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Local Sea-surface Temperature and Salinity on Flemish Cap

by

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The data archive of MEDS was examined for all the submitted oceanographic information on Flemish Cap for the period 1955-80. There is a considerable amount of older data available, but no biological records of utility to the Flemish Cap experiment extend into this early period, which makes the early oceanographic data of less utility. As well, the seasonal coverage before 1955 is much less than since then.

Tables 1 and 2 are the mean surface temperature and salinity from 0 to 20 m, from March to September, 1955 to 1980. Only stations in less than 400 m of water on Flemish Cap were chosen to characterize the waters of the Flemish Cap gyre and to avoid the waters of the Labrador Current and the North Atlantic current. When more than one data set was reported from Flemish Cap in a month, the means of each cruise were computed separately, and then combined according to their standard error. A poorly determined mean, one with a large standard error due to either a fewer number of observations or to a large variability in the observations, is therefore discounted in computing the monthly value. Occasional situations occurred where it was felt necessary to use temporal weighting for the monthly value, but this was the case for very few months.

In order to allow a closer examination of the source and quality of the data, computer graphics of the cruise tracks for all the relevant cruises were produced. For assurance of data quality, the minimum and maximum temperatures and salinities for each cruise were also examined for every cruise. These checks on quality, however, do not make up for the generally poor spatial coverage of most cruises. There are more means from the western side than from any other area. Nevertheless, these are the actual measurements from the Cap and the best available measurements of the conditions of the surface experiment.

In the two tables, the sums of temperature and salinity for April to May and April to August were computed. For cells that have no observed values, the long term monthly mean was used in place of that cell. This means that missing months in any year give the resultant temperature or salinity sum a central tendency. This is from the philosophy that it is better to have a slightly weakened correlation than to amplify errors by computing expected cell values from new and column anomalies. The data necessary to generate new annual indices is presented.

Figure 1 is the April-May sea surface temperature and the April-August sea surface salinity, demonstrating that significant trends and variability apparently do exist for Flemish Cap.

Table 1. Flemish Cap 0-20 m mean temperatures, March to September, 1955 to 1980

	Mar.	Apr.	May	June	July	Aug.	Sept.	N	Σ April to August	N	Σ April May
55		3.59	3.61	6.24	9.68			4	34.28	2	7.20
56		3.83	5.26	5.60	10.06	11.28		5	36.03	2	9.09
57		3.08	4.53	-	11.11	10.99		4	36.16	2	7.61
58		5.39[a]	4.95	11.13	9.72	12.79	11.28	5	43.98	2	10.34
59		2.69	4.60	6.02	10.64		14.41	4	35.12	2	7.29
60	3.35		3.58	9.04	12.62			3	39.66	1	6.83
61		3.67	3.26	7.16	11.30		11.68	4	36.56	2	6.93
62		4.28		5.92[b]	9.95			3	35.66	1	8.62
63		3.48	5.17		10.25			3	36.52	2	8.65
64		3.79	5.80	6.60	10.48			4	37.84	2	9.59
65		3.66	5.42[c]		10.86			3	37.56	2	9.08
66	3.72				12.08			1	-	0	-
67	3.89	4.05	3.16	4.50	11.79	11.16	18.23	5	34.66	2	7.21
68	3.47[d]	3.02	3.11	5.06[e]	8.68	8.81[f]		5	28.68	2	6.13
69	2.75	2.82	4.79		10.52[g]		10.44	3	35.75	2	7.61
70		3.82[h]	5.55[i]	5.00	11.00	12.64	12.76	5	38.01	2	9.37
71	1.12	1.68	4.27		8.60[j]			3	32.17	2	5.95
72	1.49	2.15[k]		1.98	10.71	6.58		4	25.79	1	6.49
73	1.98	1.66[l]	4.34	6.35	10.07[m]	12.42		5	34.84	2	6.00
74	.13	0.27[n]	1.03	4.32		10.37		4	26.68	2	1.30
75					10.45	11.55		2	36.03	0	-
76		1.48	2.59			10.80		3	32.01	2	4.07
77		3.01[o]	4.03	6.17	11.64	12.97		5	37.82	2	7.04
78		2.83	5.49	8.09	10.92[p]	12.38		5	39.71	2	8.32
79	4.31	5.46[q]	5.76[r]	8.18	12.61		13.45	4	43.18	2	11.22
80	3.76	5.02	5.09[s]	6.67	10.90[t]	11.09[u]		5	38.77	2	10.11
N	11	23	22	17	24	14	7		25		24
$\bar{x}$	2.72	3.249	4.336	6.45	10.69	11.166	-		35.89		9.16
S	1.35	1.258	1.199	2.00	1.027	1.730	-		-		-

Table 1 (Cont'd)

Footnotes: when more than one cruise to Flemish Cap in a month were reported, the average was calculated after weighting by $(S\bar{x})^{-1}$ and by tempored weighting. The original data is provided for each footnoted mean.

Cruise	Stations	Mean	Standard deviation	Date
[a]31EV08490	10	4.99	1.13	14/4/58
06GA09190	7	5.96	0.56	18/4/58
[b]31EV01760	20	5.82	0.47	1-5/4/62
58GS00920	3	6.03	0.21	7/4/62
[c]31EV05400	19	4.43	1.05	1-20/5/65
06HW00620	5	5.53	0.12	26/5/65
[d]180568003	19	4.14	0.72	2-8/3/68
31SC12530	6	1.70	1.08	20/3/68
[e]31EV80390	13	5.32	1.85	1-24/6/68
31HV12750	6	4.89	0.84	20/6/68
[f]180568009	3	8.73	0.26	6/8/68
31SC13080	3	8.85	0.13	22/8/68
[g]313L15380	7	9.37	1.44	10/7/69
180569027	4	11.16	0.61	30/7/69
[h]31EV81530	10	3.95	0.86	9-30/4/70
31AZ16330	7	3.69	0.87	12/4/70
[i]90 70003	8	5.80	0.98	21/5/70
90 70013	3	5.26	0.70	20-31/5/70
[j]31CM18870	7	7.74	0.41	15/7/71
180S71014	4	11.43	1.03	30/7/71
[k]31EV82960	7	0.52	1.49	8-18/4/72
74CZ72004	5	2.78	0.56	17/4/72
[l]31EV83550	4	0.71	1.02	21/4/73
90PH73011	8	1.98	0.48	27/4/73
[m]90P304400	29	9.82	1.83	13-20/7/73
180573010	4	10.80	1.94	26/7/73
[n]31EV83700	3	0.69	0.80	15/4/74
31E123960	3	-0.32	0.37	1/4/74
[o]31EV85300	9	2.79	0.35	13-30/4/77
90PE77018	31	3.15	0.42	20-30/4/77
[p]90PH78017	40	10.37	2.05	1-28/7/78
90P378020	29	10.92	1.57	26-31/7/78
180578008	14	11.86	2.06	29/7/78
[q]90SU79002	8	5.48	1.34	1-30/4/79
90GE79107	36	7.26	2.40	9-30/4/79
180579020	51	5.09	1.18	22-29/4/79
[r]180579021	37	5.85	1.10	5/5/79
90GE79017	51	5.67	1.34	1-31/5/79
[s]90PH80020	36	5.02	1.00	1-31/5/80
90KV80002	13	5.10	0.14	1-31/5/80
[t]90KV80002	34	10.62	1.03	1-31/7/80
90PH80021	3	11.76	0.94	31/7/80
[u]90KV80002	5	10.19	1.62	1/8/80
90PH80021	76	11.34	1.75	31/8/80

Table 2. Flemish Cap 0-20 mean salinities March to September, 1955 to 1980

	Mar.	Apr.	May	June	July	Aug.	Sept.	N	Σ April to August	N	Σ April May
55		34.08	34.09	33.75	33.32			4	168.36	2	68.17
56		34.16	33.98	33.77	32.81	33.44		5	168.16	2	68.14
57		34.36	34.31		33.86	33.91		4	170.12	2	68.67
58		33.98[a]	33.85	33.73	33.00	33.18	33.56	5	167.74	2	67.83
59		34.33	34.09	33.95	33.63		32.87	4	169.12	2	68.42
60	34.19		34.10	33.87	33.50			3	168.58	1	68.09
61		34.12	34.08	33.79	33.32		33.36	4	168.43	2	68.20
62		34.12		34.06[b]	33.62			3	168.77	1	67.97
63		34.20	34.12		33.53			3	168.65	2	68.32
64		34.52	34.57	34.25	33.41			4	168.87	2	69.09
65		34.47	34.40[c]		34.09			3	169.76	2	68.87
66	34.54				33.83			1	-	0	-
67	34.39	34.20	33.61	33.47	33.33	33.11	33.51	5	167.72	2	67.81
68	33.75[d]	33.58	33.52	33.59[e]	33.27	33.06		5	167.02	2	67.10
69	33.82		33.87		33.26[f]		32.40	2	167.92	1	67.86
70		33.59[g]	33.56	33.52	33.22[h]	33.10	32.25	5	166.99	2	67.15
71	33.72	33.50	32.83		32.34[i]			3	165.47	2	66.33
72	33.82	33.84[j]		32.41	32.20	32.39		4	164.69	1	67.69
73	33.07	33.10[k]	33.03		32.96[l]	32.38		4	165.15	2	66.13
74	33.74	33.54[m]	33.32	33.21		33.30		4	166.67	2	66.86
75					33.35	33.19		2	168.06	0	-
76		33.72	33.34			33.22		3	167.26	2	67.06
77		33.85	33.79	33.78	33.23			4	167.77	2	67.64
78		34.24	34.14	33.55	33.44[n]	33.36		5	168.73	2	68.38
79	34.32[o]	34.29[p]	34.29	34.06	33.50		32.98	4	169.26	2	68.58
80	34.01	33.95	33.86	33.76	33.14[q]	32.95[r]		5	167.66	2	67.81
N	11	22	22	17	24	13	7		25		24
$\bar{x}$	33.94	33.99	33.85	33.68	33.30	33.12	32.99		167.88		67.84
S	0.41	0.36	0.67	0.41	0.43	0.40	0.52				

Table 2 (Cont'd)

Footnotes: when more than one cruise to Flemish Cap in a month were reported, the average was calculated after weighting by $(S\bar{x})^{-1}$ and by tempored weighting. The original data is provided for each footnoted mean.

Cruise	Stations	Mean	Standard deviation	Date
[a]06GA09190	7	34.14	0.19	18/4/58
31EV08490	10	34.00	0.14	14/4/58
90SY09420	5	33.92	0.05	16/4/58
[b]31EV01760	20	34.05	0.07	1-5/6/62
58GS00920	3	34.18	0.23	7/6/62
[c]06HW00620	5	34.67	0.11	26/5/65
31EV05400	19	34.23	0.14	1-20/5/65
[d]180568003	19	33.86	0.12	2-8/3/68
31SC12530	6	33.61	0.08	20/3/68
[e]31EV80390	13	33.62	0.32	1-24/6/68
31HU12750	6	33.57	0.10	20/6/68
[f]180569027	4	33.32	0.38	30/7/69
313L15380	7	33.23	0.27	10/7/69
[g]31AZ16330	7	33.57	0.08	12/4/70
31EV81530	10	33.61	0.11	9-30/4/70
[h]180570019	4	33.40	0.18	29/7/70
31CC16690	7	33.02	0.25	30/7/70
[i]180571014	4	32.36	0.11	30/7/71
31CM18870	7	32.32	0.11	15/7/71
[j]31EV82960	7	33.66	0.19	8-18/4/72
74CZ02070	5	33.97	0.11	17/4/72
[k]31EV83550	4	33.12	0.11	21/4/73
90PH04390	8	33.07	0.16	27/4/73
90PH73011	8	33.11	0.21	27/4/73
[l]180573010	4	32.75	0.16	27/7/73
31EV83550	4	33.12	0.14	1/7/73
90P304400	29	32.97	0.22	13-20/7/73
[m]31EV83700	3	33.36	0.27	15/4/74
31E123960	3	33.60	0.09	1/4/74
[n]180578008	14	33.60	0.49	29/7/78
90PH78017	40	33.38	0.36	1-28/7/78
90P378020	29	33.43	0.26	26-31/7/78
[o]180579019	7	34.34	0.06	18/3/79
90SU79002	26	34.30	0.10	20/3/79
[p]180579020	51	34.23	0.33	22-29/4/79
90GE79017	36	34.25	0.28	9/4/79
90SU79002	8	34.61	0.39	1-30/4/79
[q]90KV80002	34	33.00	0.25	1-31/7/80
90PH80021	3	33.26	0.26	31/7/80
[r]90KV80002	5	32.87	0.28	1/8/80
90PH80021	76	32.97	0.30	1-31/8/80

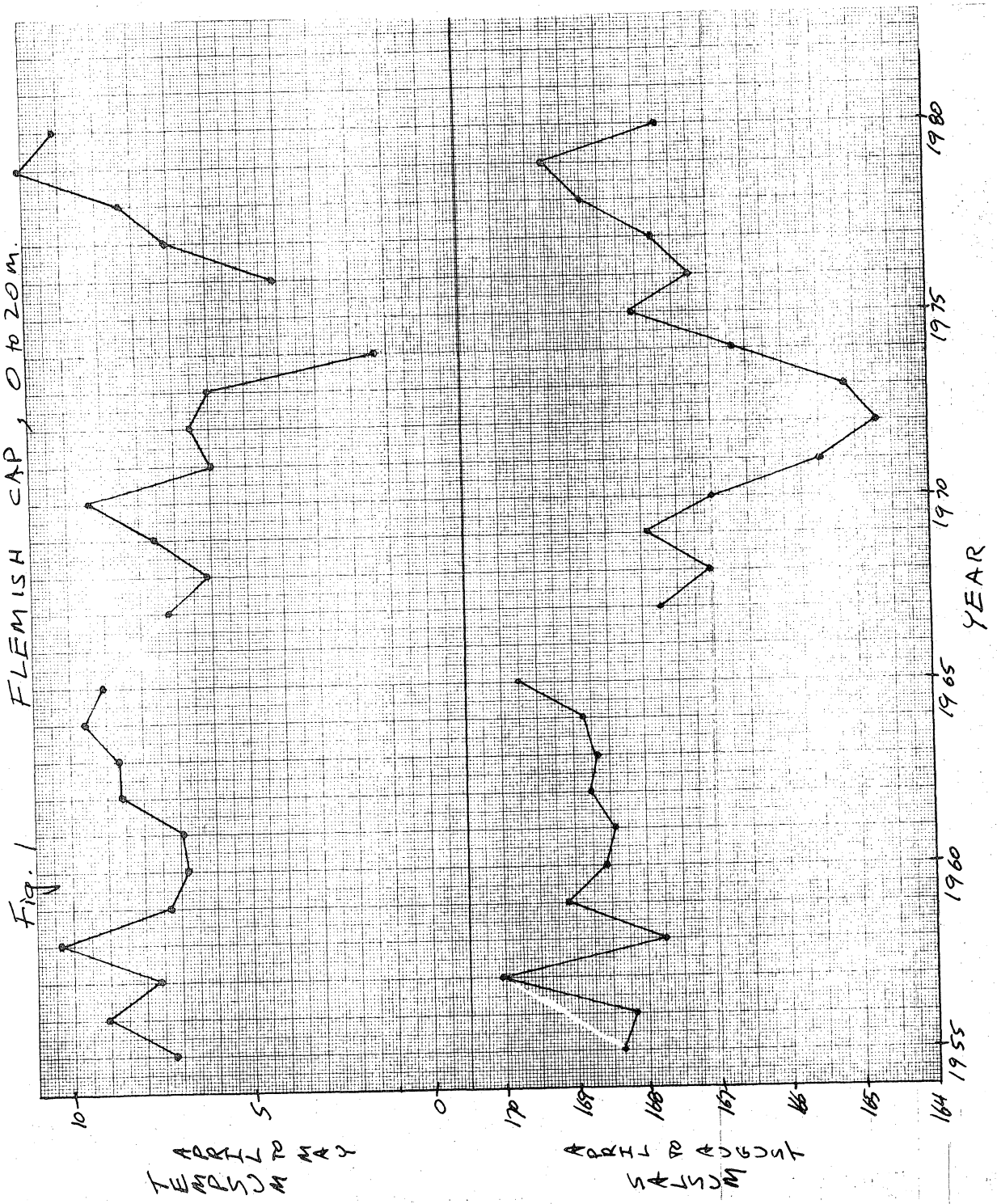
FLEMISH CAP, 0 to 20 m.
APRIL to MAY TEMPERATURE
APRIL to AUGUST SALINITY
10
5
0
170
169
168
167
166
165
164
1955
1960
1965
1970
1975
1980
YEAR

Fig. 1