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Temperature Variations
in the West Greenland Area after 1950

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In the following a short review is given of the variation of air temperature at three stations, of the variation of sea surface temperature anomalies and of some characteristic features of the variation of the temperature in the deeper water layers off West Greenland. For comparison air temperatures and sea surface temperatures from earlier years are also considered.

Air temperature.

Figure 1 shows the 5 years consecutive means of the annual mean temperature of the three meteorologic stations Ivigtut ($61^{\circ}12'N-48^{\circ}10'W$), Godthåb ($64^{\circ}11'N-51^{\circ}43'W$) and Jacobshavn ($69^{\circ}12'N-50^{\circ}02'W$) on the west coast of Greenland. Where observations for a few months are missing temperatures have been calculated by interpolation from anomalies of neighbouring months.

After the rise in temperature in the late twenties and the beginning of the thirties the temperatures decreased again to a minimum in the beginning of the fifties. In the last half of the fifties the temperature has again been increasing slightly. The variation in temperature has been much greater in the northern part of the West Greenland area than in the southern.

Figure 2a, 2b and 2c show the 5 years running means of the difference between summer temperature and winter temperature, where the summer temperature is the mean for the months June, July and August and the winter temperature the mean for December, January and February. There has been very great variation in the annual amplitude, specially in the northernmost part of the area. When the rise in temperature occurred the annual amplitude decreased and during the minimum about 1950 the annual amplitude rose to a new maximum.

In the northern part of the area the variation in the annual mean temperature is in fact mainly due to variation in the winter temperature.

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Sea temperature.

Figure 3 presents the variation of sea surface temperature anomalies for area A₁ (West Greenland waters) and B (South Greenland waters) calculated from the sea surface anomalies given by Jens Smed.

The general trends for the sea surface temperatures are the same as those for the air temperature.

After the decrease in temperature to a minimum in the beginning of the fifties, the temperatures have had a distinct increasing trend in the late fifties and beginning of the sixties both in the West Greenland and the South Greenland area.

Subsurface temperature.

The best material of subsurface temperatures is probably the data from the standard sections worked by M/S Dana and M/C Adolf Jensen across the West Greenland Banks in July. For some of the most frequently worked stations the mean values and anomalies were calculated for different water layers and the result is given in the table below. Figure 4 illustrates the variation in temperature from 1950 to 1966 at three of the stations, for the water layer between 200 m and 300 m at the stations west of Fylla Bank and west of Great Hellefiske Bank and at 300 m in the northwestern part of the Disko Bay. The temperatures have generally had an increasing trend during the period and specially after 1963 this increase has been very strong.

Off Fylla Bank the temperature seems to have culminated in 1964 or 1965, but in the area from Great Hellefiske Bank and northwards the temperatures were still increasing up to 1966.

It is doubtful what the reason is for this increase in temperature, but it seems likely that it can be due to a less severe winter cooling in the area south and east of Greenland.

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66°37' N - 57°05' W. (N. of Great Hellefiske Bank). Temperatures, July.

Depth interv.	Mean value	Anomalies.											
		50	52	53	54	55	57	58	59	61	63	64	66
0-50	2.14	-0.1	0.9	1.4	0.0	0.1	-0.8	0.2	-0.6	1.5	-0.6	0.1	-1.0
50-100	1.14	0.0	0.2	0.8	-0.2	0.2	-0.9	-0.4	-0.5	-0.3	0.5	0.2	0.6
100-200	1.83	-0.1	-0.9	0.6	-0.5	-0.2	-0.3	-0.3	-0.4	-0.2	0.5	0.4	1.7
200-300	2.81	-0.6	-1.5	0.6	-0.6	-0.6	-0.1	0.0	-0.1	0.1	0.2	0.8	1.7
300-400	3.42	-0.6	-1.4	0.2	-0.4	-0.4	0.1	0.2	-	0.0	0.2	0.8	1.4
400-500	3.78	-	-1.3	-0.1	-	-0.1	0.0	0.1	-	0.4	-0.7	0.6	1.0

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x): For the years 1959, 1961 and 1964 the position is: 66°41'N-56°38'W.

65°06N - 56°30'W (W of Little Hellefiske Bank)

Depth interv.	Mean value	Temp. anomalies												
		1950	52	53	54	55	56	57	58	59	61	63	64	66
0-50	2.10	-0.95	0.20	1.65	0.90	-1.05	-2.45	-0.65	0.40	0.65	0.15	0.85	1.40	-1.15
50-100	0.21	0.04	-0.81	1.24	-0.31	-0.26	-1.51	-1.61	-0.11	-0.21	1.14	1.44	1.49	-0.51
100-200	1.39	-0.29	-0.69	0.41	-0.44	0.51	-1.49	-2.09	-0.19	-0.49	1.26	0.86	1.61	1.01
200-300	3.11	-0.11	-1.56	0.19	-0.21	0.35	0.09	-2.21	0.09	-0.61	0.24	0.24	1.59	1.89
300-400	3.90	-0.75	-1.95	0.20	0.30	-0.10	0.90	-1.15	0.10	-0.10	-0.15	0.20	1.15	1.40
400-500	4.05	-0.75	-1.95	0.35	0.20	0.40	0.75	-0.55	-0.40	-0.20	0.05	0.45	0.90	0.80
500-600	3.85	-0.35	-1.05	0.60	-	0.60	0.55	-0.25	-1.05	-0.20	0.40	0.70	1.00	-0.95

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63°44'N - 54°30'W. (Fylla Bank 6.) Temperature July.

Temp. anomalies

Depth interv.	Mean value	50	52	53	54	55	56	57	58	59	60	61	63	64	65	66
0-50	3.20	1.0	-2.0	0.2	1.0	-3.0	-0.3	1.9	0.2	0.4	0.4	0.1	1.0	1.6	0.3	-2.0
50-100	3.00	1.0	-2.8	-0.3	0.1	-2.7	0.0	0.6	-0.2	0.4	0.4	0.1	0.4	2.4	0.4	-2.0
100-200	3.30	0.6	-2.6	0.1	0.2	-1.6	0.8	0.6	0.6	0.4	0.4	0.2	0.1	2.1	0.4	-0.2
200-300	3.96	0.0	-2.1	0.1	0.0	-0.9	0.3	0.2	0.1	0.2	0.2	0.0	0.2	1.3	0.3	0.8
300-400	4.22	-0.2	-1.4	0.0	0.0	-0.2	0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.1	0.9	0.0	1.0
400-600	4.27	-0.1	-0.9	0.0	-0.2	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	0.1	-0.1	0.6	0.1	0.8
600-800	4.14	-0.1	-0.4	0.0	-0.2	0.0	-0.3	-0.2	-0.1	-0.1	-0.1	0.1	0.1	0.4	0.1	0.8
800-1000	3.90	-0.2	-0.1	-0.1	-0.2	0.0	-0.2	-0.2	-0.1	0.0	0.0	0.2	0.2	0.2	0.2	0.6

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63°53'N - 53°22'W. (Fylla Bank 4.) Temperatures July.

Depth interv. value	Mean	<u>Temperature anomalies</u>														
		50	52	53	54	55	56	57	58	59	60	61	63	64	65	66
0-50	2.07	0.1	-0.1	1.2	-0.4	-1.5	0.8	-0.9	-1.0	-0.3	0.2	1.7	0.3	0.2	0.0	-0.5
50-100	1.33	0.9	-1.2	1.0	-0.1	-1.0	0.6	0.4	-0.6	-0.1	-0.2	0.4	0.3	0.2	0.4	-0.4
100-200	1.85	0.4	-1.8	0.6	0.6	-1.0	1.2	1.2	-0.8	-0.6	0.0	-0.1	0.1	0.2	0.3	-0.2
200-300	2.88	0.4	-2.3	0.6	0.4	-0.5	0.9	0.3	0.1	-1.0	0.3	-0.4	0.5	0.6	0.7	0.4
300-400	3.79	0.1	-2.9	0.5	-	-0.2	0.4	0.0	0.5	-0.3	0.4	0.4	-1.9	0.8	1.0	1.0
400-500	4.22	-0.3	-2.2	0.3	-	-0.3	0.0	-0.2	0.0	0.1	0.3	-0.3	-0.6	0.7	1.2	1.2

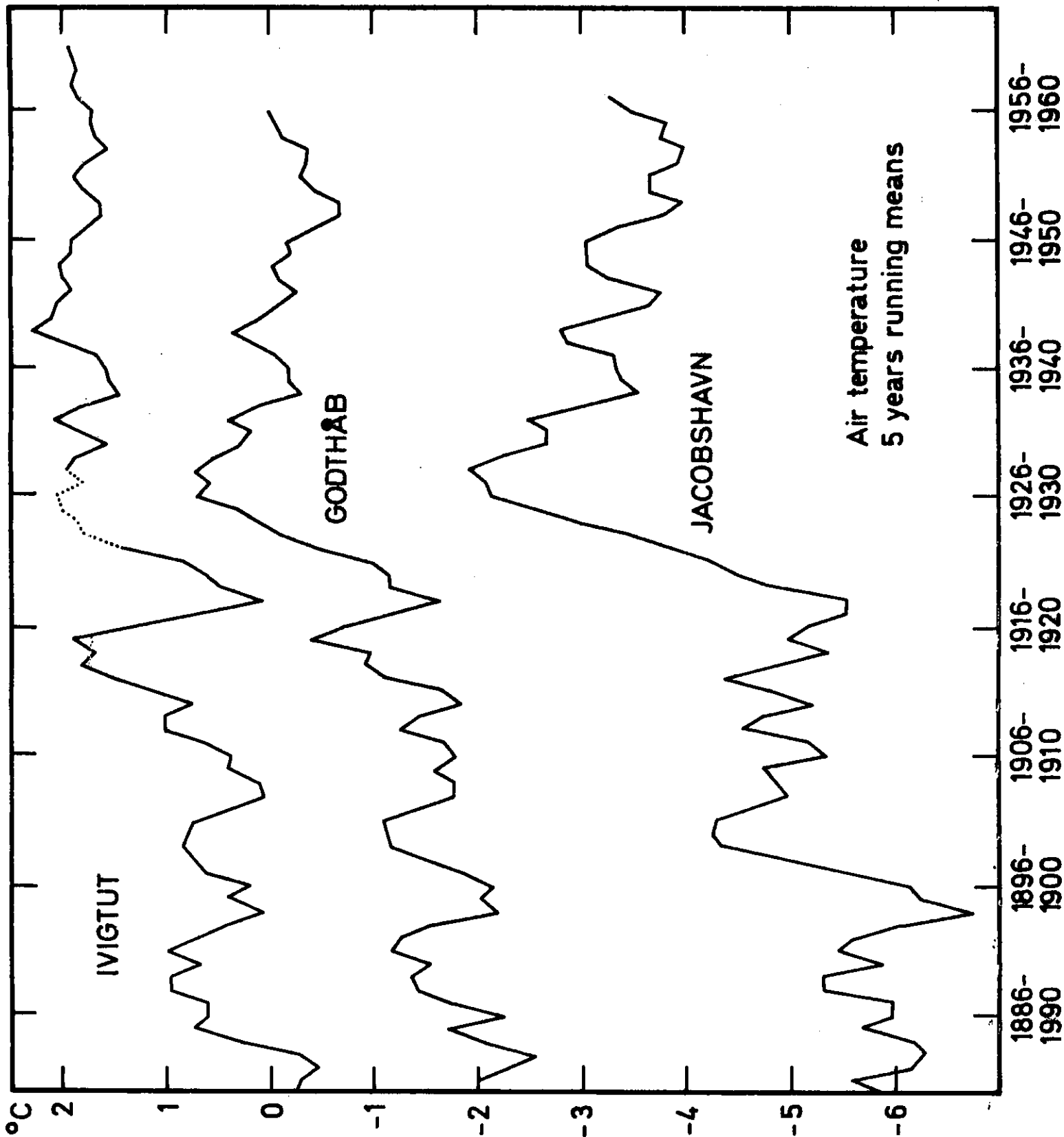


Figure 1. Annual mean air temperature at Ivigtut, Godthåb and Jacobshavn, 5 years running means.

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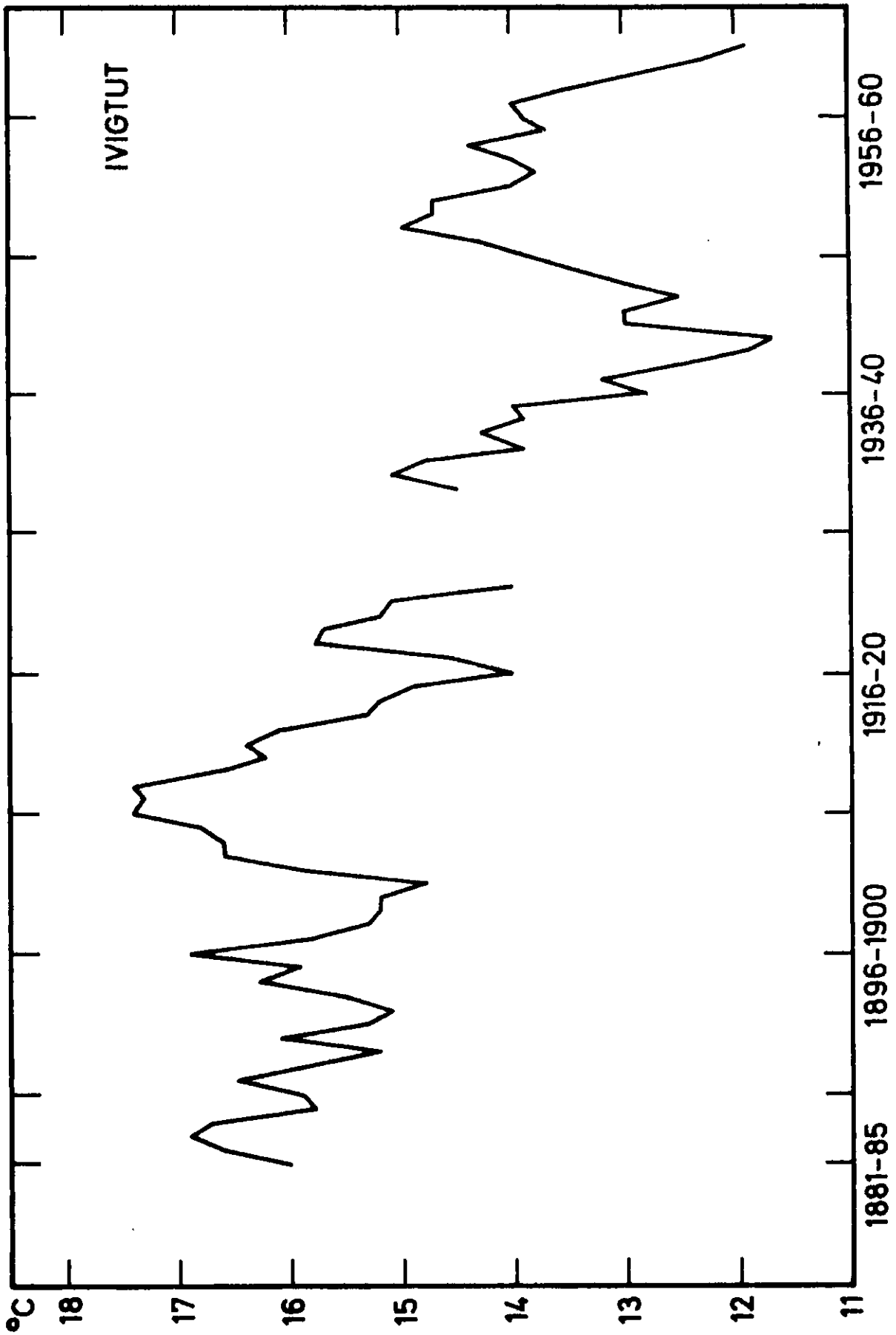


Figure 2a. Difference between summer temperature and winter temperature at Ivigtut.

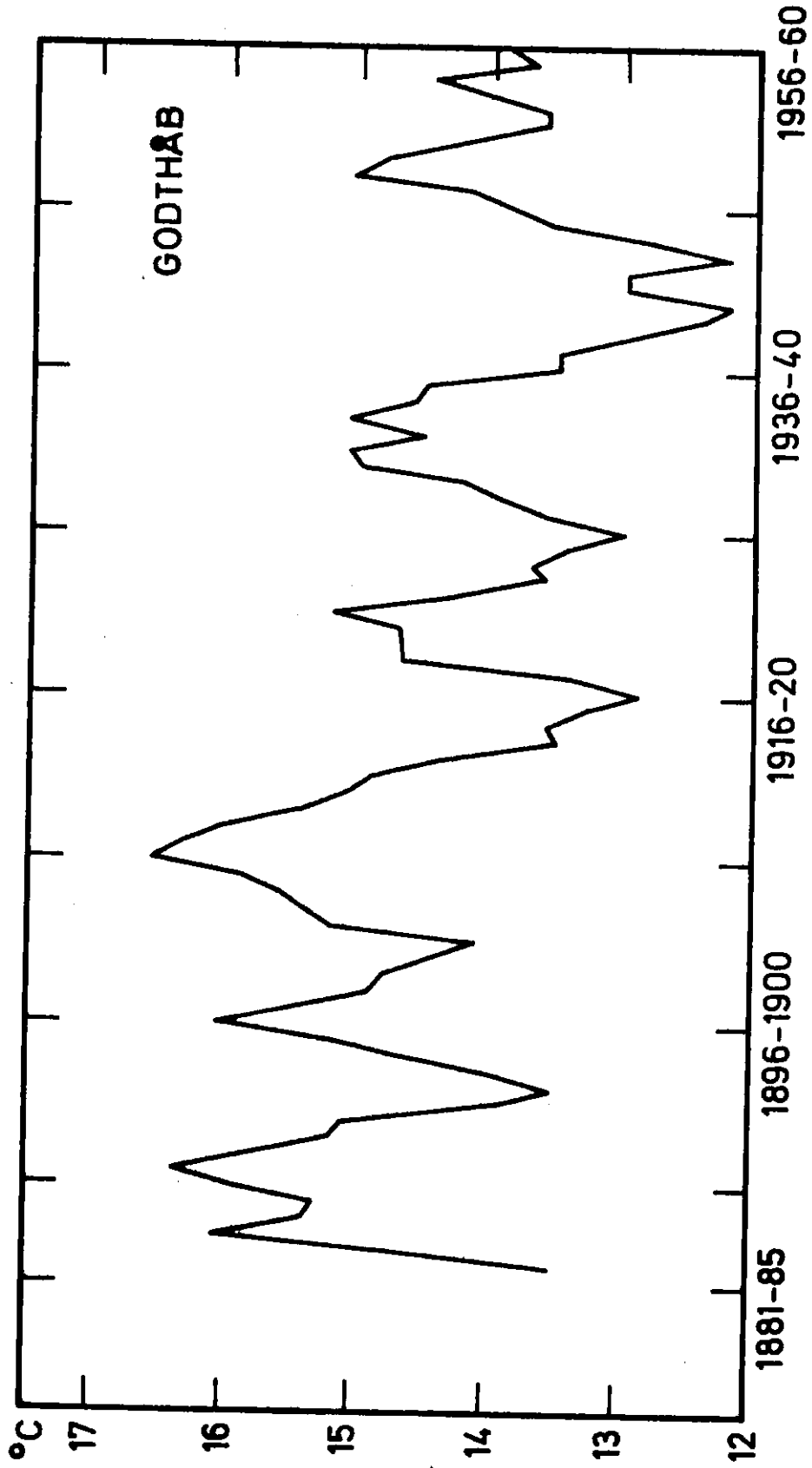


Figure 2b. Difference between summer temperature and winter temperature at Godthåb.

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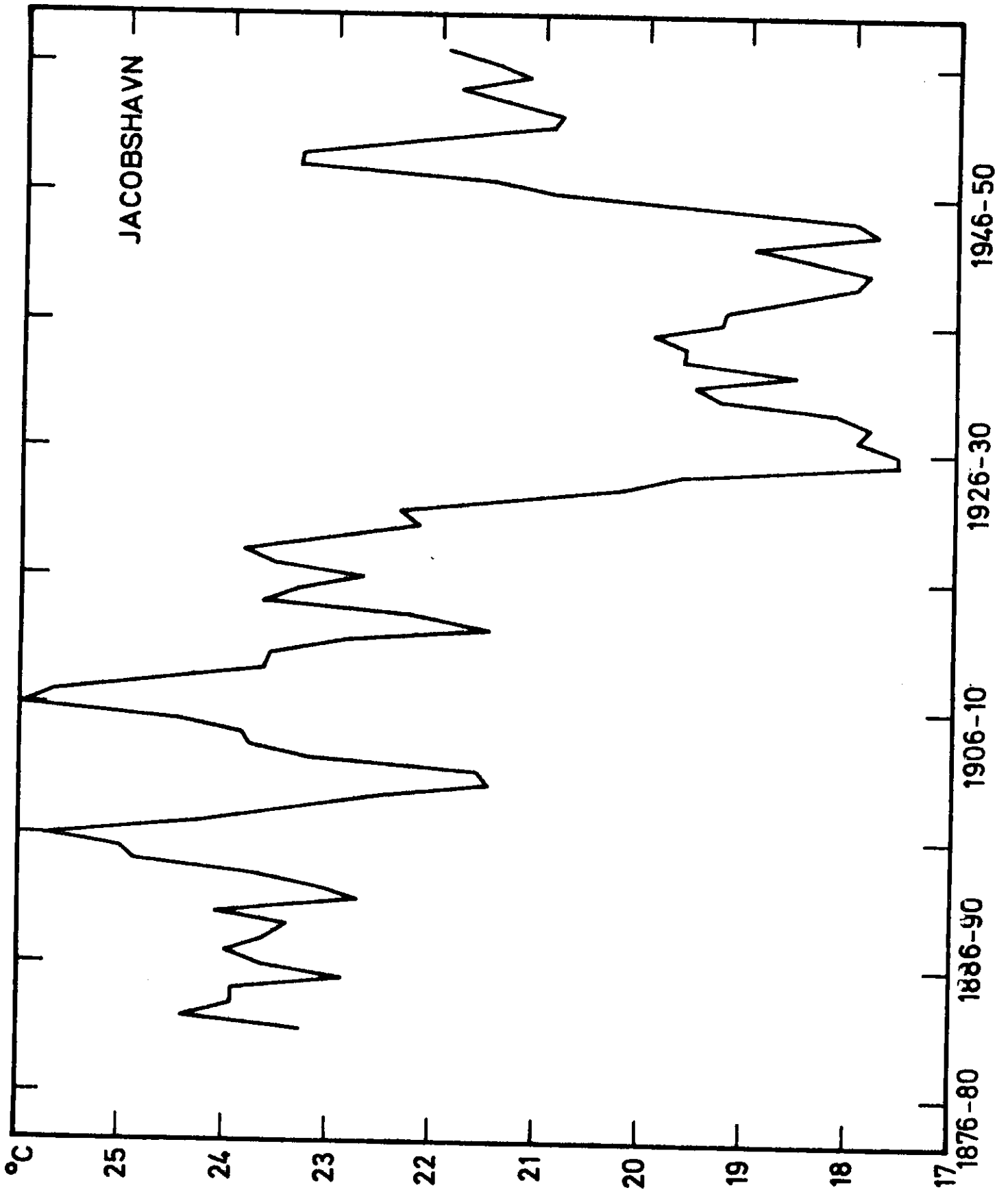


Figure 2c. Difference between summer temperature and winter temperature at Jacobshavn.

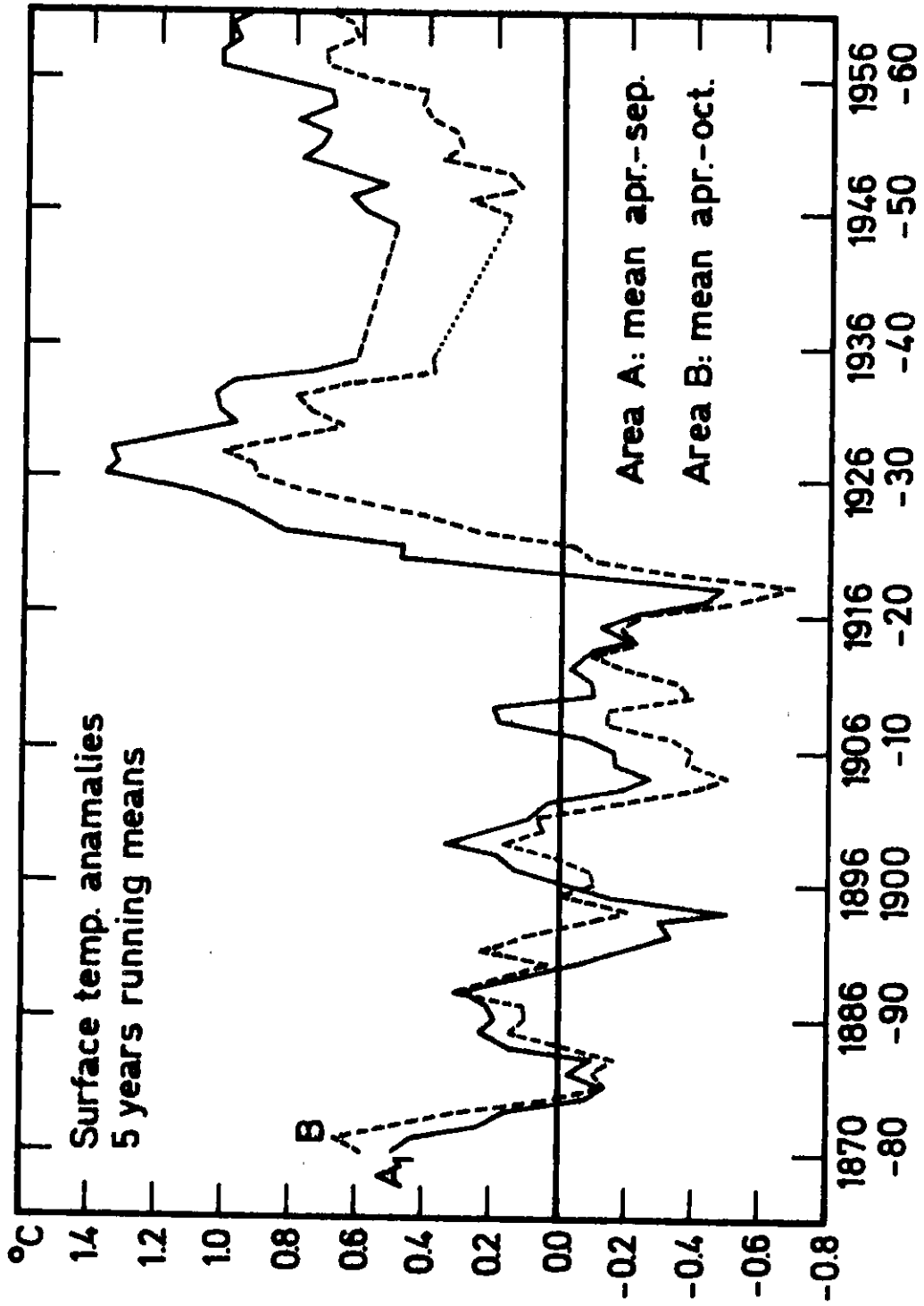


Figure 3. Sea surface temperature anomalies for area A₁ (West Greenland) and area B (South Greenland), 5 years running means.

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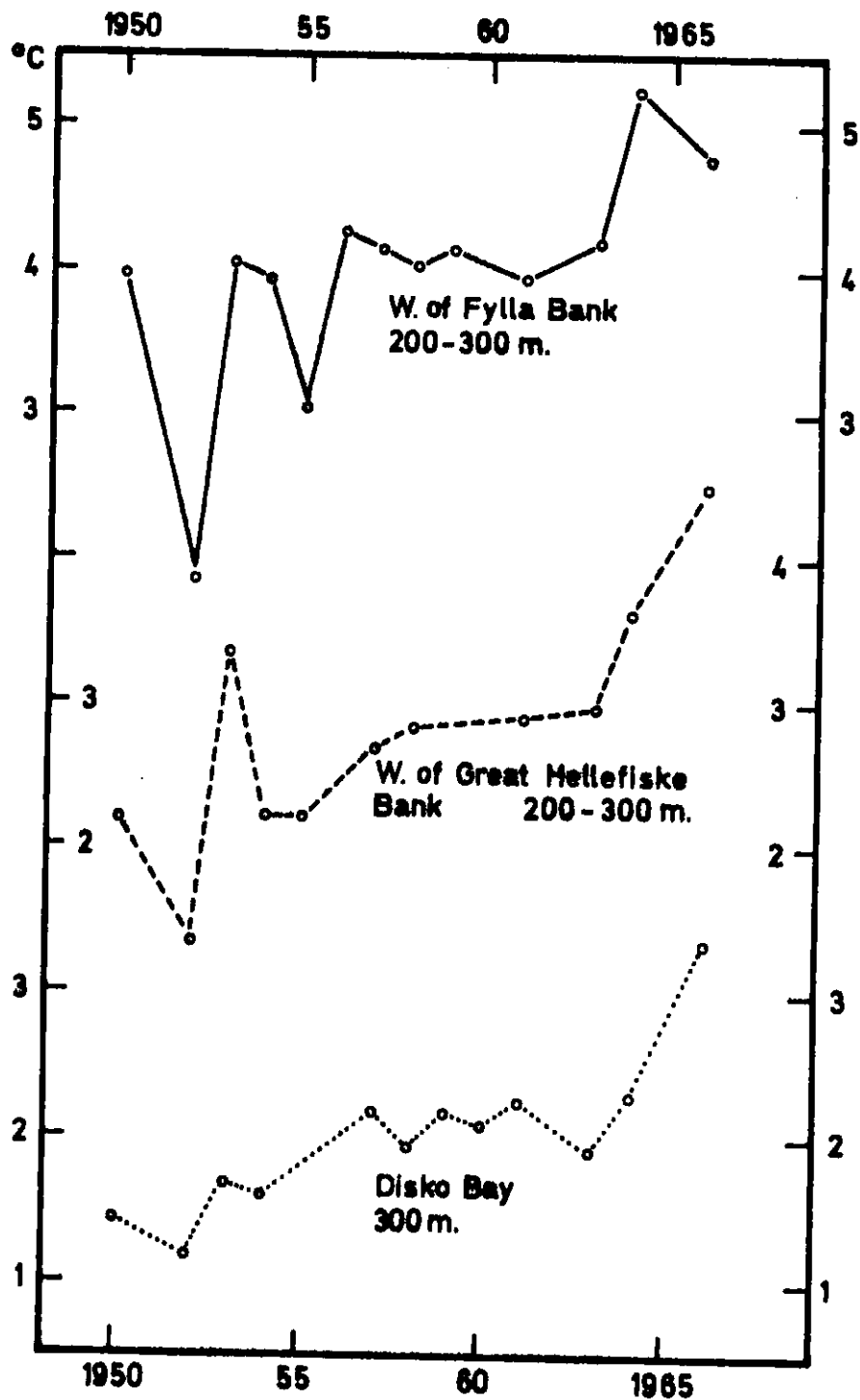


Figure 4. Temperatures for July. W of Fylla Bank ($65^{\circ}44'N-54^{\circ}30'W$)
west of Great Hellefiske Bank ($66^{\circ}37'N-57^{\circ}05'W$)
and in Disko Bay ($69^{\circ}17'N-52^{\circ}40'W$.)