

Oceanographic Observations on the
Western Surinam shelf

March - April 1966

D. Eisma

NETHERLANDS INSTITUTE FOR SEA RESEARCH

PUBLICATIONS AND REPORTS

number 1966-1

13016

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Introduction

In march - april 1966 oceanographic data were collected on the Western part of the Surinam shelf between the Surinam river and the Corantijn. This program was part of the O.C.P.S.II (Onderzoek Continentaal Plat Suriname), carried out on Hr. Ms. Snellius and made possible by the cooperation of the Royal Netherlands Navy. The results have been published in the Hydrographic Newsletter Special Publication no.5, pp. 21-53, 1967. The data are given in this report. A second cruise covering the eastern Surinam shelf will be made in 1969.

Methods

At all stations water samples were taken with Nansen bottles and at the surface with a bucket. The temperature of the surface water was measured in the bucket immediately after pulling it on board. Temperature - depth curves were obtained with a bathythermograph. Salinity was determined on board with an Auto Lab inductive salinometer. Secchi disc visibility was measured with a white disc of 30 cm diameter; at a number of stations the Secchi disc could not be used due to the sun's low altitude.

The extinction with respect to distilled water was determined in a Zeiss Elko III photometer in the laboratory of the "Waterloopkundige Afdeling" of the Department of Public Works at Paramaribo. Determinations of the natural fluorescence of the water in UV light were carried out in Den Helder in a Zeiss photometer at 460 m μ with a solution of 0.5 mg quinine bisulphate per litre as standard.

Current velocity and current direction were measured at the surface, near the bottom and at intermediate depths with an Ekman current meter. Current measurements could only be made during the night when the ship lay at anchor and during two weekends which were spent at sea.

Results and conclusions

The results are given in Tables I (Station list), II (T,S, mFl and Secchi disc), III (Extinction) and IV (Current measurements). Summarizing the discussion given in the published paper mentioned above it can be concluded that:

a Three types of water can be distinguished following the distribution of salinity and temperature, viz.:

1. a surface layer of 34.0-35.5 ‰ S and around 27 °C
2. an intermediate layer of 36.0-36.5 ‰ S and 20°-26 °C

3. a deep layer of 35.5 ‰ S and 15 °C.

b The surface water near to the coast contains an admixture of river water presumably mainly derived from the Guyanese rivers; near the shelf edge low salinities are due to the presence of large surface lenses of Amazon water further offshore; the high salinity intermediate layer is the continuation of the salinity maximum present in the Atlantic Ocean between about 25°N and 15°S; the deep layer of lower salinity can be identified as the top of the subantarctic intermediate water.

c Upwelling on the shelf is evident from the temperature - salinity distribution as well as from the current measurements: the bottom currents have a strong landward component, whereas the surface currents have a strong seaward component. The calculated upwelling velocity (using Yoshida's formula) agrees rather well with the observed one. The upwelling is therefore probably mainly wind - induced but may also (partly) be caused by local divergence of the surface currents due to the bending of the coastline, or to the influence of outflowing Amazon water.

d Mud transport occurs predominantly in a narrow (20 - 30 km) belt along the coast down to about 25-30 m depth.

e The relation between natural fluorescence and salinity is not the same for the nearshore and the offshore low salinity water, which suggests a difference in origin of the admixed fresh water.

Table I Station list

Station number	date	position	water depth m
A 1	1/4	06°55.7'N 55°12.4'W	56
B 2	2/4	06°54.1'N 55°29.0'W	51
C 3	4/4	06°31.5'N 55°47.3'W	36
D 4	5/4	06°48.5'N 55°58.9'W	50
E 5	6/4	06°49.3'N 56°13.5'W	44
F 6	12/4	06°26.6'N 56°33.0'W	33
G 7	13/4	07°16.8'N 56°47.6'W	64
H 8	14/4 15/4	06°14.0'N 57°04.0'W	14

Table I (continued)

A 9	21/4	06°52.2'N 55°12.4'W	51
A 10	21/4	06°59.5'N 55°11.2'W	56
A 11	22/4	07°08.2'N 55°08.8'W	75
A 12	22/4	07°22.7'N 55°05.5'W	120
A 13	22/4	07°26.8'N 55°04.3'W	940
A 14	23/4	06°14.2'N 55°19.2'W	18
A 15	23/4	06°21.2'N 55°17.7'W	33
A 16	25/4	06°08.0'N 55°20.0'W	12
B 17	25/4	06°17.5'N 55°33.8'W	31

Table I (continued)

C 18	25/4	06°13.3'N 55°50.0'W	30
C 19	26/4	06°35.0'N 55°55.3'W	38
C 21	26/4	07°03.8'N 55°40.4'W	72
B 22	27/4	07°21.6'N 55°22.2'W	200
B 23	27/4	07°17.8'N 55°23.3'W	96
B 24	27/4	07°04.4'N 55°25.0'W	66
A 25	28/4	06°44.3'N 55°13.5'W	44
A 27	28/4	06°35.1'N 55°15.4'W	41
A 29	28/4	06°28.0'N 55°16.7'W	37

Table I (continued)

D 30	3/5	06°26.2'N 56°02.5'W	41
D 32	3/5	06°44.5'N 55°59.6'W	49
D 33	4/5	06°56.6'N 55°56.9'W	60
D 34	4/5	07°08.9'N 55°53.8'W	85
D 35	4/5	07°24.8'N 55°50.4'W	950
F 36	5/5	07°26.8'N 56°21.8'W	400
F 37	5/5	07°24.6'N 56°22.4'W	121
F 38	5/5	07°13.8'N 56°24.4'W	81
F 39	5/5	07°05.4'N 56°25.8'W	65

Table I (continued)

F 40	6/5	07°00.2'N 56°26.5'W	59
F 41	6/5	06°54.8'N 56°28.6'W	60
F 42	6/5	06°46.5'N 56°30.6'W	40
F 43	6/5	06°37.2'N 56°31.3'W	37
F 44	6/5	06°33.6'N 56°31.6'W	38
F 45	7/5	06°26.5'N 56°32.8'W	34
F 46	7/5	06°18.7'N 56°34.2'W	27
F 47	7/5	06°13.2'N 56°35.3'W	27
F 48	7/5	06°05.3'N 56°36.6'W	12

Table I (continued)

H 49	9/5	06°14.3'N 57°04.5'W	14
H 50	9/5	06°22.4'N 57°02.8'W	25
H 51	9/5	06°36.1'N 57°02.0'W	29
H 52	9/5	06°50.3'N 56°59.2'W	39
H 53	10/5	07°00.5'N 56°58.2'W	38
H 57	11/5	07°35.7'N 56°52.6'W	94
H 58	11/5	07°25.4'N 56°54.4'W	66
H 59	11/5	07°08.5'N 56°57.0'W	49
E 60	12/5	06°05.8'N 56°21.2'W	18
E 61	12/5	06°17.1'N 56°18.8'W	35

Table I (continued)

E 62	12/5	06°30.6'N 56°15.3'W	36
E 63	13/5	06°44.8'N 56°13.4'W	43
E 64	13/5	06°55.3'N 56°12.1'W	57
E 65	13/5	07°03.3'N 56°11.0'W	64

Table II T,S, mFl and Secchi disc

Station number	date	local time	water depth m	Secchi disc m	sampling depth	T _{°C}	S _{°/oo}	mFl
A 1	1/4	18.00- 18.42	56	15	0	27.1	35.16	2.3
					20	-	35.19	2.2
					30	-	35.58	3.2
					50	-	36.15	1.4
B 2	2/4	18.42- 19.17	51	*)-	0	27.1	35.31	2.9
					10	-	35.31	-
					20	-	35.35	-
					30	-	35.92	-
					50	-	36.07	1.2
C 3	4/4	18.15- 18.50	36	-	0	26.8	35.76	2.2
					10	-	35.71	-
					20	-	35.78	-
					30	-	35.74	3.3
D 4	5/4	18.14- 18.52	50	-	0	27.0	35.18	1.8
					10	-	-	-
					20	-	35.29	-
					30	-	35.52	-
					50	-	36.10	14.5
E 5	6/4	18.07- 18.25	44	-	0	-	35.07	2.7
					10	-	35.11	-
					20	-	35.51	-
					30	-	36.07	-
					40	-	36.07	4.4

*) Secchi disc on 3/4 at 16.58: 16 m.

Table II (continued)

F	6	12/4	20.00-	33	-	0	27.1	35.50	4.6
			20.13			10	27.1	35.43	-
						20	27.1	35.45	-
						30	27.1	35.53	1.3
G	7	13/4	18.10-	64	-	0	27.5	34.04	4.8
			19.12			10	27.5	34.07	-
						20	27.4	34.75	-
						30	27.3	35.74	-
						40	27.0	35.81	-
						60	26.3	35.91	0.9
H	8	14/4	20.31	14	-	0	27.6	34.57	5.7
		15/4	10.20-			13	27.5	34.52	5.4
			10.27						
A	9	21/4	12.47-	51	6	0	27.2	35.42	2.9
			13.07			10	26.9	35.41	2.5
						20	26.9	35.62	1.5
						30	25.8	36.17	1.2
						50	25.7	36.17	0.9
A	10	21/4	15.30-	56	10	0	27.4	35.48	-
			15.56			10	27.3	35.47	1.4
						20	27.2	35.51	1.0
						30	27.2	35.98	0.4
						50	25.7	36.24	0.1

Table II (continued)

A 11	22/4	8.20- 8.45	75	11	0	27.0	35.61	2.2
					10	27.0	35.58	1.5
					20	27.0	35.77	0.2
					30	27.0	35.96	0.6
					50	27.0	36.03	0.3
					70	24.8	36.33	12.16
A 12	22/4	11.45- 12.45	120	15.5	0	27.7	35.68	8.1
					10	27.4	35.63	1.4
					20	27.4	35.82	3.2
					30	27.4	35.97	0.3
					50	27.3	36.18	1.5
					70	23.8	36.39	0.7
					120	23.5	36.42	0.4
A 13	22/4	15.10- 16.01	940	20	0	27.8	35.70	4.1
					10	27.8	35.67	0.7
					20	27.7	35.76	-
					30	27.7	35.94	1.3
					50	27.7	35.95	0.7
					70	25.6	36.19	1.4
					100	22.2	36.26	1.6
					150	22.1	36.47	1.1
					200	18.6	35.75	0.6
					400	11.5	34.96	2.9
A 14	23/4	15.06- 15.26	18	3.2	0	28.4	34.41	4.1
					10	26.6	35.12	3.4
					18	26.4	35.77	2.6

Table II (continued)

A 15	23/4	17.50-	33	-	0	27.4	35.18	2.9
		18.10			10	27.2	35.28	1.6
					20	26.5	36.09	1.3
					30	26.5	36.07	1.6
A 16	25/4	9.32-	12	1	0	27.2	33.85	7.0
		10.22			10	26.7	35.52	-
B 17	25/4	14.43-	31	2.5	0	27.1	35.13	4.4
		15.19			10	27.0	35.23	-
					20	26.2	35.97	-
					30	26.2	35.98	2.6
C 18	25/4	17.28-	30	2	0	27.4	34.83	6.1
		17.59			10	27.4	34.84	-
					20	27.1	35.12	-
					30	26.9	35.43	2.3
C 19	26/4	9.54-	38	10	0	27.3	35.10	3.6
		10.15			10	27.3	35.17	-
					20	27.1	35.41	-
					35	26.6	36.00	1.9
C 21 *)	26/4	14.17-	72	16	0	27.7	34.83	3.3
		14.54			10	27.7	34.81	-
					20	27.6	34.85	-
					30	27.6	35.35	-
					50	27.0	35.80	-
					70	24.3	36.14	2.1

*) C 20 no hydrographic data

Table II (continued)

B 22	27/4	9.07- 11.35	200	17	0	27.4	34.72	3.0
					10	27.4	34.73	-
					20	27.3	34.96	-
					30	27.3	35.23	-
					50	26.3	36.04	-
					70	23.6	36.15	-
					100	22.9	36.29	-
					150	18.0	36.21	-
					200	14.4	35.92	2.1
B 23	27/4	12.54- 14.10	96	17	0	27.7	34.69	3.0
					10	27.7	34.64	-
					20	27.6	34.66	-
					30	27.6	34.82	-
					50	27.1	35.44	-
					70	25.4	36.23	-
					95	23.8	36.02	0.9
B 24	27/4	16.45- 16.57	66	11	0	27.4	34.70	4.0
					10	27.4	34.66	-
					20	27.4	34.76	-
					40	27.1	35.85	-
					60	25.9	36.07	1.6
A 25	28/4	9.39- 10.21	44	5	0	26.8	35.21	4.5
					10	26.8	35.15	3.4
					20	26.8	35.22	1.6
					30	26.6	35.95	1.1
					44	26.2	36.08	1.1

Table II (continued)

A 27 [*])	28/4	12.20- 12.45	41	4.5	0	26.7	35.30	3.7
					10	26.7	35.27	2.1
					20	26.5	35.70	1.4
					35	26.2	36.07	2.3
A 29 [*])	28/4	16.48- 17.10	37	3	0	26.5	35.47	3.1
					10	26.4	35.48	2.2
					20	26.3	36.09	1.1
					35	26.3	35.63	2.3
D 30	3/5	11.06- 11.34	41	4	0	26.8	35.53	5.9
					10	26.8	35.53	-
					20	26.7	35.56	-
					30	26.6	35.67	-
					40	26.6	35.72	0.7
D 32 [*])	3/5	18.38- 19.04	49	-	0	27.4	34.51	3.0
					10	27.4	34.59	-
					20	27.3	35.35	-
					30	27.2	35.99	-
					45	26.3	36.05	0.9
D 33	4/5	8.21- 8.50	60	9.5	0	27.3	34.72	3.4
					10	27.3	34.67	-
					20	27.1	35.70	-
					40	26.0	36.15	-
					58	25.6	36.17	0.7

^{*}) A 26, A 28, and D 31 no hydrographic data

Table II (continued)

D 34	4/5	11.36- 12.07	85	20	0	27.7	34.37	2.5
					10	27.7	34.32	-
					20	27.6	34.32	-
					40	27.5	34.56	-
					60	25.5	36.02	-
					80	23.9	36.58	1.2
D 35	4/5	15.03- 16.03	950	22	0	27.8	34.22	2.7
					10	27.7	34.30	-
					20	27.7	34.36	-
					30	27.6	35.13	-
					50	26.3	35.66	-
					70	25.1	36.03	-
					100	23.2	36.73	-
					150	20.0	36.29	-
					200	16.5	36.35	-
					300	10.4	35.95	-
400	-	35.88	1.5					
F 36	5/5	10.24- 12.15	400	-	0	27.5	33.94	4.5
					10	27.4	33.91	2.9
					20	27.2	34.52	2.0
					30	27.1	34.86	0.9
					50	26.5	35.06	1.4
					70	25.0	35.96	0.0
					90	22.0	36.16	0.3
					120	20.8	36.43	0.2
					170	19.7	36.26	0.6
					270	13.3	35.25	1.4
					390	12.4	34.98	2.9

Table II (continued)

F 37	5/5	12.43- 13.12	121	19	0	27.5	34.03	3.5
					10	27.5	33.96	2.5
					20	27.3	33.96	3.3
					40	26.8	35.35	1.9
					60	25.7	36.01	0.3
					90	21.9	36.62	0.7
					110	21.0	36.34	0.9
F 38	5/5	14.07- 14.45	81	12	0	27.7	34.19	4.3
					10	27.6	34.15	2.9
					20	27.4	34.21	1.2
					30	27.2	34.64	2.0
					55	26.1	35.76	1.2
					80	23.3	36.45	1.1
					F 39	5/5	17.01 18.50- 19.10	65
10	27.4	34.96	1.6					
20	27.2	36.26	0.4					
40	26.1	36.24	1.4					
60	25.8	36.25	1.1					
F 40	6/5	8.05- 8.50	59	18				
					10	27.5	34.75	2.3
					20	27.4	34.79	2.4
					40	26.6	36.07	0.7
					60	26.4	36.05	0.8
					F 41	6/5	10.23- 11.10	60
10	27.5	35.00	1.9					
20	27.3	35.40	0.4					
35	27.0	35.98	1.4					
50	26.8	35.98	1.0					

Table II (continued)

F 42	6/5	13.08- 13.48	40	13	0	27.6	35.18	2.0
					10	27.5	35.18	1.5
					20	26.9	35.49	1.3
					30	26.8	35.75	1.5
					40	26.8	35.77	1.9
F 43	6/5	15.36- 16.10	37	9	0	27.4	35.49	4.7
					10	27.0	35.45	2.1
					20	26.8	35.53	1.1
					35	26.7	35.69	2.2
F 44	6/5	18.17- 18.40	38	-	0	27.7	35.54	5.4
					10	27.5	35.55	1.6
					20	27.4	35.71	1.9
					35	27.4	35.84	3.6
F 45	7/5	8.51- 9.08	34	8	0	27.4	35.98	2.9
					10	27.4	35.90	1.5
					20	27.4	35.88	1.9
					30	27.4	35.82	1.8
F 46	7/5	10.40- 11.13	27	5	0	27.5	35.36	7.8
					10	27.5	35.35	3.9
					20	27.4	35.43	2.5
					27	27.3	35.53	2.3
F 47	7/5	12.29- 12.39	27	4	0	27.5	35.06	5.6
					10	27.4	35.36	3.1
					20	27.2	35.53	2.3
					27	27.1	35.55	2.3

Table II (continued)

F 48	7/5	14.23-	12	0.6	0	27.8	34.32	5.4
		14.36			11	26.7	35.52	2.7
H 49	9/5	11.26-	14	-	0	27.8	34.42	8.7
		11.36			14	27.3	34.70	4.8
H 50	9/5	12.30- 12.40	25	3	0	27.9	35.21	5.4
					10	27.7	35.19	-
					25	27.6	35.19	2.8
H 51	9/5	13.58- 14.41	29	8.5	0	27.8	35.46	1.9
					10	27.7	35.46	-
					20	27.7	35.50	-
					28	27.7	35.51	2.4
H 52	9/5	17.05 18.25- 18.35	39	10	0	27.3	35.71	2.0
					10	27.3	35.69	-
					20	27.3	35.69	-
					35	27.3	35.72	1.9
H 53	10/5	8.20- 8.47	38	15	0	27.0	35.50	2.3
					10	27.0	35.51	-
					20	27.0	35.67	-
					35	26.9	35.58	1.6
H 57 ^{*)}	11/5	9.07- 11.10	91	20	0	27.1	35.45	3.2
					10	27.1	35.42	-
					20	26.9	35.43	-
					30	26.6	35.42	-
					50	26.1	35.88	-
					70	24.0	36.60	-
90	21.2	36.94	1.2					

*) G 54, G 55, and G 56 no hydrographic data

Table II (continued)

H 58	11/5	12.13- 12.38	66	22	0	27.4	35.37	3.9
					10	27.4	35.32	-
					20	27.2	35.34	-
					40	26.1	36.04	-
					60	24.0	36.57	0.8
H 59	11/5	15.41- 16.15	49	19	0	27.4	35.56	2.3
					10	27.4	35.55	-
					20	27.2	35.58	-
					30	27.1	35.98	-
					48	26.2	36.19	1.6
E 60	12/5	12.14- 12.40	18	3.5	0	27.7	34.42	4.8
					15	27.1	34.51	3.6
E 61	12/5	14.28 15.01	35	6	0	27.8	35.24	3.6
					10	27.5	35.24	-
					20	27.4	35.36	-
					30	27.4	35.43	1.6
E 62	12/5	17.46- 18.20	36	-	0	27.1	35.48	2.3
					10	27.1	35.45	-
					20	26.9	35.68	-
					35	26.2	36.08	1.3
E 63	13/5	9.02 9.36	43	-	0	26.7	35.87	3.1
					10	26.7	35.86	-
					25	26.5	35.86	-
					40	25.3	36.29	0.7

Table II (continued)

E 64	13/5	11.22- 12.02	57	10	0	27.2	35.30	2.2
					10	27.2	35.29	-
					20	27.1	35.38	-
					35	27.0	35.67	-
					55	24.4	36.31	1.0
E 65	13/5	13.42- 14.20	64	15	0	27.8	35.03	7.9
					10	27.7	35.00	-
					20	27.7	35.92	-
					40	25.8	36.07	-
					60	24.2	36.38	3.4

Table III Extinction

Station number	sampling depth	extinction % ^{x)}
A 9	0	100
	10	100
	20	100
	30	100
	50	100
A 14	0	100
	10	100
	18	90
A 15	0	100
	10	100
	20	100
	30	100
A 16	0	98.5
	10	60
A 25	0	100
	10	100
	20	100
	30	100
	44	100

^{x)} 100 % indicates no difference found with aquadest.

Table III (continued)

A 27	0	100
	10	100
	20	100
	35	99.5
A 29	0	100
	10	100
	20	100
	35	100
F 42	0	100
	10	100
	20	100
	30	100
	40	100
F 43	0	100
	10	100
	20	100
	35	100
F 44	0	100
	10	100
	20	100
	35	69 [*])
F 45	0	100
	10	100
	20	100
	30	100

^{*}) bottle probably hit the bottom

Table III (continued)

F 46	0	100
	10	100
	20	100
	27	100
F 47	0	100
	10	100
	20	100
	27	99.5
F 48	0	96.8
	11	57
H 49	0	97.5
	14	87.5
H 50	0	100
	10	100
	25	98.5
H 51	0	100
	10	100
	20	100
	28	100
H 52	0	100
	10	100
	20	100
	35	100

Table IV Current measurements

date	Station	local time	measuring depth m	velocity	
				cm/sec	direction
3/4	B2	10.00	0	55	300
	06°54.1'N	10.21	15	42	260
	55°29.0'W	1057	30	39	210
		11.08	0	68	290
		11.15	15	53	250
		11.22	30	37	200
		11.30	50	27	210
		12.05	0	72	290
		12.12	15	52	250
		12.19	30	45	210
		12.26	50	29	210
		13.05	0	60	290
		13.13	15	59	240
		13.20	30	32	200
		13.27	50	37	210
		14.05	0	61	300
		14.12	15	43	240
		14.18	30	15	210
		14.27	50	12	220

Table IV (continued)

15.03	0	66	330
15.10	15	37	290
15.25	30	10	320
15.44	50	20	0
16.02	0	72	340
16.25	15	34	320
16.33	30	28	0
16.56	50	26	180
17.04	0	80	350
17.11	15	41	310
17.17	30	26	350
17.24	50	28	50
18.00	0	79	350
18.07	15	45	330
18.15	30	31	20
18.23	50	23	40
19.06	0	71	350
19.34	15	34	340
19.40	30	10	40
19.47	50	11	20
20.00	0	62	340
20.08	15	31	330
20.15	30	7	330
20.21	50	8	60

Table IV (continued)

		21.03	0	57	340
		21.10	15	24	280
		21.17	30	20	200
		21.28	50	22	200
		22.03	0	56	300
		22.12	15	36	240
		22.20	30	43	190
		22.28	50	31	190
		23.04	0	72	280
		23.11	15	48	240
		23.19	30	43	180
		23.26	50	40	180
4/4	C3	20.00	0	71	350
	06°31.5'N	20.06	10	71	350
	55°47.3'W	20.16	20	26	350
		20.24	30	16	350
		21.02	0	93	340
		21.11	10	77	340
		21.20	20	32	330
		21.27	30	9	330
		22.03	0	40	320
		22.06	10	43	320
		22.18	20	29	310
		22.28	30	21	230

Table IV (continued)

		23.05	0	46	280
		23.15	10	45	290
		23.25	20	29	280
		23.30	30	25	290
5/4	C3	00.02	0	57	280
		00.14	10	50	260
		00.23	20	60	300
		00.30	30	66	290
		01.02	0	63	250
		01.07	10	65	250
		01.13	20	55	250
		01.19	30	41	250
		02.02	0	77	320
		02.07	10	73	290
		02.14	20	66	290
		02.21	30	48	230
		03.02	0	70	300
		03.10	10	60	280
		03.18	20	45	240
		03.26	30	28	270
		04.05	0	66	300
		04.12	10	65	330
		04.22	20	31	320
		04.29	30	34	320

Table IV (continued)

		05.01	0	68	330
		05.04	10	65	340
		05.18	20	63	320
		05.29	30	37	350
		06.05	0	68	350
		06.12	10	62	350
		06.18	20	60	0
		06.23	30	48	0
5/4	D4	17.01	0	68	350
	06°48.5'N	17.13	15	89	350
	55°58.9'W	17.34	30	55	350
		17.38	50	34	30
		20.04	0	89	350
		20.15	15	82	350
		20.20	30	48	350
		20.28	50	19	40
		21.07	0	80	350
		21.16	15	79	340
		21.28	30	87	0
		21.48	50	6	150
		22.05	0	80	350
		22.12	15	65	340
		22.20	30	7	330
		22.28	50	15	160

Table IV (continued)

		23.11	0	67	340
		23.19	15	60	320
		23.32	30	26	230
		23.39	50	6	0
6/4	D4	00.11	0	70	310
		00.17	15	68	310
		00.27	30	43	220
		00.36	50	38	300
		01.07	0	70	310
		01.13	15	70	280
		01.21	30	80	230
		01.28	50	40	220
		02.08	0	87	250
		02.14	15	78	300
		02.17	30	65	240
		02.29	50	40	210
		03.11	0	85	300
		03.17	15	80	300
		03.24	30	55	250
		03.31	50	25	300
		04.05	0	82	300
		04.16	15	78	310
		04.23	30	49	260
		04.31	50	12	260

Table IV (continued)

		05.03	0	73	330
		05.08	15	75	330
		05.14	30	51	260
		05.21	50	14	330
		06.05	0	82	350
		06.11	15	80	340
		06.17	30	50	330
		06.24	50	31	30
13/4	G7	20.56	0	58	320
	07°16.8'N	21.19	20	42	310
	56°47.6'W	21.26	40	40	270
		21.34	60	34	240
		22.03	0	60	320
		22.10	20	35	300
		22.16	40	34	250
		22.24	60	26	240
		23.07	0	70	330
		23.13	20	52	320
		23.20	40	28	270
		23.26	60	30	250
14/4	G7	00.14	0	65	320
		00.20	20	35	290
		00.27	40	32	270
		00.34	60	26	270

Table IV (continued)

		01.06	0	65	330
		01.12	20	31	320
		01.17	40	20	310
		01.24	60	17	310
		02.08	0	58	340
		02.15	20	38	320
		02.22	40	25	330
		02.30	60	16	300
		03.07	0	56	350
		03.13	20	38	340
		03.19	40	27	300
		03.26	60	12	130
		04.18	0	63	340
		04.25	20	29	330
		04.31	40	22	320
		04.38	60	14	240
		05.05	0	68	350
		05.11	20	42	330
		05.17	40	19	350
		05.24	60	17	230
		06.03	0	57	340
		06.09	20	42	330
		06.15	40	21	240
		06.21	60	13	290
23/4	A15	18.16	0	37	310
	06°21.2'N	18.23	15	17	340
	55°17.7'W	18.30	30	9	340

Table IV (continued)

		19.06	0	35	290
		19.24	15	17	330
		19.35	30	9	0
		22.04	0	40	310
		22.11	15	21	350
		22.18	30	10	20
		23.06	0	47	280
		23.12	15	12	320
		23.32	30	6	130
24/4	A15	00.00	0	45	280
		00.10	15	45	170
		00.20	30	12	190
		01.10	0	51	270
		01.30	30	43	260
		02.05	0	52	270
		02.20	30	48	-
		03.08	0	73	270
		03.16	15	34	220
		03.29	30	53	220
		04.03	0	67	290
		04.10	15	36	240
		04.16	30	22	220

Table IV (continued)

05.04	0	60	280
05.10	15	34	260
05.15	30	18	210
08.06	0	68	300
08.13	15	22	310
08.20	30	31	50
09.20	0	65	310
09.31	15	21	320
09.40	30	29	40
10.05	0	82	300
10.12	15	24	330
10.21	30	9	80
11.05	0	66	320
11.10	15	10	330
11.19	30	12	100
12.20	0	48	290
12.27	15	9	230
12.34	30	16	150
13.04	0	48	290
13.10	15	15	190
13.16	30	15	180

Table IV (continued)

14.04	0	55	280
14.09	15	28	280
14.18	30	29	280
15.05	0	43	280
15.10	15	32	210
15.17	30	24	210
16.00	0	53	290
16.05	15	34	210
16.15	30	31	210
17.05	0	63	310
17.09	15	27	180
17.17	30	27	20
18.05	0	58	260
18.10	15	21	290
18.20	30	14	190
20.15	0	55	300
20.24	15	21	300
20.32	30	12	30
21.11	0	55	300
21.18	15	15	320
21.46	30	21	30

Table IV (continued)

		22.09	0	63	300
		22.18	15	43	320
		22.26	30	19	40
		23.05	0	63	320
		23.16	15	15	330
		23.24	30	18	0
25/4	A15	00.00	0	87	270
		00.11	15	15	210
		00.21	30	12	70
		01.00	0	68	270
		01.14	15	12	170
		01.23	30	26	160
		02.02	0	52	270
		02.09	15	31	300
		02.15	30	26	180
		03.02	0	57	270
		03.07	15	40	250
		03.13	30	32	190
		04.05	0	90	250
		04.21	15	61	270
		04.30	30	29	200

Table IV (continued)

		05.05	0	70	320
		05.16	15	48	270
		05.26	30	24	200
		06.00	0	88	300
		06.05	15	34	260
		06.13	30	24	200
25/4	C18	18.13	0	72	10
	06°13.3'N	18.20	15	28	250
	55°50.0'W	18.31	30	18	220
		19.05	0	56	240
		19.14	15	27	220
		19.25	30	12	210
		20.04	0	56	300
		20.10	15	31	300
		20.35	30	10	160
		21.07	0	51	290
		21.12	15	19	300
		21.20	30	11	210
		22.06	0	59	300
		22.11	15	26	310
		22.24	30	12	120

Table IV (continued)

		23.05	0	53	270
		23.10	15	29	300
		23.17	30	13	100
26/4	C18	00.03	0	53	320
		00.10	15	28	290
		00.17	28	15	240
		01.03	0	45	260
		01.12	15	31	270
		01.19	27	21	150
		02.03	0	56	270
		02.11	15	34	240
		02.30	27	18	320
		03.02	0	50	270
		03.10	15	37	240
		03.19	27	37	290
		04.10	0	55	280
		04.20	15	41	250
		04.28	30	33	220
		05.07	0	54	260
		05.14	15	48	270
		05.33	30	26	230

Table IV (continued)

	06.02	0	62	270
	06.09	15	42	280
	06.17	30	21	240
26/4 near B24	18.40	0	40	280
07°64.4'N	18.47	20	42	210
55°25.0'W	18.55	40	43	230
	19.02	60	12	350
	19.10	0	40	280
	19.14	20	37	220
	19.23	40	34	180
	19.40	60	10	110
	20.04	0	40	300
	20.08	20	34	220
	20.14	40	27	210
	20.25	60	13	80
	21.01	0	40	310
	21.09	20	25	30
	21.14	40	29	90
	21.25	60	24	220
	22.07	0	34	260
	22.12	20	29	230
	22.18	40	18	230
	22.28	60	34	20

Table IV (continued)

		23.01	0	32	320
		23.06	20	29	230
		23.13	40	18	230
		23.23	60	26	40
27/4	near B24	00.00	0	29	300
		00.05	20	45	240
		00.13	40	38	120
		00.25	60	36	40
		01.00	0	31	290
		01.05	20	31	290
		01.10	40	28	260
		01.17	60	9	90
		02.00	0	31	330
		02.10	20	35	290
		02.17	40	30	190
		02.24	60	15	40
		03.00	0	22	
		03.05	20	24	
		03.13	40	29	
		03.19	60	18	
		04.03	0	24	
		04.08	20	53	
		04.16	40	45	
		04.25	60	28	

Table IV (continued)

05.05	0	31
05.10	20	57
05.16	40	41
05.25	60	28
06.11	0	34
06.16	20	46
06.22	40	58
06.31	60	21