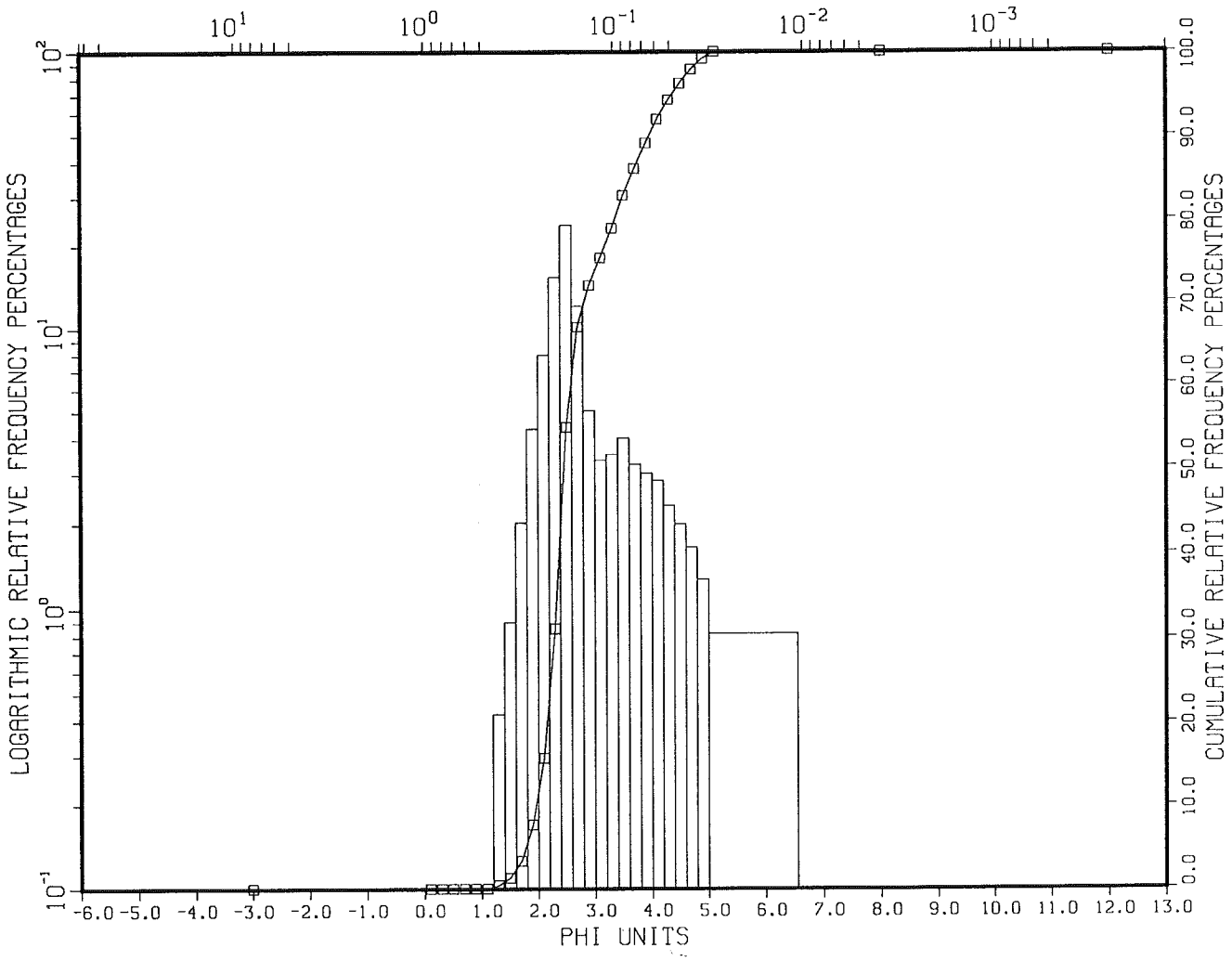
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	89.09	10.91	0.00	10.91

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.81	0.77	3.52	1.06

(0.06 mm)

93501-3-LOWER,RD008951, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-4-LOWER,RD008952, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.00	0.00
.81	0.30	0.00	0.00
.71	0.50	0.00	0.00
.62	0.70	0.00	0.00
.54	0.90	0.00	0.00
.47	1.10	0.00	0.00
.41	1.30	0.00	0.00
.35	1.50	0.20	0.20
.31	1.70	0.73	0.93
.27	1.90	1.99	2.92
.23	2.10	4.93	7.85
.20	2.30	10.60	18.45
.18	2.50	22.30	40.75
.15	2.70	15.74	56.49
.13	2.90	7.08	63.56
.12	3.10	4.79	68.35
.10	3.30	4.94	73.29
.88E-01	3.50	5.08	78.37
.77E-01	3.70	5.01	83.38
.67E-01	3.90	3.73	87.12
.58E-01	4.10	3.49	90.61
.51E-01	4.30	2.84	93.45
.44E-01	4.50	2.27	95.73
.38E-01	4.70	1.82	97.54
.33E-01	4.90	1.46	99.01
.29E-01	5.10	0.99	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

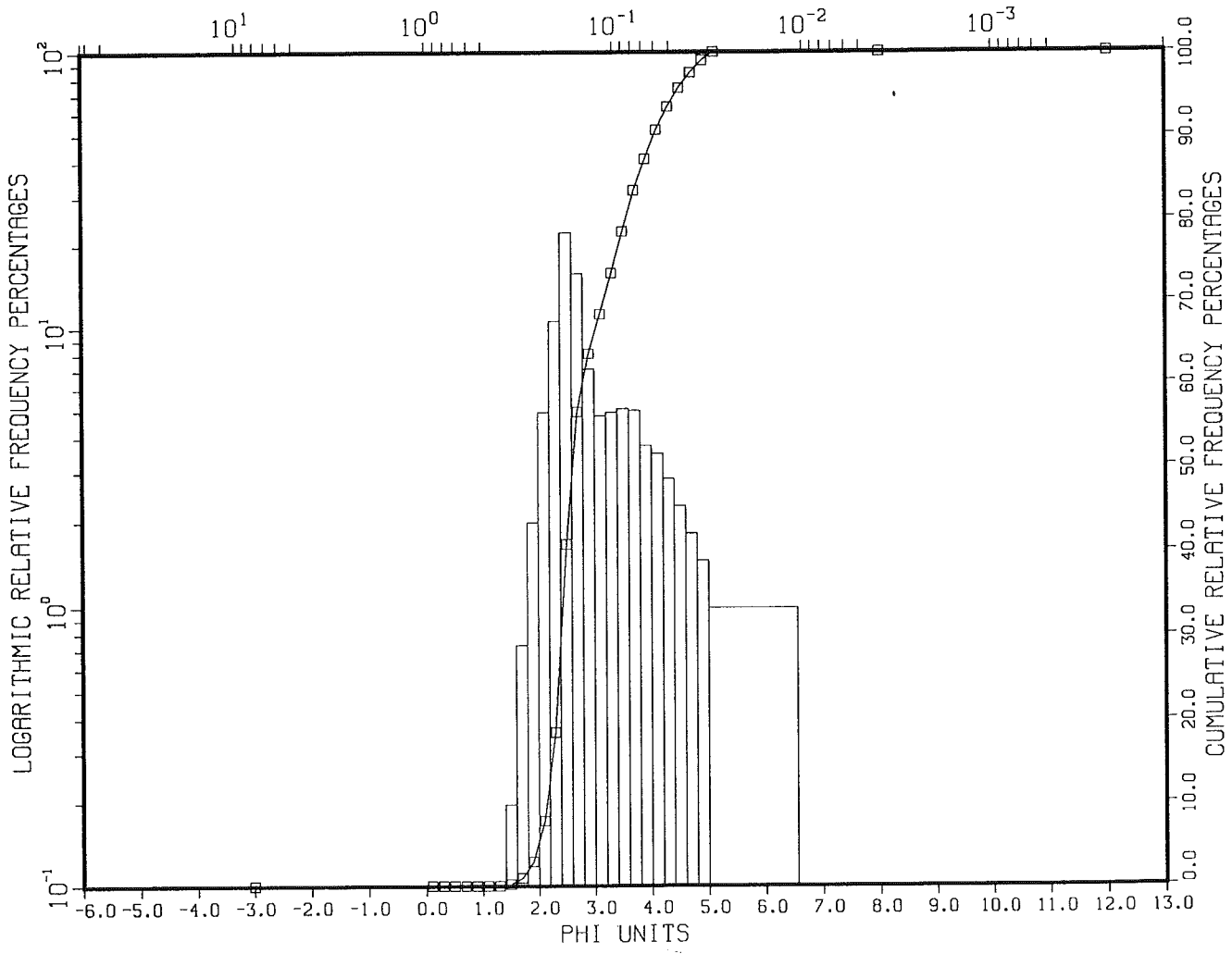
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	87.12	12.88	0.00	12.88

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.98	0.75	3.06	0.92

(0 051 mm)

93501-4-LOWER,R0008952, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-5-LOWER,RD008953, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.00	0.00
.81	0.30	0.00	0.00
.71	0.50	0.00	0.00
.62	0.70	0.00	0.00
.54	0.90	0.00	0.00
.47	1.10	0.00	0.00
.41	1.30	0.08	0.08
.35	1.50	0.06	0.13
.31	1.70	0.31	0.44
.27	1.90	0.90	1.35
.23	2.10	2.27	3.62
.20	2.30	5.74	9.35
.18	2.50	13.08	22.43
.15	2.70	13.27	35.70
.13	2.90	6.92	42.62
.12	3.10	5.55	48.18
.10	3.30	7.53	55.71
.88E-01	3.50	7.47	63.18
.77E-01	3.70	5.84	69.02
.67E-01	3.90	7.19	76.22
.58E-01	4.10	6.70	82.91
.51E-01	4.30	5.65	88.56
.44E-01	4.50	4.29	92.84
.38E-01	4.70	3.32	96.16
.33E-01	4.90	2.33	98.49
.29E-01	5.10	1.51	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

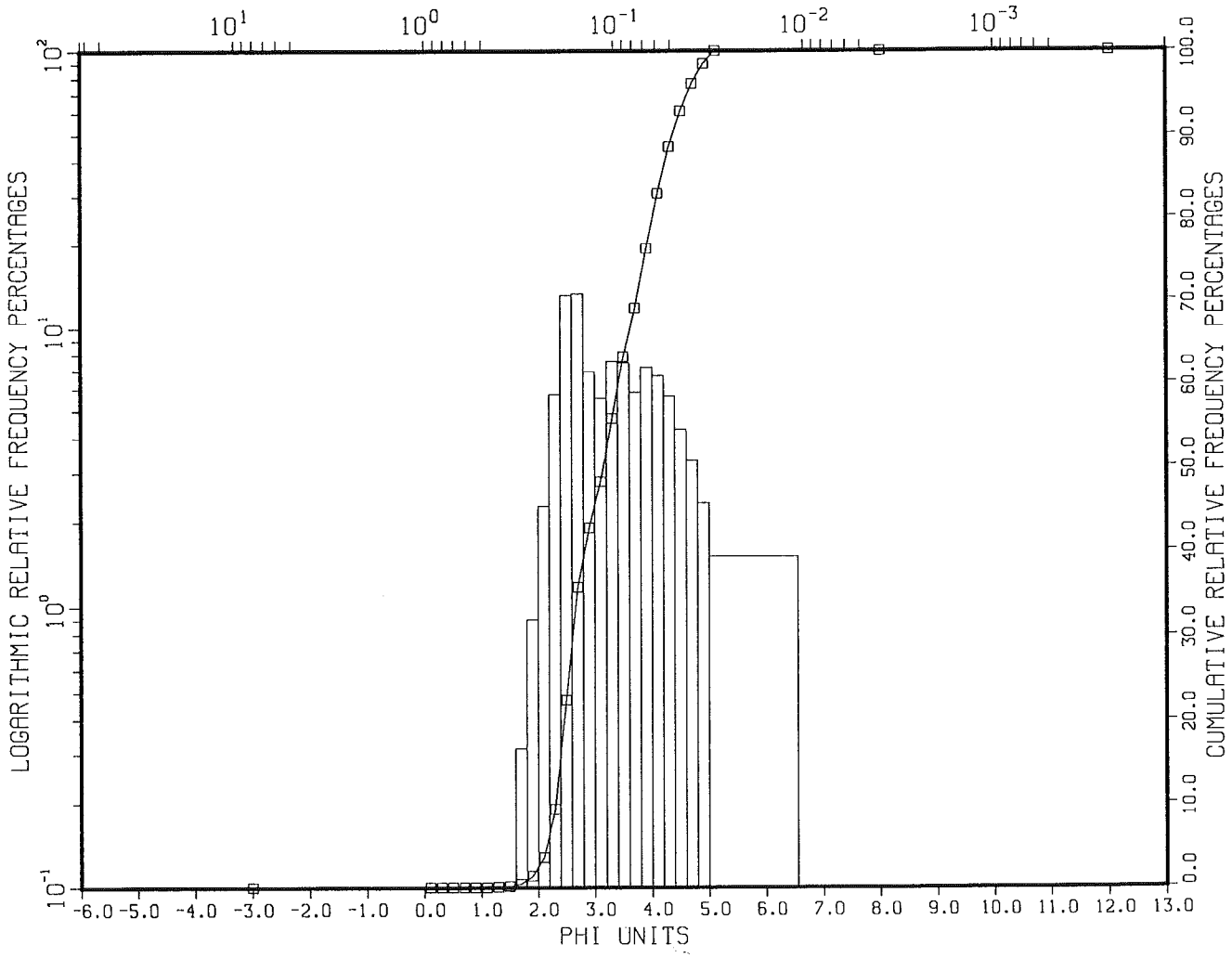
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	76.22	23.78	0.00	23.78

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
3.33	0.80	2.10	0.32

(0.039)

93501-5-LOWER,RD008953, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-1-MIDDLE,RD008954, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.16	0.16
.93	0.10	0.05	0.21
.81	0.30	0.25	0.47
.71	0.50	0.89	1.36
.62	0.70	1.64	2.99
.54	0.90	3.25	6.24
.47	1.10	5.02	11.26
.41	1.30	5.55	16.81
.35	1.50	5.61	22.42
.31	1.70	5.85	28.27
.27	1.90	7.96	36.23
.23	2.10	16.39	52.63
.20	2.30	28.75	81.38
.18	2.50	10.78	92.16
.15	2.70	3.76	95.92
.13	2.90	1.35	97.26
.12	3.10	0.96	98.22
.10	3.30	0.68	98.90
.88E-01	3.50	0.41	99.31
.77E-01	3.70	0.30	99.61
.67E-01	3.90	0.19	99.80
.58E-01	4.10	0.20	100.00
.51E-01	4.30	0.00	100.00
.44E-01	4.50	0.00	100.00
.38E-01	4.70	0.00	100.00
.33E-01	4.90	0.00	100.00
.29E-01	5.10	0.00	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

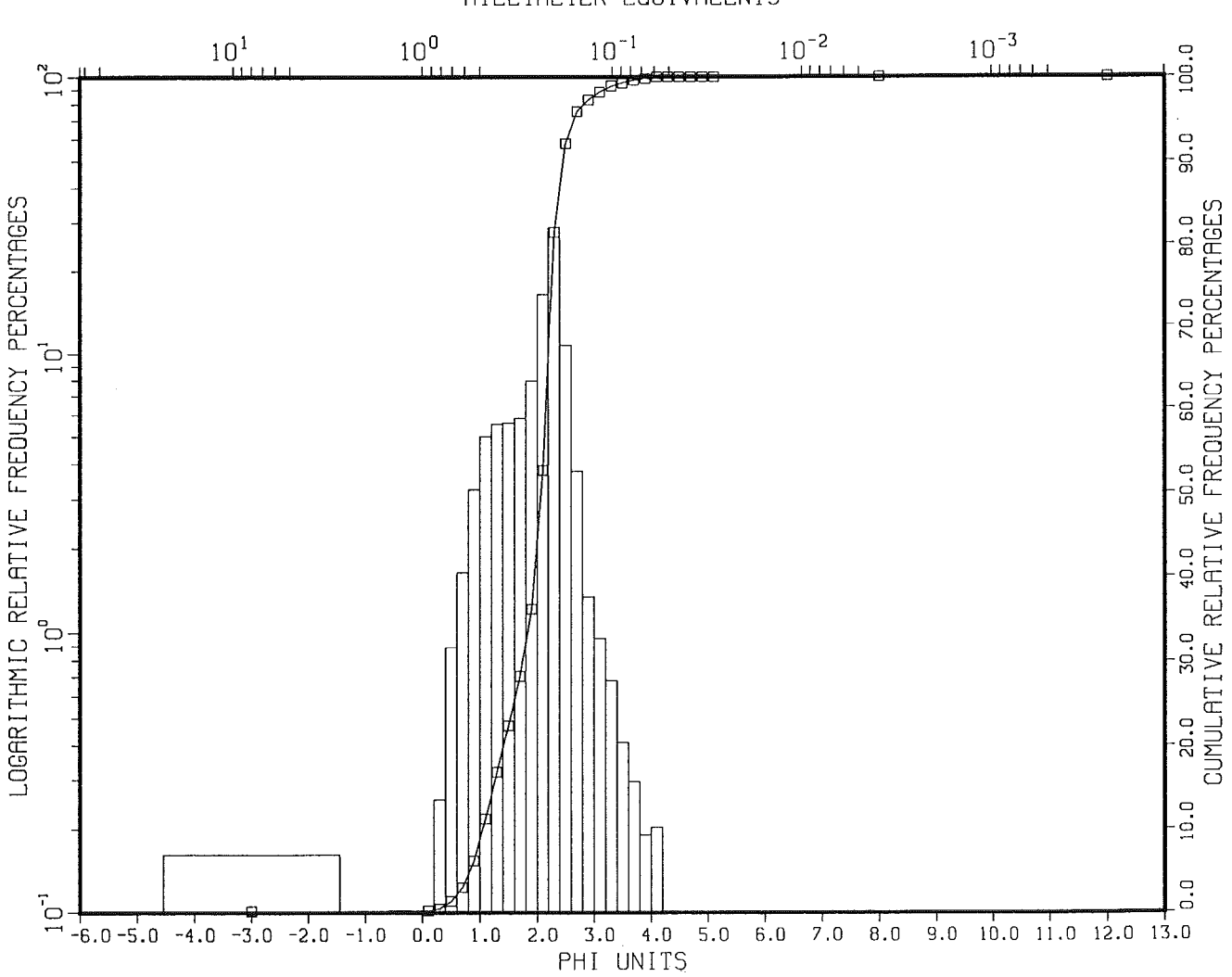
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.16	99.64	0.20	0.00	0.20

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.01	0.60	10.60	-1.24

(σ = 132 mm)

93501-1-MIDDLE,RD008954, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-2-MIDDLE,RD008955, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.14	0.14
.93	0.10	0.00	0.14
.81	0.30	0.19	0.34
.71	0.50	0.22	0.56
.62	0.70	0.61	1.16
.54	0.90	1.53	2.69
.47	1.10	2.34	5.03
.41	1.30	3.76	8.79
.35	1.50	4.06	12.85
.31	1.70	5.53	18.38
.27	1.90	8.28	26.66
.23	2.10	15.24	41.90
.20	2.30	28.84	70.73
.18	2.50	18.58	89.31
.15	2.70	5.73	95.05
.13	2.90	1.87	96.92
.12	3.10	0.88	97.80
.10	3.30	0.59	98.39
.88E-01	3.50	0.64	99.03
.77E-01	3.70	0.47	99.50
.67E-01	3.90	0.27	99.78
.58E-01	4.10	0.22	100.00
.51E-01	4.30	0.00	100.00
.44E-01	4.50	0.00	100.00
.38E-01	4.70	0.00	100.00
.33E-01	4.90	0.00	100.00
.29E-01	5.10	0.00	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

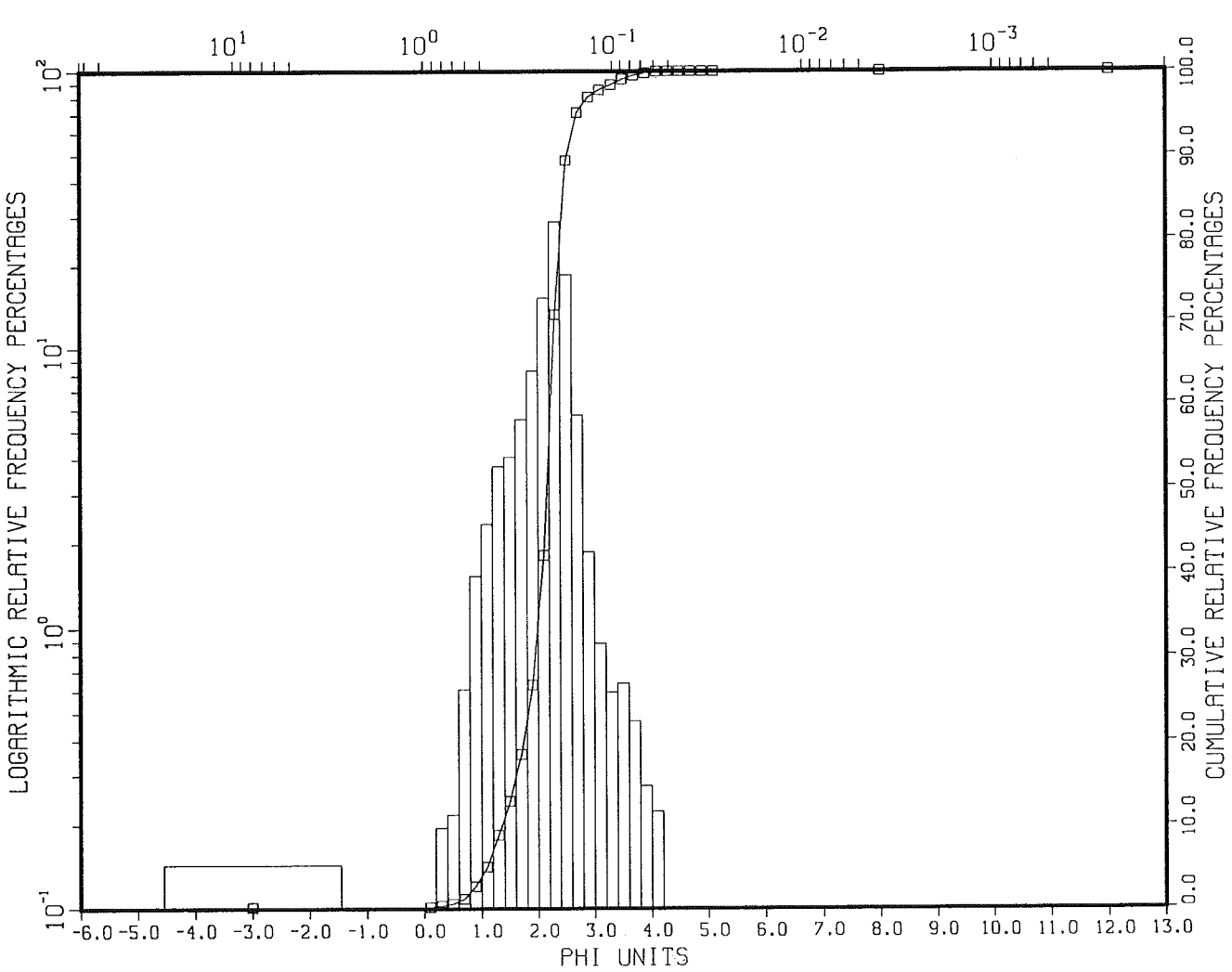
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.14	99.63	0.22	0.00	0.22

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.17	0.54	16.10	-1.56

(0.11 mm)

93501-2-MIDDLE,RD008955, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-1-UPPER,RD008956, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	1.07	1.07
.93	0.10	0.08	1.15
.81	0.30	0.60	1.75
.71	0.50	1.49	3.24
.62	0.70	2.76	5.99
.54	0.90	4.66	10.65
.47	1.10	5.31	15.96
.41	1.30	5.12	21.08
.35	1.50	4.07	25.15
.31	1.70	4.34	29.48
.27	1.90	5.34	34.82
.23	2.10	9.69	44.51
.20	2.30	26.21	70.72
.18	2.50	16.82	87.54
.15	2.70	5.02	92.56
.13	2.90	1.98	94.54
.12	3.10	1.31	95.85
.10	3.30	1.09	96.94
.88E-01	3.50	0.94	97.88
.77E-01	3.70	0.81	98.70
.67E-01	3.90	0.74	99.44
.58E-01	4.10	0.56	100.00
.51E-01	4.30	0.00	100.00
.44E-01	4.50	0.00	100.00
.38E-01	4.70	0.00	100.00
.33E-01	4.90	0.00	100.00
.29E-01	5.10	0.00	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

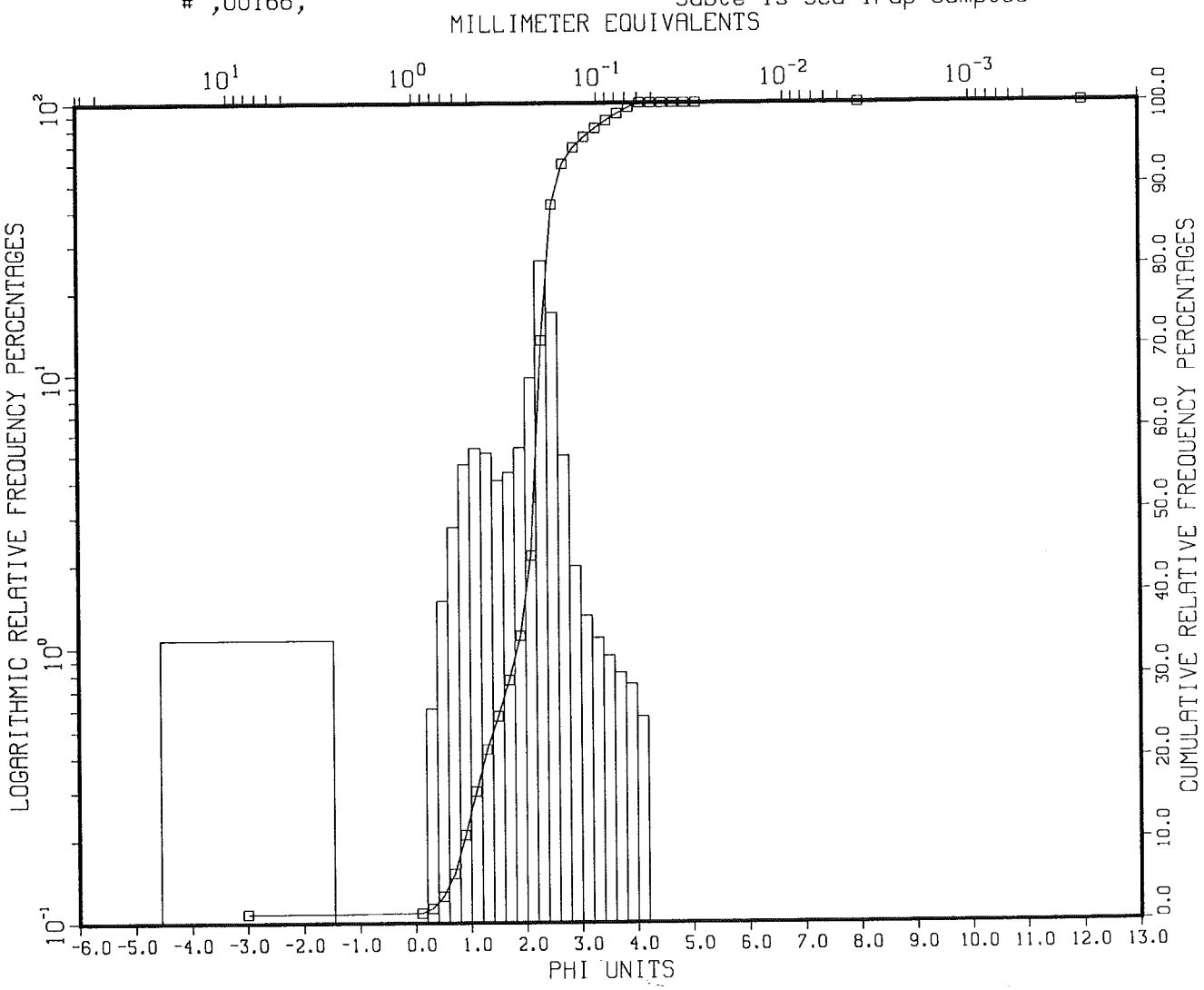
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
1.07	98.37	0.56	0.00	0.56

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.01	0.86	13.51	-2.11

(0.134 mm)

93501-1-UPPER,RD008956, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-2-UPPER,RD008957, Dr. Carl Amos
,00166, Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.26	0.26
.93	0.10	0.07	0.33
.81	0.30	0.53	0.86
.71	0.50	1.57	2.43
.62	0.70	2.88	5.31
.54	0.90	5.14	10.45
.47	1.10	6.63	17.08
.41	1.30	6.14	23.22
.35	1.50	4.90	28.13
.31	1.70	4.35	32.48
.27	1.90	5.83	38.30
.23	2.10	9.69	47.99
.20	2.30	25.87	73.86
.18	2.50	15.39	89.25
.15	2.70	4.57	93.82
.13	2.90	1.69	95.50
.12	3.10	1.22	96.72
.10	3.30	0.92	97.64
.88E-01	3.50	0.72	98.37
.77E-01	3.70	0.71	99.08
.67E-01	3.90	0.54	99.62
.58E-01	4.10	0.38	100.00
.51E-01	4.30	0.00	100.00
.44E-01	4.50	0.00	100.00
.38E-01	4.70	0.00	100.00
.33E-01	4.90	0.00	100.00
.29E-01	5.10	0.00	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.26	99.36	0.38	0.00	0.38

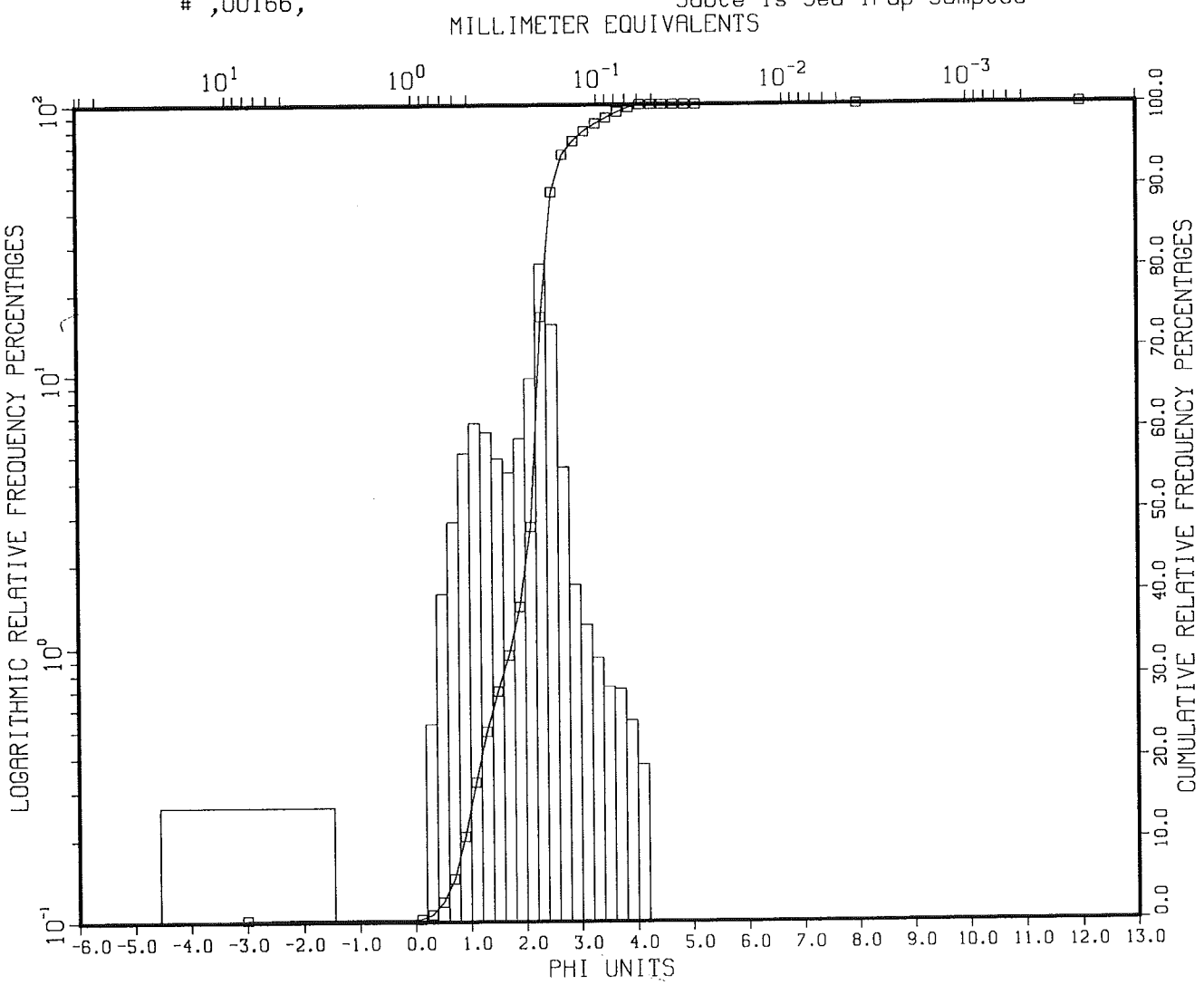
STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
1.99	0.73	8.12	-0.99

(0.137mm)

93501-2-UPPER,RD008957, Dr. Carl Amos

,00166, Sable Is Sed Trap Samples



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-3-UPPER,RD008958, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.00	0.00
.81	0.30	0.00	0.00
.71	0.50	0.00	0.00
.62	0.70	0.00	0.00
.54	0.90	0.01	0.01
.47	1.10	0.45	0.45
.41	1.30	0.89	1.34
.35	1.50	1.32	2.66
.31	1.70	1.98	4.64
.27	1.90	3.58	8.22
.23	2.10	7.14	15.35
.20	2.30	18.68	34.04
.18	2.50	27.12	61.16
.15	2.70	12.44	73.60
.13	2.90	4.91	78.51
.12	3.10	3.72	82.23
.10	3.30	3.83	86.06
.88E-01	3.50	3.43	89.49
.77E-01	3.70	2.88	92.37
.67E-01	3.90	2.33	94.69
.58E-01	4.10	1.75	96.45
.51E-01	4.30	1.20	97.65
.44E-01	4.50	0.85	98.50
.38E-01	4.70	0.64	99.14
.33E-01	4.90	0.48	99.62
.29E-01	5.10	0.38	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

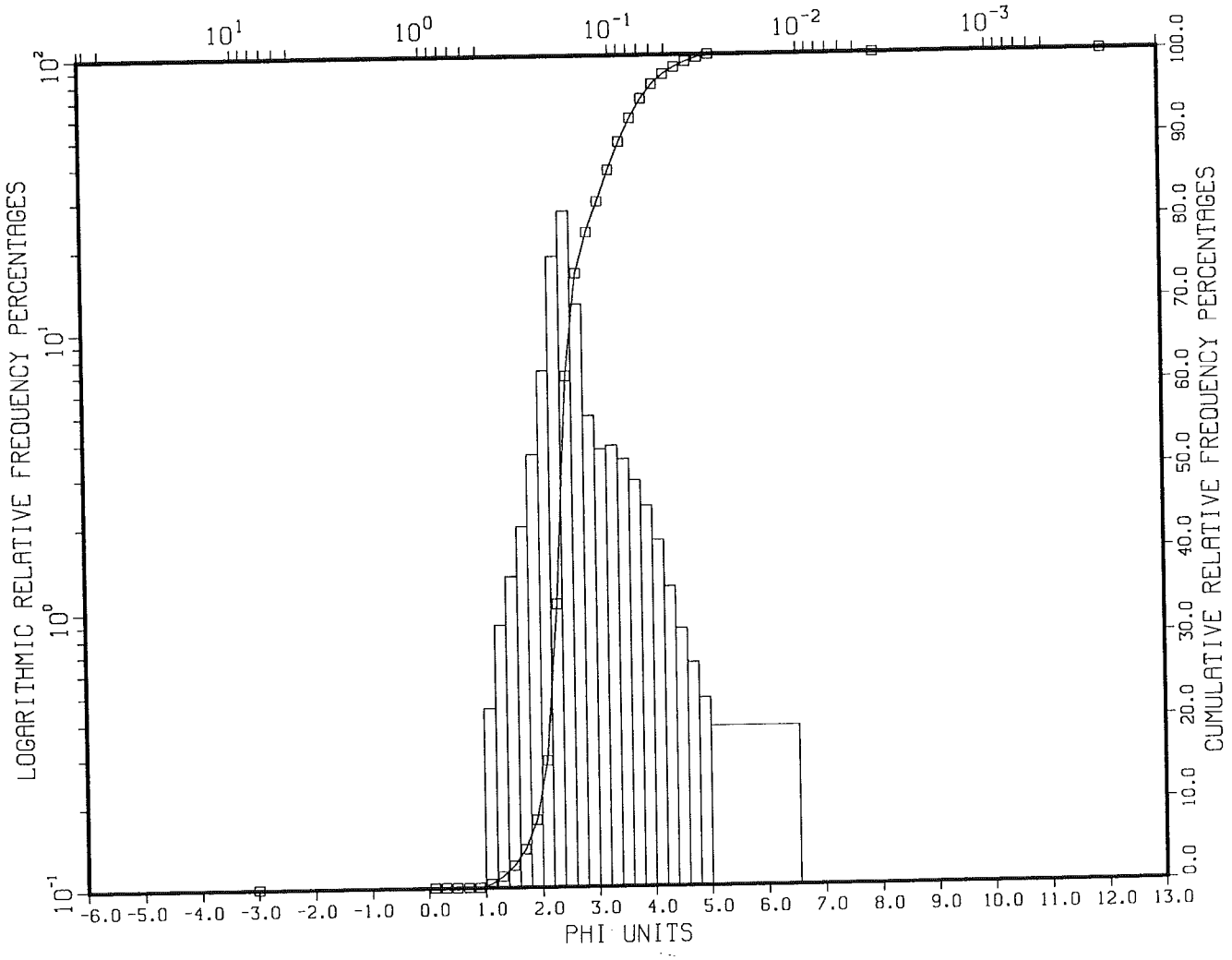
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	94.69	5.31	0.00	5.31

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
2.67	0.65	4.70	1.11

(0.069mm)

93501-3-UPPER,RD008958, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-4-UPPER,RD008959, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.00	0.00
.81	0.30	0.00	0.00
.71	0.50	0.00	0.00
.62	0.70	0.00	0.00
.54	0.90	0.00	0.00
.47	1.10	0.07	0.07
.41	1.30	0.19	0.26
.35	1.50	0.38	0.65
.31	1.70	0.70	1.35
.27	1.90	1.42	2.77
.23	2.10	3.19	5.96
.20	2.30	7.27	13.22
.18	2.50	14.64	27.86
.15	2.70	11.24	39.10
.13	2.90	6.51	45.61
.12	3.10	7.45	53.05
.10	3.30	8.21	61.26
.88E-01	3.50	9.50	70.76
.77E-01	3.70	6.50	77.26
.67E-01	3.90	5.02	82.28
.58E-01	4.10	4.04	86.32
.51E-01	4.30	3.54	89.86
.44E-01	4.50	3.00	92.85
.38E-01	4.70	2.60	95.46
.33E-01	4.90	2.45	97.91
.29E-01	5.10	2.09	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

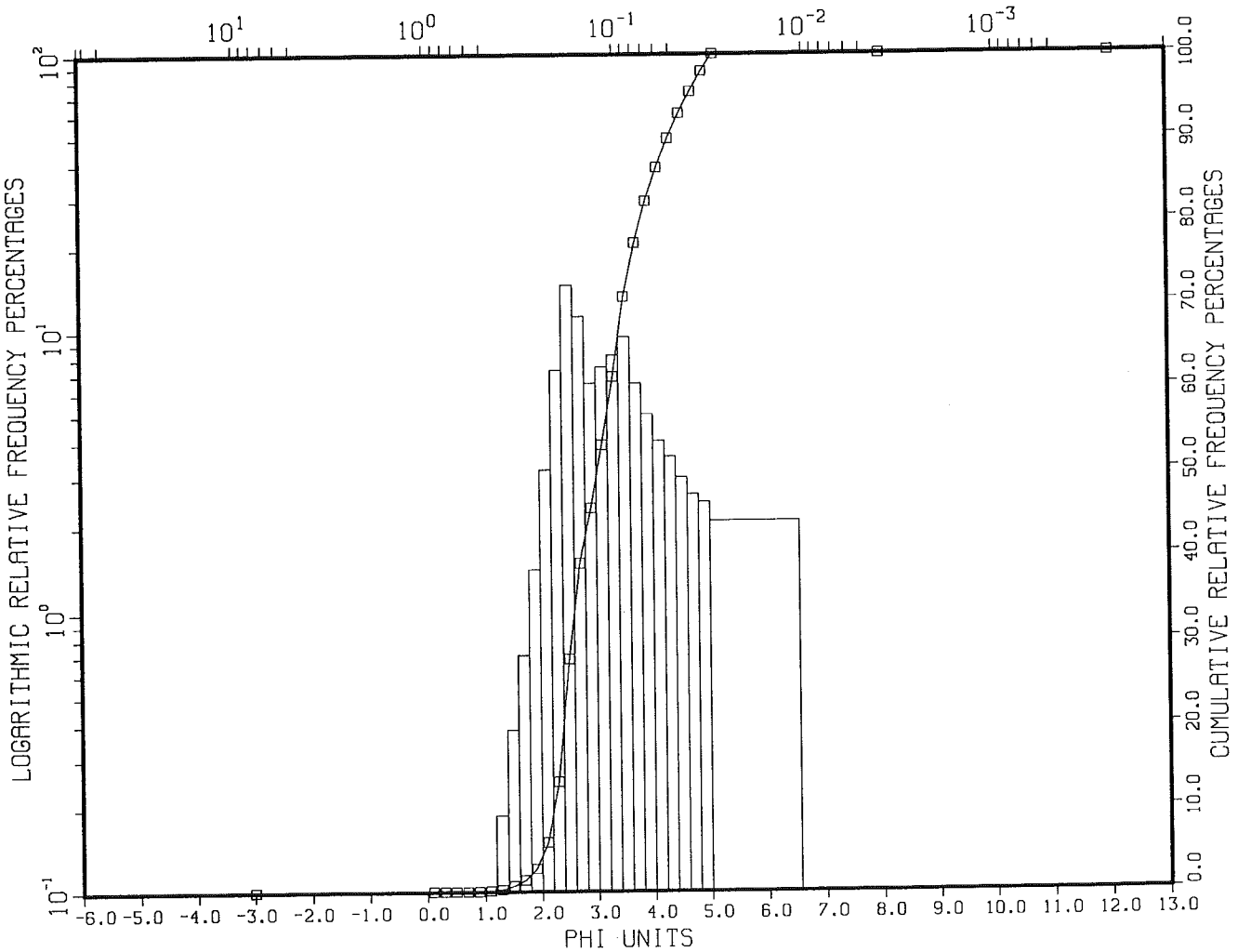
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	82.28	17.72	0.00	17.72

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
3.21	0.80	2.54	0.47

(0.040 mm)

93501-4-UPPER,RD008959, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS



CALCULATION RESULTS FOR
THE SAMPLE WITH THE IDENTIFIER:

93501-5-UPPER,RD008960, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples

RESULTS

MIDPOINTS MM	MIDPOINTS PHI	RELATIVE FREQUENCY PERCENTAGES	CUMULATIVE FREQUENCY PERCENTAGES
8.0	-3.00	0.00	0.00
.93	0.10	0.00	0.00
.81	0.30	0.00	0.00
.71	0.50	0.00	0.00
.62	0.70	0.00	0.00
.54	0.90	0.00	0.00
.47	1.10	0.00	0.00
.41	1.30	0.00	0.00
.35	1.50	0.11	0.11
.31	1.70	0.17	0.28
.27	1.90	0.33	0.62
.23	2.10	0.77	1.39
.20	2.30	1.51	2.90
.18	2.50	3.38	6.27
.15	2.70	4.17	10.44
.13	2.90	3.61	14.05
.12	3.10	5.12	19.17
.10	3.30	10.26	29.42
.88E-01	3.50	11.74	41.16
.77E-01	3.70	10.33	51.49
.67E-01	3.90	9.62	61.11
.58E-01	4.10	8.07	69.18
.51E-01	4.30	6.97	76.15
.44E-01	4.50	6.56	82.71
.38E-01	4.70	6.24	88.95
.33E-01	4.90	5.86	94.81
.29E-01	5.10	5.19	100.00
.39E-02	8.00	0.00	100.00
.24E-03	12.00	0.00	100.00

GRAIN SIZE BREAKDOWN

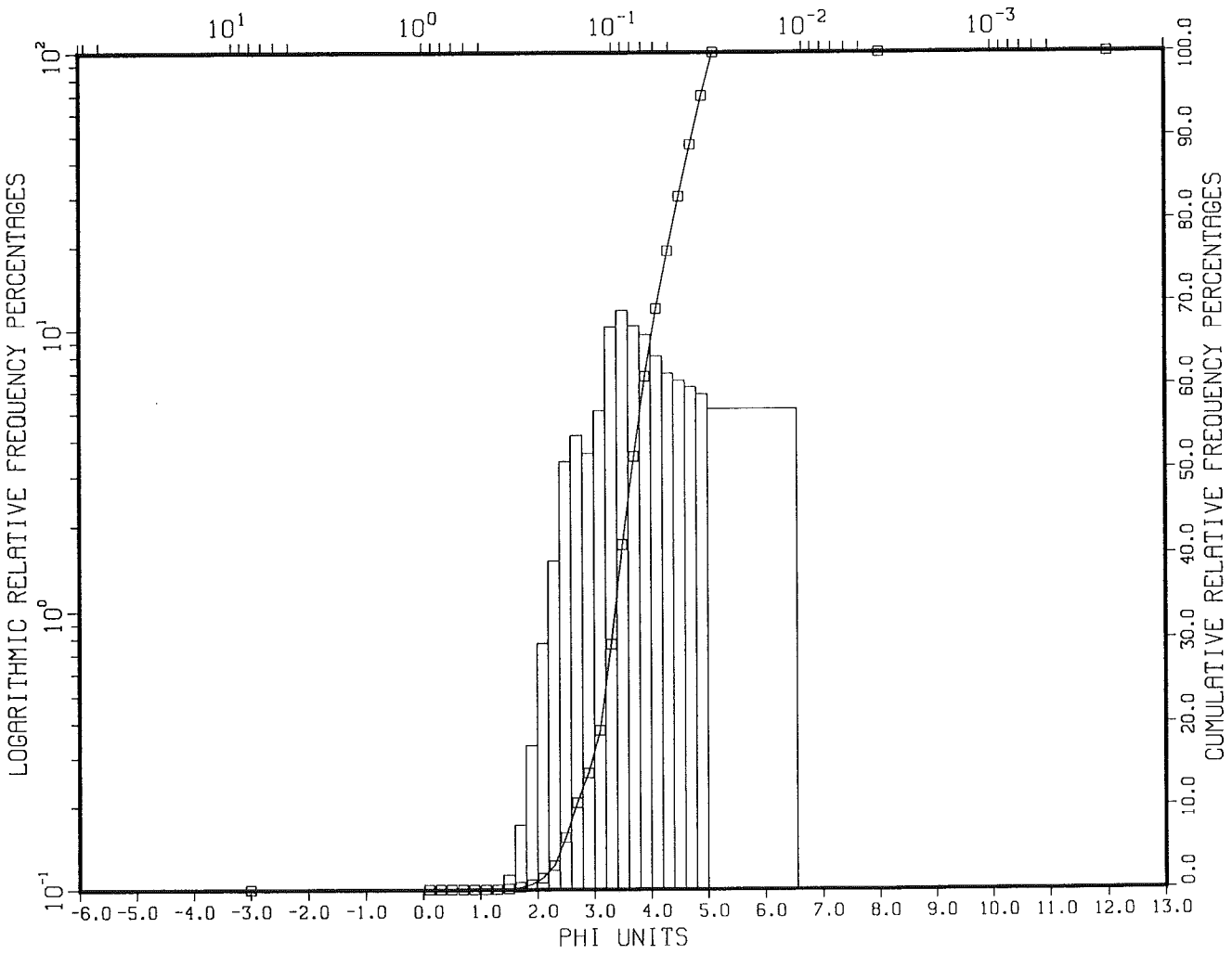
% GRAVEL	% SAND	% SILT	% CLAY	% MUD
0.00	61.11	38.89	0.00	38.89

STATISTICAL MEASURES

MEAN (PHI)	STANDARD DEVIATION (PHI)	KURTOSIS (NO DIM.)	SKEWNESS (NO DIM.)
3.80	0.74	2.48	-0.15

(0.022mm)

93501-5-UPPER,RD008960, Dr. Carl Amos
ORGANICS REMOVED, >0.025 cut off Sable Is Sed Trap Samples
MILLIMETER EQUIVALENTS



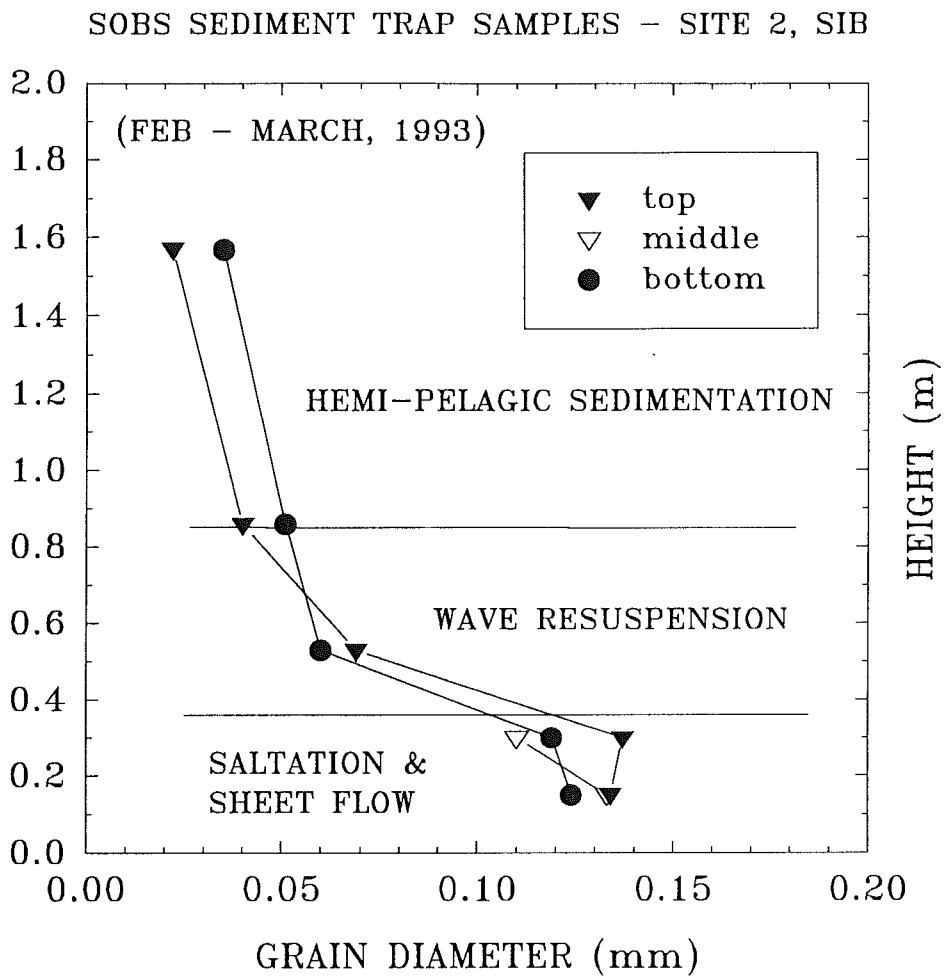

SOBS SEDIMENT TRAP SAMPLES – SITE 2, SIB
(FEB – MARCH, 1993)
top
middle
bottom
HEMI–PELAGIC SEDIMENTATION
WAVE RESUSPENSION
SALTATION &
SHEET FLOW
HEIGHT (m)
GRAIN DIAMETER (mm)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.05
0.10
0.15
0.20

Figure A4 - 1

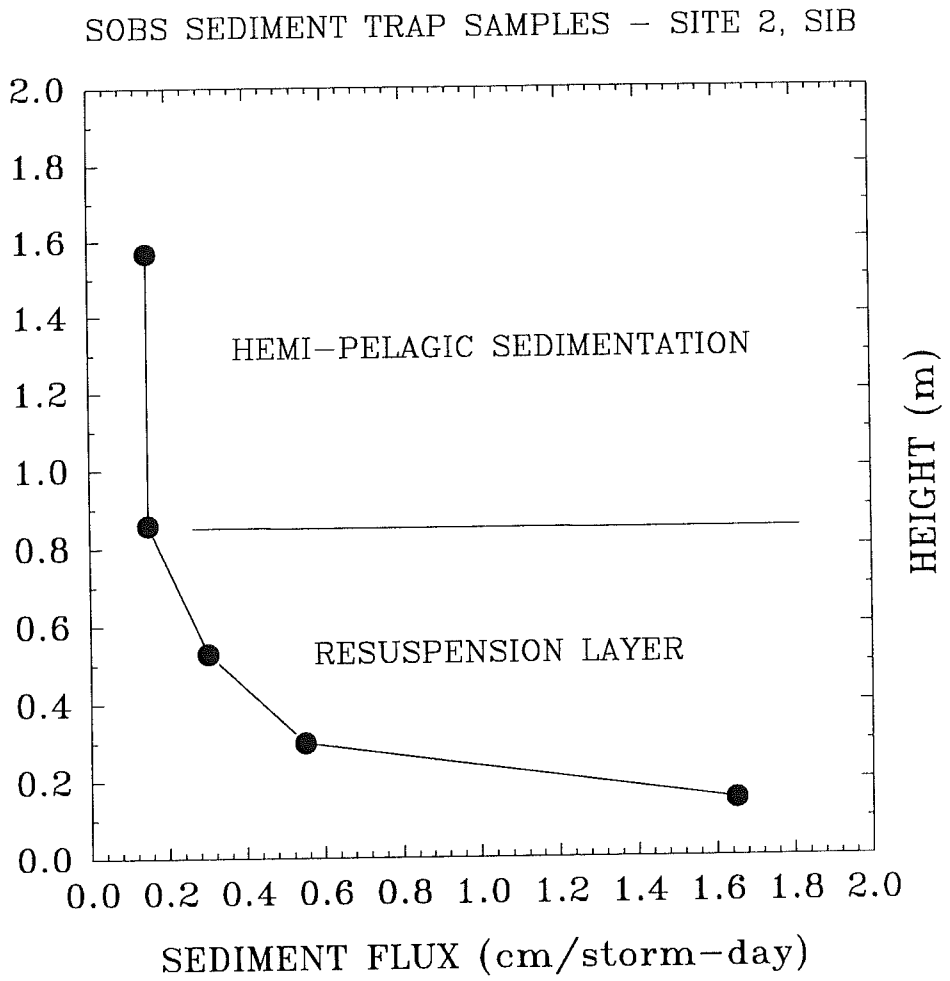

SOBS SEDIMENT TRAP SAMPLES – SITE 2, SIB
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
HEMI–PELAGIC SEDIMENTATION
RESUSPENSION LAYER
HEIGHT (m)
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
SEDIMENT FLUX (cm/storm–day)

Figure A4 - 2