SUSPENDED PARTICULATE MATTER IN THE CHESAPEAKE BAY ENTRANCE AND ADJACENT SHELF WATERS

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INTRODUCTION

The Department of Oceanography, Old Dominion University, participated in a 1980 NASA/NOAA Superflux program. To support the scientific objectives of the program, water samples were collected and analyzed for hydrocarbons, chlorophyll, nutrients, and suspended solid concentrations and size distributions. The program consisted of three experimental study periods (March, Superflux I, June, Superflux II, and October, Superflux III) in 1980 to study the plume of Chesapeake Bay under various seasonal conditions.

This report utilized the data collected during the Superflux II mission to describe the distribution of several component characteristics of suspended solids that may have influenced the Chesapeake Bay entrance and adjacent shelf waters.

Superflux II was conducted between the 18th and the 27th of June, 1980. The NOAA ships Delaware II and George B. Kelez and the R/V Linwood Holton collected water from 50 stations adjacent to the entrance of Chesapeake Bay (figs. 1(a) and 1(b)). Samples were collected at standard Superflux stations (along four shelf transects) and at six BAPLEX stations. BAPLEX is a program at the Department of Oceanography to study bay plumes. Station locations and sequences of sampling were determined by Dr. James P. Thomas, Superflux work unit monitor (tables 1 to 3).

Approximately 400 samples were collected for the various analyses, including 138 for suspended solids. Characteristics of suspended solids that were analyzed included: total suspended matter (TSM), total suspended inorganics (TSI), total suspended organics (TSO), percent organics, particle size distribution (PSD) and presence or absence of 11 of the most prominent particle types.

METHODS

Optimal vertical representation of the water column was obtained by sampling four depths at each station. Surface samples were taken with buckets and 8-liter Niskin bottles were used to obtain water samples from two mid-depths and 1 m above the bottom. Samples to be analyzed for suspended solids were withdrawn first, followed by the biological and chemical samples. Approximately one liter was collected for determination of TSM and 500 milliliters were collected for PSD analysis. Temperature and salinity measurements were also taken at each station with an RS-5 inductive salinometer.

The suspended solids were filtered onboard ship immediately following sample collection using Gelman type A/E glass fiber filters that had been prewashed, preignited and preweighed. Filters were weighed on a Mettler Balance with an accuracy of 0.1 mg.

Initially, a microscopic overview of the filters revealed Ceratium sp., Peridinium sp., a variety of centric diatoms, Biddulphia sp., tintinnids, lamillebranch larvae, pennate diatoms, a variety of zooplankton, fecal pellets, inorganic/organic fibers and quartz grains as the most prominent particle types present in the samples. More thorough microscopic analysis of each filter was performed to determine the presence, absence, or abundance of each particle type.

Concentrations of TSO and TSI were determined by weight loss after ignition of the filters for 2 hours at 400° C. The filters were equilibrated for 1 hour before being weighed.

OBSERVATIONS AND DISCUSSION OF RESULTS

The three major parameters of suspended solids, total suspended matter, total suspended inorganics and total suspended organics, were plotted in cross-section and areally for the three depth intervals. Since precipitation on the watersheds of the Chesapeake Bay was abnormally low in June, low concentrations of total particulates were expected. The average concentration of the 138 samples analyzed for TSM was 3.2 mg/ℓ (table 4).

The distribution of surface concentrations illustrated that the concentrations of total suspended matter were lower at the shelf stations and higher adjacent to the Bay entrance (fig. 2). The highest surface concentrations were found adjacent to Cape Henry, Virginia. The concentrations were relatively constant (2.1 to 2.5 mg/ℓ) across the Bay entrance in a northeast direction and in a southerly direction along the Virginia coastline.

The areal distributions of concentrations at the mid-depth interval (3 to 6 m) and at 1 m above the bottom showed the same general trend (figs. 3 and 4). The highest concentrations were near Cape Henry, and concentrations decreased in an offshore direction and south of False Cape.

The cross-sectional diagrams of the five transects (fig. 5) were constructed as an alternate method of viewing the data. The BAPLEX transect (profile A) indicated a minor increase in total suspended matter with depth, with higher values at the margins of the entrance adjacent to Cape Henry and Fishermans Island. Approximately 9.2 km to the south of profile A (profile B), the concentration of total suspended matter decreased in an offshore direction and increased with depth. Data from profiles C, D and E exhibited similar trends with increasingly lower concentrations away from Cape Henry.

Surface distribution of organic matter showed very little variation in concentration (fig. 6). Concentrations were generally low and values ranged from 0.4 to 1.4 mg/ℓ with a mean of 1.1 mg/ℓ. It was anticipated that organics would comprise the major portion of total suspended particulates due to the extremely low runoff, but it was found that organic material accounted for only 30 to 50 percent of TSM in the majority of the samples. The organic percentage of TSM increased slightly in an offshore direction. Relatively high inorganic percentages of total suspended matter may be due to three potential sources: (1) resuspension within the Bay, (2) resuspension over shoals in the Bay mouth area, and/or (3) runoff. Since the concentration of organic matter was relatively constant, variations in concentrations of inorganic matter controlled variations in the concentrations of total suspended matter. Spatial distributions of total suspended inorganics at the three depth intervals showed trends identical to those for TSM (figs. 7 to 9).

Inspection of the microscopic components of the suspended solids data revealed several general trends that complimented the trends observed for concentrations of organic and inorganic suspended matter (appendix).

Centric diatoms, fecal pellets and quartz grains appeared to have sources within the Bay, whereas zooplankton were found in patches outside the Bay entrance. Centric diatoms were present at all depths at the stations across the Bay mouth (profile A) and in surface and mid-depth nearshore waters. Stations further offshore did not contain these species at any depth (stations 803, 804, 807, 810, and 813). Quartz grains were observed in samples from all depths in the Bay entrance and from nearshore stations for transects B, C and D (stations 69, 802, 803, 805, 819 and 820). Tintinnids showed a similar pattern; they were observed at all depths at the Bay mouth stations (profile A) and stations 819 and 820. Fecal pellet distribution in bottom waters appeared to be limited to the Bay entrance area and nearshore waters adjacent to Cape Henry and Virginia Beach (stations 69, 802, 805, 808, 820, 819 and 71). Inorganic/organic fibers were present in surface waters for all BAPLEX stations and at depth at stations adjacent to Thimble Shoal Channel (stations 3 and 800). Surface waters off False Cape, Virginia, also contained some of this material.

The distribution of concentrations of total suspended matter as depicted by contouring procedures has obvious limitations since the sample collection was spaced over a 10-day period. It was also difficult to create a synoptic view of the area, but the Superflux II observations did not seem to illustrate the presence of a surface or near-surface turbidity plume emerging from the mouth of Chesapeake Bay. Trends observed were characteristic of June conditions only and cannot be used to predict patterns and concentrations during different seasons and under different runoff conditions.

Partial analysis of the October 15, 1980 portion of the Superflux III data did illustrate the presence of a surface or near-surface turbidity plume associated with Chesapeake Channel waters. The October 15 experiment involved a sampling scheme that was more appropriate to local dynamics, therefore aiding in the creation of a synoptic view of the region. Four ships were employed to collect samples simultaneously along four transects (fig. 1b). Similar procedures were followed for suspended solids analysis of total suspended matter, total suspended inorganics and total suspended organics. Concentrations were plotted in cross-section to determine whether a pattern was evident (fig. 10).

The contours drawn for the Bay entrance (profile A) were speculative because bottom samples were not collected at those three stations. However, concentrations along profile A illustrated higher concentrations at the surface adjacent to Chesapeake Channel. Insufficient data collection from the Bay margins prevents any speculation on concentration variability that may have been produced by the North Channel or the James River.

Profile B illustrated relatively high surface concentrations adjacent to Virginia Beach and decreasing values in an offshore direction. The central part of profile C showed the strongest influence of Chesapeake Channel waters and the possible existence of a turbidity plume.

Twenty-two km south of Cape Henry there was still evidence of relatively high surface concentrations through the central part of the profile.

CONCLUSION

Analyses of water samples collected during the Superflux II mission indicated several turbid regions associated with resuspended material, although there seemed to be no semblance of a surface or near-surface turbidity plume emerging from the Chesapeake Bay mouth. This was probably related to drought conditions prior to and during the time of the experiment. Superflux III size distribution data (ref. 1) and total suspended matter calculations did illustrate the possible existence of a near-surface turbidity plume in the Bay entrance area. Completion of the analyses for the Superflux III data, including the determination of TSO and TSI, will provide more information about the contents and presence of a surface or near-surface turbidity plume in the area of the Chesapeake Bay entrance.

REFERENCE

1. Byrnes, Mark R,; and Oertel, George F.: Particle Size Distribution of Suspended Solids in the Chesapeake Bay Entrance and Adjacent Shelf Waters. Chesapeake Bay Plume Study - Superflux 1980, NASA CP-2188, 1981 (Paper no. 16 of this compilation).

APPENDIX - CHARACTERISTICS OF TOTAL SUSPENDED MATTER

STATION DEPTH	DATE TIME DEPTH (M)	TOTAL CONCENTRATION (mg/ℓ)	INORGANIC CONCENTRATION (mg/ℓ)	ORGANIC CONCENTRATION (mg/ℓ)	PERCENT ORGANICS	*Ceratium* sp.	*Peridinium* sp.	Centric diatoms	fecal pellets	Lamellibranch larvae	Zooplankton	Pennate diatoms	quartz grains	*Biddulphia* sp.	inorganic/organic fibers	Tintinnids
Delaware II																
800-1	6-17	2.29	1.35	0.93	40.9	X			X	X						
800-5	2100	2.96	2.04	0.92	31.0	X			X	X						
800-7	15	3.90	2.16	0.93	30.0	X		X	X					X		X
801-1	6-18	2.73	1.72	1.01	37.0	X	X	X								X
801-5	1210	2.10	1.10	1.00	47.6	X	X		X	X		X				
801-10	15	3.90	3.20	0.70	18.0	X		X	X				X			X
801-13		4.50	3.50	1.00	22.2	X	X		X				X	X		X
69-1	6-18	3.49	2.35	1.14	32.7	X	X	X					X			
69-5	1445	4.65	3.33	1.31	28.3	X	X	X		X			X			
69-10	11	10.60	9.30	1.30	12.3	X	X	X	X				X	X		X
802-1	6-18	2.68	1.75	1.03	38.5	X	X	X		X			X			
802-5	1700	0.61	0.00	0.61	100.0	a	X			X	X					
802-10	18	2.37	1.34	1.03	43.5	X	X		X			X	X			
802-15		7.94	7.11	0.82	10.4	X		X	X				X			X
803-1	6-18	3.10	2.20	0.90	29.0	X	X			X	X			X		
803-5	2030	2.20	1.40	0.80	36.4	a	X						X			
803-10	11	2.22	1.31	0.91	40.9	X	X				X	X	X			
804-1	6-18	2.35	1.33	1.02	43.5	X	X			X						
804-5	2330	2.00	1.00	1.00	50.0	a	X			X						
804-10	14.6	1.72	0.91	0.81	47.1	a	X			X	X					
804-15		3.06	2.24	0.82	26.7	X			X							X

STATION DEPTH	DATE TIME DEPTH (M)	TOTAL CONCENTRATION (mg/ℓ)	INORGANIC CONCENTRATION (mg/ℓ)	ORGANIC CONCENTRATION (mg/ℓ)	PERCENT ORGANICS	*Ceratium* sp.	*Peridinium* sp.	Centric diatoms	fecal pellets	Lamellibranch larvae	Zooplankton	Pennate diatoms	quartz grains	*Biddulphia* sp.	inorganic/organic fibers	Tintinnids
1A-1	6-19 0952 20.1	2.60	1.70	0.90	34.6	X		X		X			X			
2A-1	6-19 1018 20.1	4.90	3.50	1.40	28.6	X	X			X	X					
3A-1	6-19 1036 9	5.50	4.30	1.20	21.8	X		X	X				X			X
805-1	6-19	2.60	1.60	0.80	30.8	X	X			X			X			X
805-5	1200	2.80	1.80	1.00	35.7	X	X									X
805-10	10	9.80	8.30	1.50	18.1	X		X	X	X			X			
70-1	6-19	1.90	0.90	1.00	52.6	X	X			X			X			
70-5	1720	1.50	0.70	0.80	53.3	X	X			X						X
70-10	13	2.60	1.50	1.10	42.3	a	X	X		X	X		X			
70-13		1.90	1.00	0.90	47.4	a		X			X			X		
806-1	6-19	1.20	0.60	0.60	50.0	X				X	X					
806-5	1940	1.00	0.30	0.70	70.0	X										
806-10	15	1.50	0.60	0.90	60.0	X	X			X	X					
806-15		3.23	1.92	1.31	40.6	X		X	X	X		X		X		

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807-1	6-19	1.46	0.73	0.73	50.0	X					X					
807-5	2150	1.32	0.66	0.66	50.0	X					X					
807-10	16.5	1.18	0.65	0.52	44.4	X	X				X					
807-15		2.04	1.22	0.82	40.0	a				X		X		X		
66-1	6-20 0535 1280	1.46	1.06	0.40	27.3	X										
67-1	6-20 0635 914	1.24	0.83	0.41	33.3	X	X									
68-1	6-20 0735 93	1.09	0.61	0.48	43.8						X					
81-1	6-20 0845 48	0.86	0.33	0.53	61.5	X										
82-1	6-20 0945 35	1.07	0.53	0.53	50.0	X										
83-1	6-20 1100 33	1.13	0.73	0.40	35.3											

STATION DEPTH	DATE TIME DEPTH (M)	TOTAL CONCENTRATION (mg/ℓ)	INORGANIC CONCENTRATION (mg/ℓ)	ORGANIC CONCENTRATION (mg/ℓ)	PERCENT ORGANICS	Ceratium sp.	Peridinium sp.	Centric diatoms	fecal pellets	Lamelli-branch larvae	Zooplankton	Pennate diatoms	quartz grains	Biddulphia sp.	Inorganic/organic fibers	Tintinnids
808-1	6-20	1.92	1.32	0.60	31.0	X	X	a						X		
808-5	1750	2.30	1.51	0.79	34.3	X	X	X	X	X						
808-10	10	4.40	3.10	1.30	29.6	X		X	X					X		
809-1	6-20	1.48	0.60	0.87	59.1	X	X	X	X	X			X			
809-5	2000	1.28	0.61	0.68	52.6	X	X			X						
809-10	15	2.38	1.29	1.09	45.7	a	X	X		X	X					
809-15		2.27	1.47	0.80	35.3	X		a			X			X		
810-1	6-20	1.54	0.81	0.74	47.8	X					X					
810-6	2235	0.97	0.48	0.48	50.0	X				X	X					
810-12	17	1.61	0.74	0.87	54.2	a	X			X				X		
810-18		2.27	1.33	0.93	41.2	X	X					X				
811-1	6-21	0.74	0.20	0.54	72.7	X					X					
811-7	0835	2.04	1.43	0.61	30.0	X					X					
811-14	20	1.39	0.90	0.49	35.0	X	X									
811-21		2.01	1.21	0.81	40.0	a	X									
813-1	6-21	0.88	0.47	0.41	46.2	X					X					
813-6	1105	1.22	0.68	0.54	44.4	X				X	X					
813-12	18	1.43	0.88	0.54	38.1	a	X									
813-18		2.08	1.34	0.74	35.5	a	X				X	X				

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812-1	6-21	1.22	0.74	0.47	38.9	a	X			X	X					
812-10	1410	1.20	0.67	0.53	44.4	X	X			X	X					
812-15	20	1.19	0.66	0.53	44.4	X	X				X					
812-20		1.62	0.88	0.74	45.8	a	X				X					
71-1	6-21	1.37	0.75	0.62	45.0	X					X					
71-6	1755	1.60	0.83	0.76	47.8	a	X	X		X	X					
71-12	14	1.69	1.01	0.68	40.0	X	X	X	X	X						
Kelez																
800-1	6-24	4.80	3.50	1.30	27.1	X	X	X	X				X	X	X	X
800-5	2152	35.10	27.60	7.50	21.4	X		X	X		X		X		X	X
800-10	12.8	5.40	4.20	1.20	22.2											
800-15		12.90	11.10	1.90	14.7	X		X	X				X	X	X	X
46-1	6-25	1.10	0.60	0.50	45.5	X										X
46-3	0703	1.40	0.60	0.80	57.1	X										X
	24															
47-1	6-25	1.27	0.80	0.47	36.8	X							X			X
47-3	0808	1.71	1.23	0.48	28.0	X							X			X
	15.8															
48-1	6-25	2.46	1.87	0.60	24.2	X	X						X			X
48-3	0857	-	-	-	-	X	X				X					
	24															

STATION DEPTH	DATE TIME DEPTH (M)	TOTAL CONCENTRATION (mg/ℓ)	INORGANIC CONCENTRATION (mg/ℓ)	ORGANIC CONCENTRATION (mg/ℓ)	PERCENT ORGANICS	Ceratium sp.	Peridinium sp.	Centric diatoms	fecal pellets	Lamellibranch larva	Zooplankton	Pennate diatoms	quartz grains	Biddulphia sp.	Inorganic/organic fibers	Tintinnids
805-1	6-25	2.20	1.10	1.10	50.0	X	X	X	X	X			X			
805-5	1236	2.50	2.50	0.00	0.00	X	X	X	X	X					X	X
805-10	9.8	4.00	2.90	1.10	2.75	X		X	X	X			X	X	X	
70-1	6-25	2.80	1.70	1.10	39.3	X	X	X		X			X		X	X
70-5	1433	2.00	1.00	1.00	50.0	X	X	X		X			X			
70-10	15.5	3.60	2.30	1.30	36.1	X	X	X					X		X	
70-15		4.40	1.90	1.50	34.1	X	X	X	X	X			X	X	X	
819-1	6-26	2.50	1.50	1.00	40.0	X	X	X		X					X	X
819-5	1015	2.50	1.50	1.00	40.0	X	X	X		X					X	
819-10	11.0	11.90	9.40	2.50	2.10	X	X	X	X	X			X	X	X	
820-1	6-26	2.58	1.44	1.13	44.0	a	X						X		X	
820-6	1045	2.80	1.80	1.00	35.7	X	X	X		X					X	
820-12	11.9	25.50	22.00	3.50	13.7	X	X	X	X	X		X	X	X	X	
49-1	6-27	3.30	2.50	0.80	24.2	X			X				X		X	X
49-3	0825	2.11	1.37	0.74	35.0	X	X						X			
	27.4															
50-1	6-27	6.70	12.80	3.90	23.4	X					X		X			X
50-3	0940	0.80	0.00	0.80	100.0	X	X			X	X					X
	22.0															
51-1	6-27	2.70	1.50	1.20	44.4	X	X	X		X	X				X	
51-3	1054	14.65	11.41	3.23	22.1	X	X	X	X	X			X			
	12.2															

STATION DEPTH	DATE TIME DEPTH (M)	TOTAL CONCENTRATION (mg/ℓ)	INORGANIC CONCENTRATION (mg/ℓ)	ORGANIC CONCENTRATION (mg/ℓ)	PERCENT ORGANICS	Ceratium sp.	Peridinium sp.	Centric diatoms	fecal pellets	Lamellibranch larvae	Zooplankton	Pennate diatoms	quartz grains	Biddulphia sp.	inorganic/organic fibers	Tintinnids
Holton																
00-Surface	6-18	3.87	2.10	1.77	45.7											
00-1	0755	4.75	3.38	1.38	28.9											
	9.1															
						NO COMPONENT PARTICLE ANALYSIS										
0-1	6-18	1.75	0.98	0.77	43.8											
0-3	0855	2.65	1.77	0.88	33.3											
	12.8															
0.5-Surface	6-18	2.42	0.99	1.43	59.1											
0.5-1	0920	1.89	1.11	0.78	41.2											
0.5-3	7.0	1.77	0.99	0.77	43.8											
1-1	6-18	1.98	0.77	1.21	61.1											
1-3	1030	5.72	0.87	1.85	68.0											
	8.0															
2-1	6-18	2.33	1.22	1.11	47.6											
2-3	1100	2.72	1.57	1.15	42.3											
	17.0															
3-1	6-18	2.55	1.28	1.28	50.0											
3-3	1130	1.73	0.86	0.86	50.0											
	13.1															
4-1	6-18	3.77	2.62	1.15	30.6											
4-3	1245	3.47	2.21	1.26	36.4											
	11.0															

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00-Surface	6-24	2.10	1.20	0.90	42.9	a		X		X			X	X	X	a
00-1	0800	1.90	1.00	0.90	47.4	a	X			X			X	X		a
00-3	10.7	1.70	0.80	0.90	52.9	X				X			X	X		X
00-Bottom		2.59	1.69	0.80	30.7	X			X	X			X	X		X
0-Surface	6-24	2.29	1.19	1.09	47.8	X	X			X	X		X		X	X
0-1	0830	2.20	1.50	0.70	31.8	X		X		X			X			X
0-3	12.2	2.53	1.82	0.71	28.0	X	X	X	X	X			X	X		X
0-Bottom		3.63	2.75	0.88	24.3	X		X	X	X			X	X	X	X
1-Surface	6-24	2.50	1.00	1.50	60.0	X				X			X	X	a	X
1-1	0905	1.59	0.80	0.80	50.0	X	X	X	X	X			X	X		X
1-3	8.2	1.90	1.10	0.80	42.1	X	X	X		X			X	X		X
1-Bottom		2.09	1.00	1.09	52.4	X		X	X	X			X	X		X
2-Surface	6-24	2.20	0.80	1.40	63.6	X		X		X			X		a	X
2-1	1025	2.00	0.90	1.10	55.0	X		X		X			X		X	X
2-3	15.5	1.69	0.70	1.00	58.8	a	X	X		X					X	X
2-Bottom		1.99	1.19	0.80	40.0	X		X	X	X		X	X	X		X
3-Surface	6-24	2.09	1.00	1.09	52.4	X		X		X			X		X	X
3-1	1105	1.70	0.80	0.90	52.9	X	X	X		X			X		X	X
3-3	13.1	1.90	0.70	1.20	63.2	X	X	X		X					X	X
3-Bottom		3.58	2.69	0.90	25.0	X		X	X	X			X		X	X

STATION DEPTH	DATE TIME DEPTH (M)	TOTAL CONCENTRATION (mg/ℓ)	INORGANIC CONCENTRATION (mg/ℓ)	ORGANIC CONCENTRATION (mg/ℓ)	PERCENT ORGANICS	*Ceratium* sp.	*Peridinium* sp.	Centric diatoms	fecal pellets	Lamellibranch larvae	Zooplankton	Pennate diatoms	quartz grains	*Biddulphia* sp.	inorganic/organic fibers	Tintinnids
4-Surface	6-24	2.10	0.90	1.20	57.1	X		X		X			X		X	X
4-1	1140	1.80	0.70	1.10	61.1	X		X		X			X		X	
4-3	10.1	2.21	1.01	1.21	54.6	X		X		X			X	X	X	
4-Bottom		4.90	3.90	1.00	20.4	X	X	X	X				X	X		X

KEY:

X = present

a = abundant

TABLE 1.- SAMPLE STATION DATA:

NOAA Delaware II Cruise, JUNE 17-23, 1980

Station no.	Date	Time	Latitude	Longitude	Depth (m)
801	6/17	2100	36° 57.3 N	76° 02.9 W	15
801	6/18	1210	36° 59.2 N	76° 00.6 W	15
69	6/18	1445	36° 55.0 N	75° 58.0 W	11
802	6/18	1700	36° 56.0 N	75° 55.0 W	18
803	6/18	2030	36° 58.0 N	75° 51.5 W	11
804	6/18	2330	37° 00.6 N	75° 44.4 W	14.6
1A	6/19	0952	36° 57.6 N	75° 59.0 W	20.1
2A	6/19	1018	36° 56.6 N	75° 58.9 W	20.1
3A	6/19	1036	36° 55.6 N	75° 59.0 W	9
805	6/19	1200	36° 52.0 N	75° 56.0 W	10
70	6/19	1720	36° 52.4 N	75° 53.5 W	13
806	6/19	1940	36° 53.2 N	75° 48.6 W	15
807	6/19	2150	36° 54.4 N	75° 41.8 W	16.5
66	6/20	0535	36° 40.2 N	74° 30.0 W	1280
67	6/20	0635	36° 41.6 N	74° 36.4 N	914
68	6/20	0735	36° 42.9 N	74° 42.6 W	93
81	6/20	0845	36° 43.9 N	74° 49.2 W	48
82	6/20	0945	36° 45.3 N	74° 56.5 W	35
82	6/20	NS	36° 45.3 N	74° 56.5 W	35
83	6/20	1100	36° 46.5 N	75° 02.6 W	33
808	6/20	1750	36° 45.5 N	75° 54.7 W	10

TABLE 1.- Concluded

Station no.	Date	Time	Latitude	Longitude	Depth (m)
809	6/20	2000	36° 46.4 N	75° 49.0 W	15
810	6/20	2235	36° 37.6 N	75° 41.2 W	17
811	6/21	0835	36° 48.7 N	75° 32.6 W	20
813	6/21	1105	36° 35.9 N	75° 31.2 W	18
812	6/21	1410	36° 34.5 N	74° 40.2 W	20
71	6/21	1755	36° 33.7 N	75° 48.1 W	14

TABLE 2.- SAMPLE STATION DATA:

NOAA KELEZ CRUISE, JUNE 24-27, 1980

Station no.	Date	Time	Latitude	Longitude	Depth (m)
800	6/24	2152	36° 57.14 N	76° 02.63 W	12.8
46	6/25	0703	36° 29.5 N	75° 22.7 W	24.0
47	6/25	0808	36° 29.8 N	75° 32.0 W	15.8
48	6/25	0857	36° 29.8 N	75° 39.8 W	24.0
805	6/25	1236	36° 52.0 N	75° 56.1 W	9.8
70	6/25	1433	36° 52.3 N	75° 53.6 W	15.5
819	6/26	1015	36° 40.0 N	75° tw.8 W	11.0
820	6/26	1045	36° 42.4 N	75° 53.9 W	11.9
49	6/27	0825	36° 31.0 N	75° 52.0 W	27.4
50	6/27	0940	36° 52.0 N	75° 43.0 W	22.0
51	6/27	1054	36° 52.0 N	75° 55.6 W	12.2

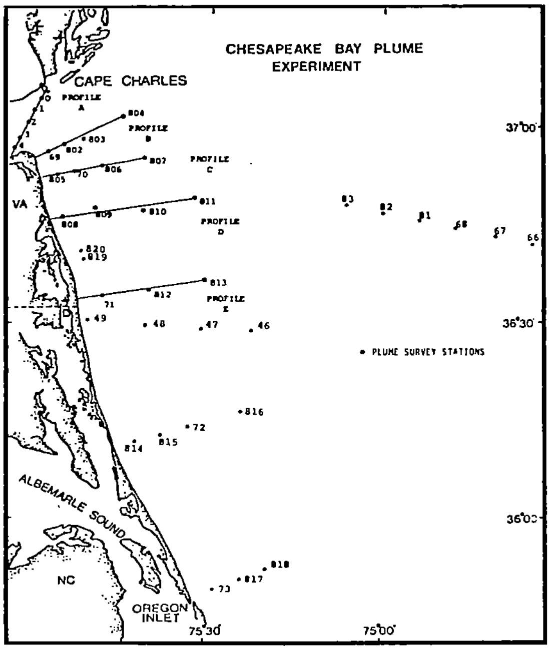
TABLE 3.- SAMPLE STATION DATA:

R/V LINWOOD HOLTON CRUISE, JUNE 18, 1980, AND JUNE 24, 1980

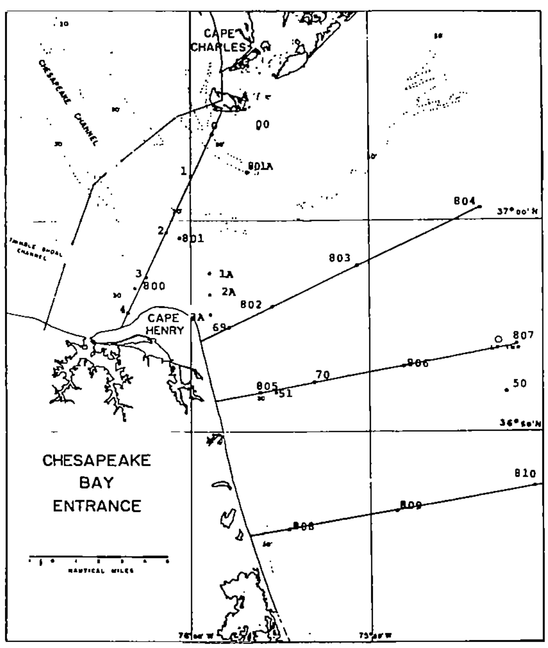
Station no.	Date	Time	Latitude	Longitude	Depth (m)
00	6/18	0755	37° 04.31' N	75° 56.44' W	9.1
0	6/18	0855	37° 04.20' N	75° 59.10' W	12.8
0.5	6/18	0920	37° 03.30' N	75° 59.60' W	7.0
1	6/18	1030	37° 02.50' N	76° 00.00' W	8.0
2	6/18	1100	36° 59.90' N	76° 01.45' W	17.0
3	6/18	1130	36° 57.75' N	76° 02.65' W	13.1
4	6/18	1245	36° 55.60' N	76° 03.80' W	11.0
00	6/24	0800	37° 04.31' N	75° 57.44' W	10.7
0	6/24	0830	37° 04.20' N	75° 59.10' W	12.2
1	6/24	0905	37° 02.50' N	76° 00.00' W	8.2
2	6/24	1025	36° 59.90' N	76° 01.45' W	15.5
3	6/24	1105	36° 57.75' N	76° 02.65' W	13.1
4	6/24	1140	36° 55.60' N	76° 03.80' W	10.1

TABLE 4.- MEAN AND STANDARD DEVIATION FOR BAPLEX-SUPERFLUX SAMPLES

		TSM (mg/ℓ)		TSO (mg/ℓ)		TSI (mg/ℓ)	
	No.	$\overline{X}$	σ	$\overline{X}$	σ	$\overline{X}$	σ
Surface (S-1 m)	58	2.33	1.19	.97	.51	1.49	1.73
Mid-Depth (3-8 m)	39	3.26	5.67	1.10	1.16	2.14	4.54
Near Bottom (>10 m)	41	4.16	4.49	1.05	.55	3.11	4.01



(a) Superflux station locations.



(b) Chesapeake Bay entrance station locations.

Figure 1.- Map showing station locations.

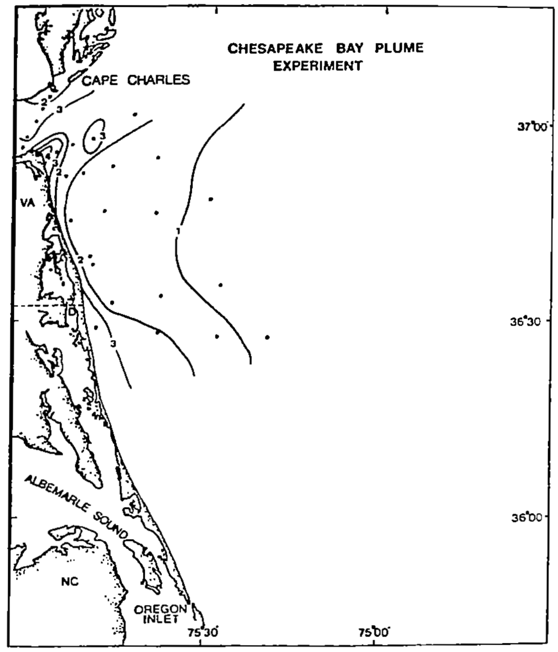


Figure 2.- Map illustrating concentration of total suspended matter (mg/ℓ) in surface water adjacent to Chesapeake Bay entrance.

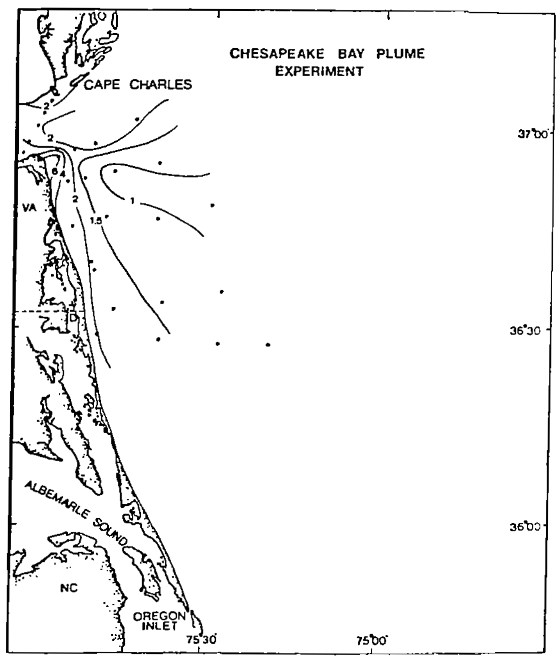


Figure 3.- Map illustrating concentration of total suspended matter (mg/ℓ) at intermediate depths.

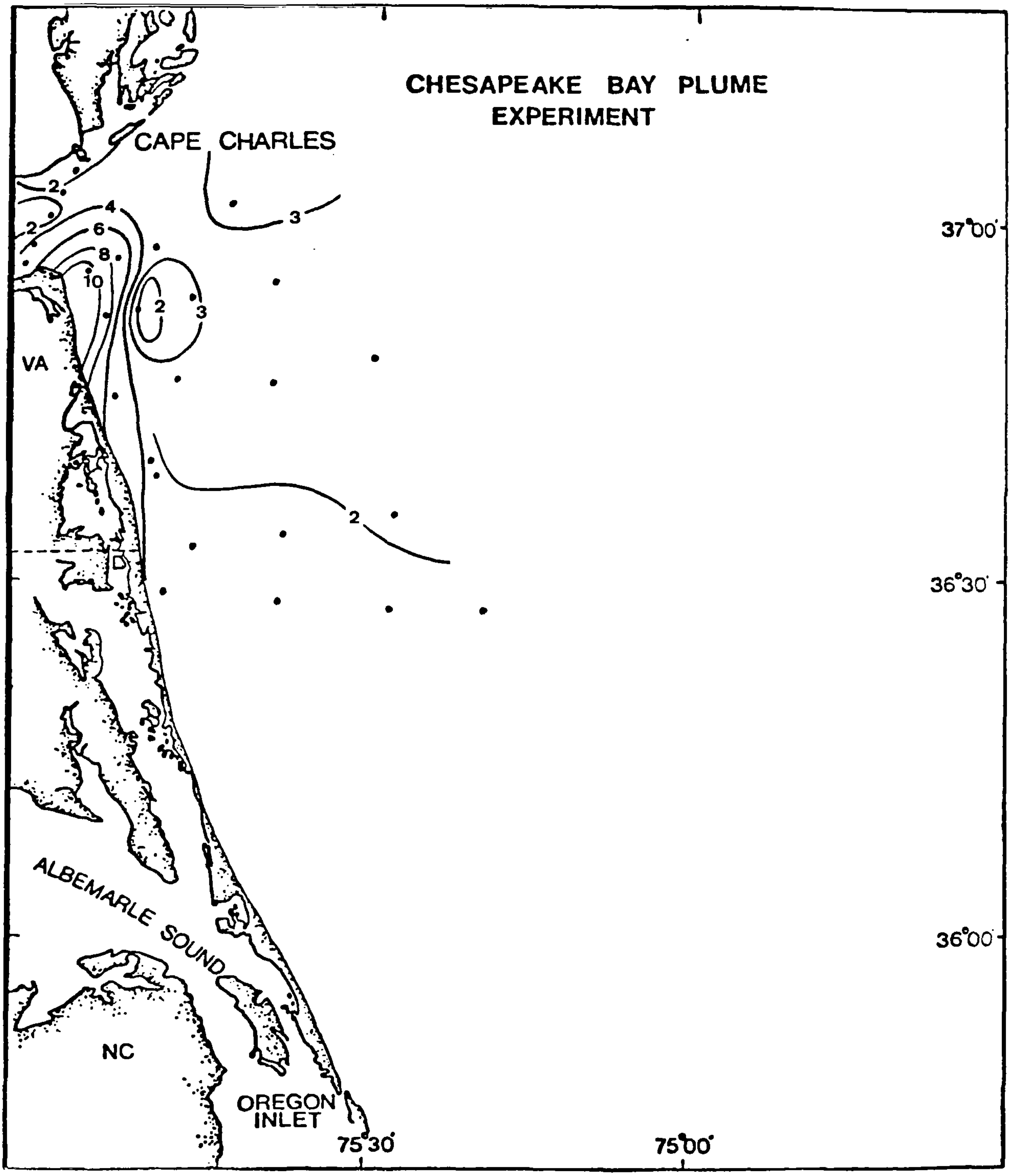
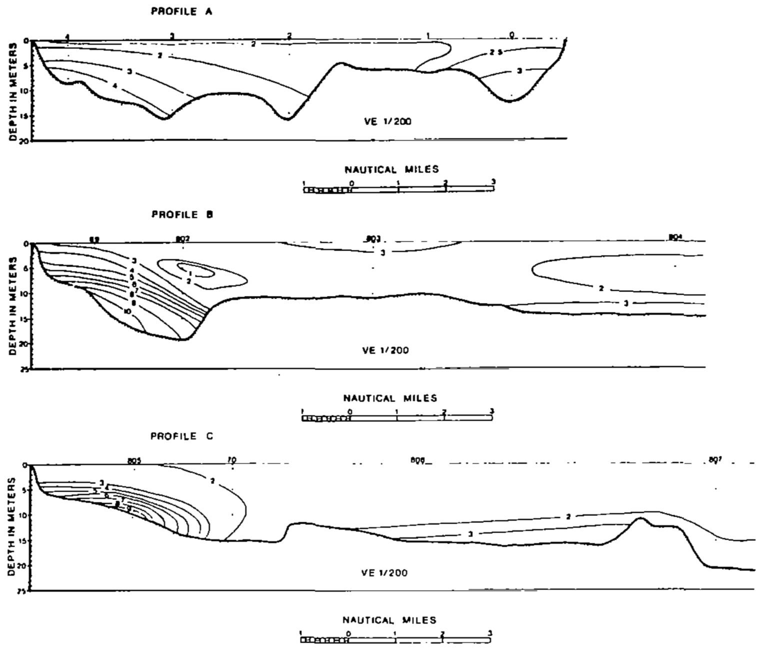
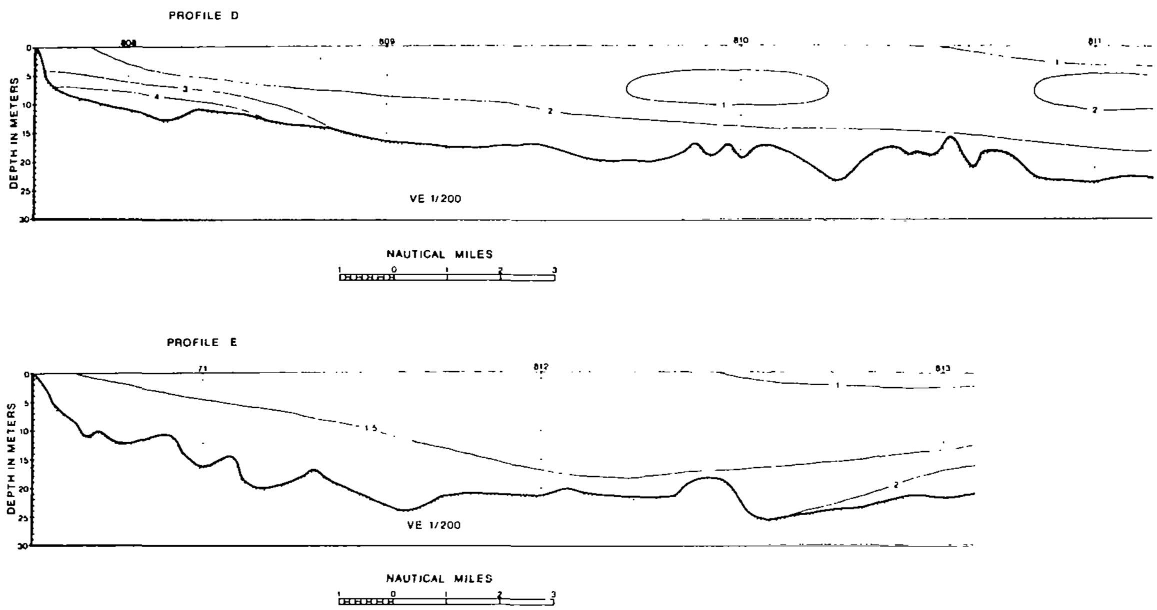


Figure 4. Map illustrating the near-bottom concentration of total suspended matter (mg/ℓ).



(a) Transects A, B, and C.



(b) Transects D and E.

Figure 5.- Profile of transects illustrating total suspended matter concentrations (mg/ℓ).

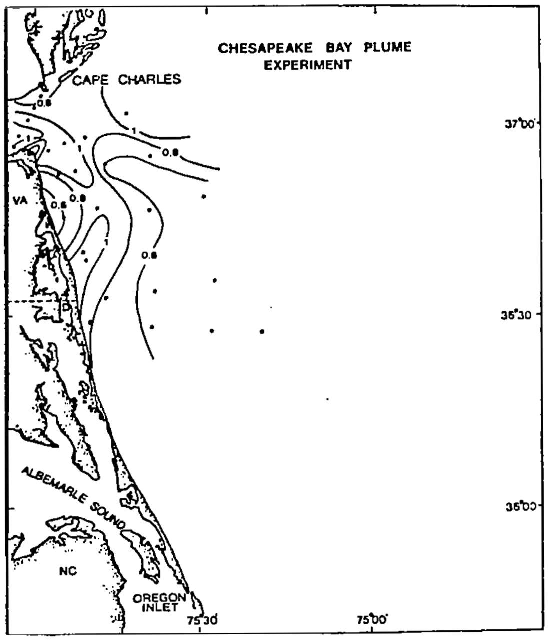


Figure 6.- Map illustrating concentration of total suspended organic matter (mg/ℓ) in surface water.

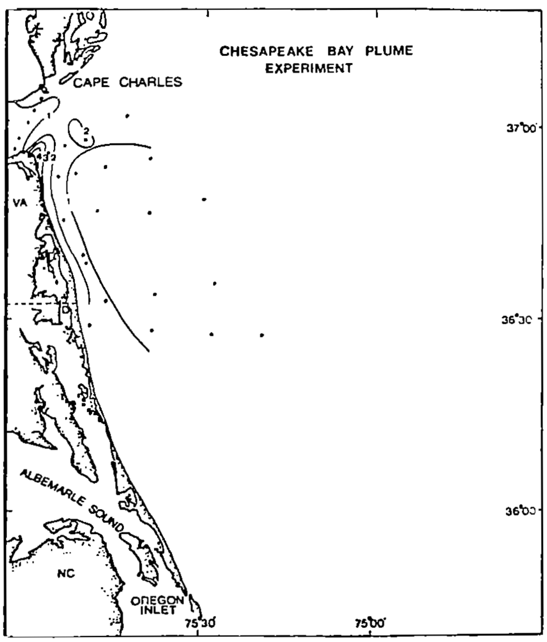


Figure 7.- Map illustrating concentration of total suspended inorganic matter (mg/ℓ) in surface water.

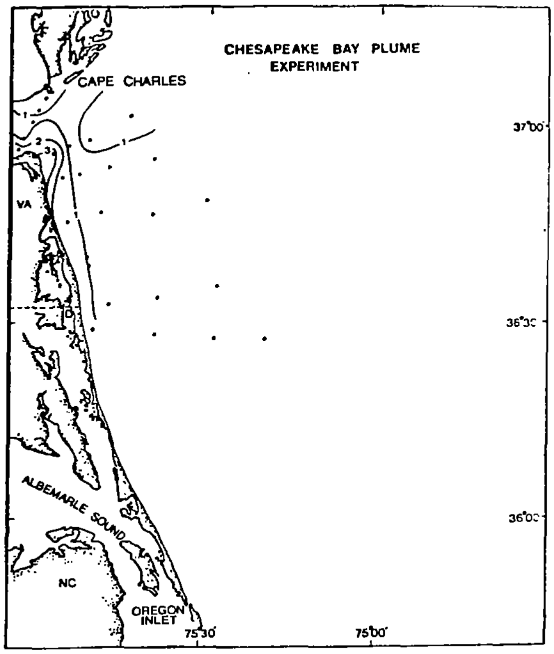


Figure 8.- Map illustrating concentration of total suspended inorganic matter (mg/ℓ) at intermediate depths.

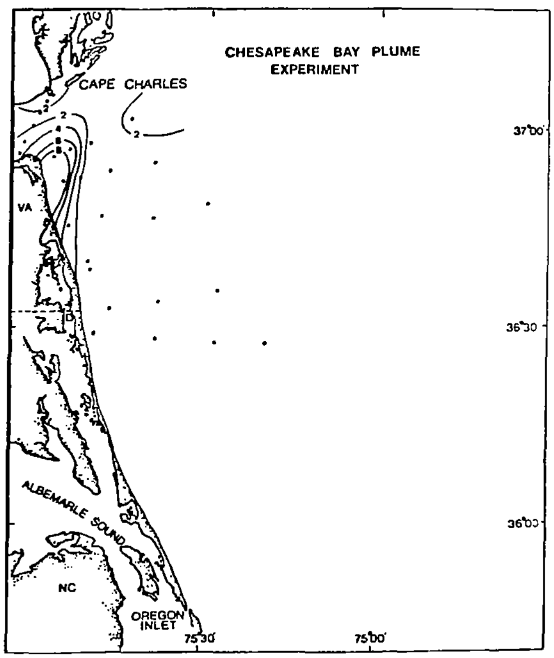
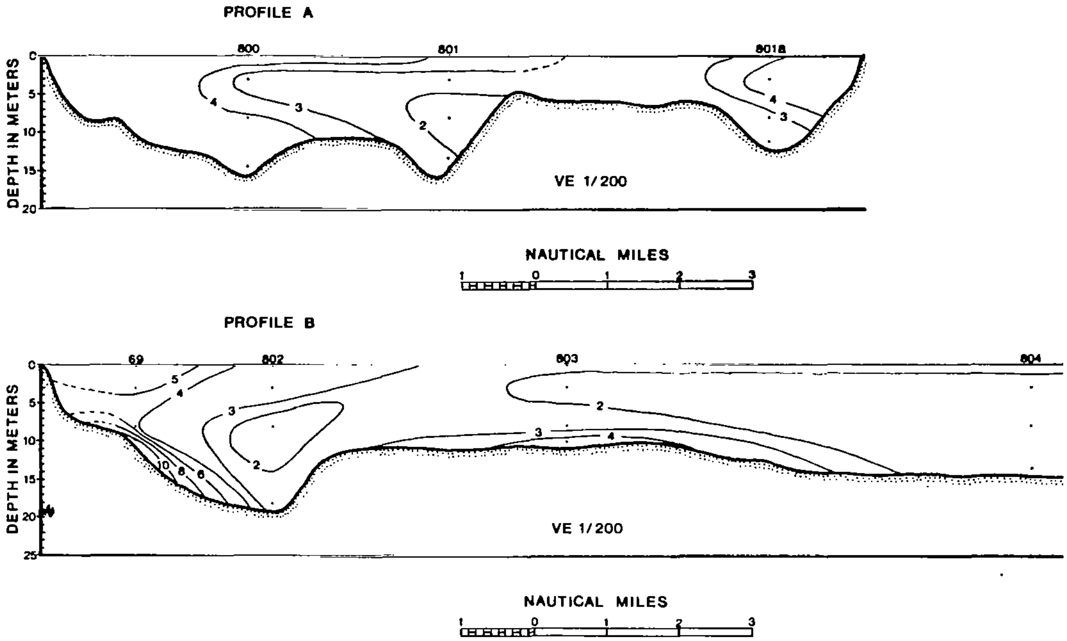
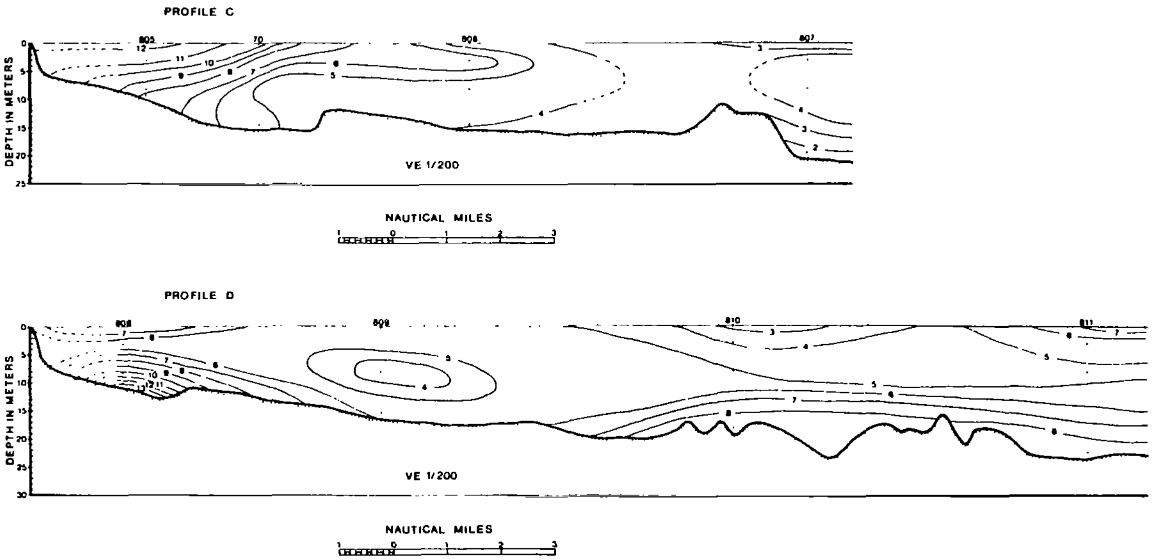


Figure 9.- Map illustrating near-bottom concentration of total suspended inorganic matter (mg/ℓ).



(a) Transects A and B.



(b) Transects C and D.

Figure 10.- Profiles of Superflux III transects illustrating total suspended matter concentrations (mg/ℓ).