



An assessment of 19th century climate data resources in the North Pacific – Arctic

Kevin R. Wood
James E. Overland

Photo: Revenue cutter in the Bering Sea, photographed from the mail steamer *Dora* in 1911.
University of Washington digital collections.
This research is funded by NOAA Arctic / CPO



A tour of some cooler historical climate data resources in the North Pacific – Arctic

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What we're after –

Variables

Meteorological data

Sea ice observations

Para-meteorology (river ice...)

Descriptive & visual records

Biogeographic reports

Proxy data (ice cores...)

Sources



Publications & official reports

Logbooks, weather diaries & other manuscript records (brown literature)

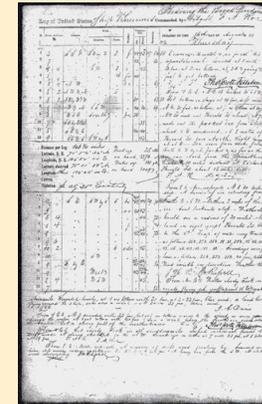


Photo / image collections

Products –

Comprehensive bibliography and image/
document bank online

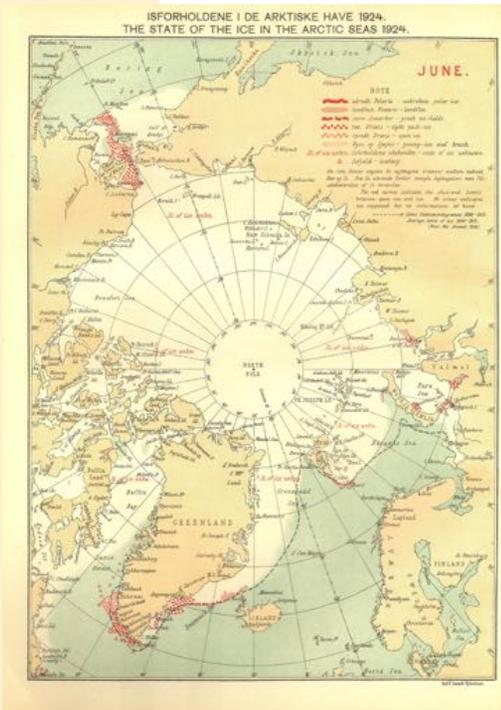
Continuous meteorological time series
(sub-daily to monthly) or best available

Historical sea ice maps and value-added
sea ice products (i.e. extended indexes)
Initial scanning nearly complete

Evaluation &
analysis



USRC *Thomas Corwin*, Nome, 1 June 1901



Meteorologisk-Nautisk Aarbog
1901-1956 (1870s for Atlantic)

Where to start: Russian–America, 1790^s-1867

Records of the PCO

9 locations with met. records

Nowo Archangelsk (Sitka):
remarkable near continuous
sub-daily record from at least
1833

Original records destroyed?



Sitka Observatory in 1865

Sitka: Kupffer series Jan. 1833 – Oct. 1842

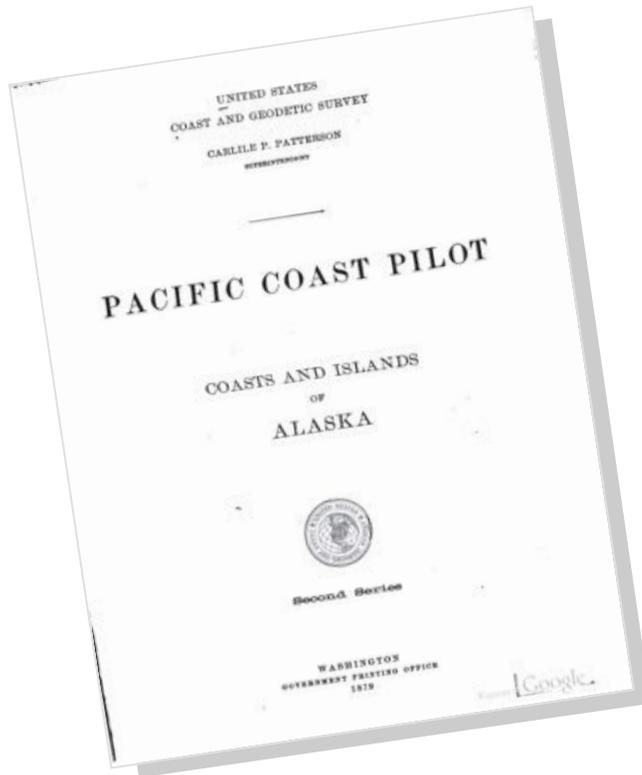


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Deux-figures décimales. **Janvier 1833.** Thermomètres réduits.

No.	1 ^{re}				2 ^e				3 ^e				4 ^e				Température de l'air.			
	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.	Bar.	Th. Air.		
1	662.1	+18.0	662.7	+ 7.0	662.1	+ 2.0	662.2	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	
2	662.4	+18.0	662.7	+ 7.0	662.1	+ 2.0	662.2	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	
3	662.7	+ 7.0	662.7	+ 7.0	662.1	+ 2.0	662.2	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	+ 6.0	
4	662.9	+18.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0	662.9	+ 7.0
5	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0	671.1	+ 6.0
6	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0	678.2	+ 7.0
7	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0	677.7	+ 6.0
8	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0	676.3	+ 7.0
9	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0	675.4	+ 6.0
10	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0	679.9	+6.0
11	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0	686.1	+ 7.0
12	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0	679.6	+ 6.0
13	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0	674.4	+ 6.0
14	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0	684.3	+ 6.0
15	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
16	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
17	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
18	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
19	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
20	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
21	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
22	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
23	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
24	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
25	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
26	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
27	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
28	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
29	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
30	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
31	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
32	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
33	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
34	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
35	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
36	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
37	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
38	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
39	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
40	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
41	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
42	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
43	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
44	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
45	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
46	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
47	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
48	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
49	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
50	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
51	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
52	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
53	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
54	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
55	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
56	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0	684.9	+ 6.0
57	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0	680.1	+ 6.0
58	684.9	+ 6.0	684.9	+ 6.0																

Sitka: U.S. Coast Survey - Army Signal Service, 1867-1877



Excellent discussion of metadata
Indicates ultimate availability
Data once in Coast Survey archive

64 LOCAL TABLES.

METEOROLOGICAL OBSERVATIONS AT SITKA, ALASKA.

TABLE I.

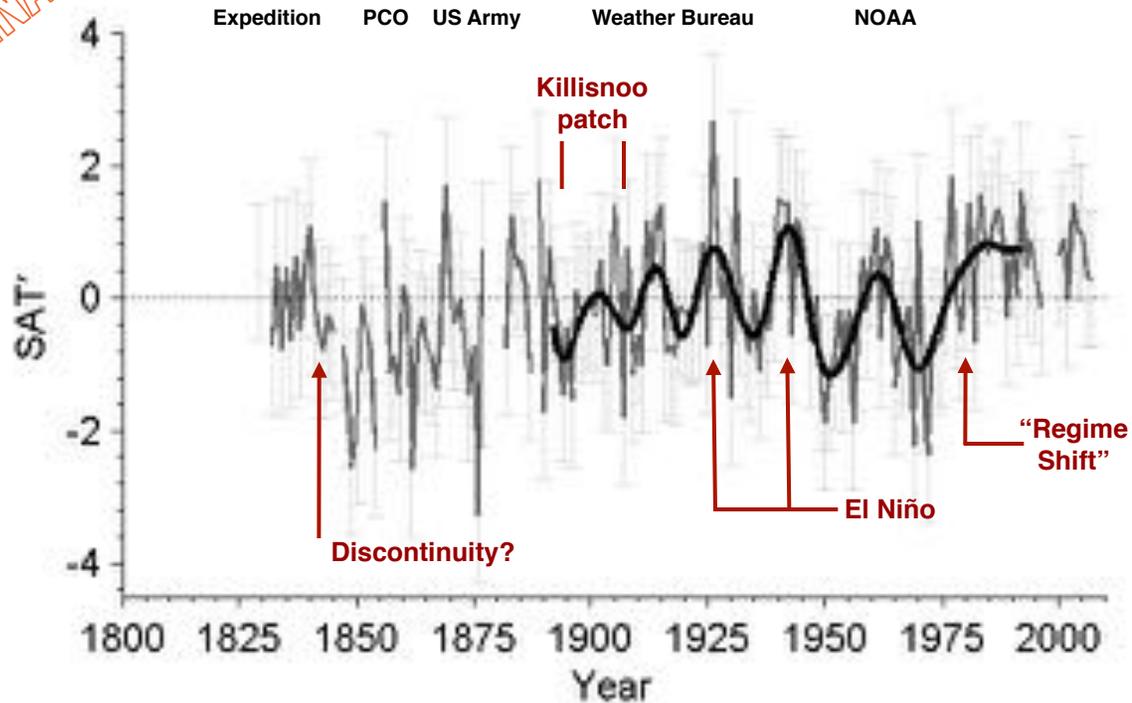
ATMOSPHERIC PRESSURE.

Barometrical observations reduced to 32° F. and to sea level.

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean	Max.	Min.
1867	30.0	29.8	29.6	29.4	29.2	29.0	28.8	28.6	28.4	28.2	28.0	27.8	28.5	30.0	27.0
1868	30.1	29.9	29.7	29.5	29.3	29.1	28.9	28.7	28.5	28.3	28.1	27.9	28.6	30.1	27.1
1869	30.2	30.0	29.8	29.6	29.4	29.2	29.0	28.8	28.6	28.4	28.2	28.0	28.7	30.2	27.2
1870	30.3	30.1	29.9	29.7	29.5	29.3	29.1	28.9	28.7	28.5	28.3	28.1	28.8	30.3	27.3
1871	30.4	30.2	30.0	29.8	29.6	29.4	29.2	29.0	28.8	28.6	28.4	28.2	28.9	30.4	27.4
1872	30.5	30.3	30.1	29.9	29.7	29.5	29.3	29.1	28.9	28.7	28.5	28.3	29.0	30.5	27.5
1873	30.6	30.4	30.2	30.0	29.8	29.6	29.4	29.2	29.0	28.8	28.6	28.4	29.1	30.6	27.6
1874	30.7	30.5	30.3	30.1	29.9	29.7	29.5	29.3	29.1	28.9	28.7	28.5	29.2	30.7	27.7
1875	30.8	30.6	30.4	30.2	30.0	29.8	29.6	29.4	29.2	29.0	28.8	28.6	29.3	30.8	27.8
1876	30.9	30.7	30.5	30.3	30.1	29.9	29.7	29.5	29.3	29.1	28.9	28.7	29.4	30.9	27.9
1877	31.0	30.8	30.6	30.4	30.2	30.0	29.8	29.6	29.4	29.2	29.0	28.8	29.5	31.0	28.0

What a Sitka T' composite might look like

PRELIMINARY

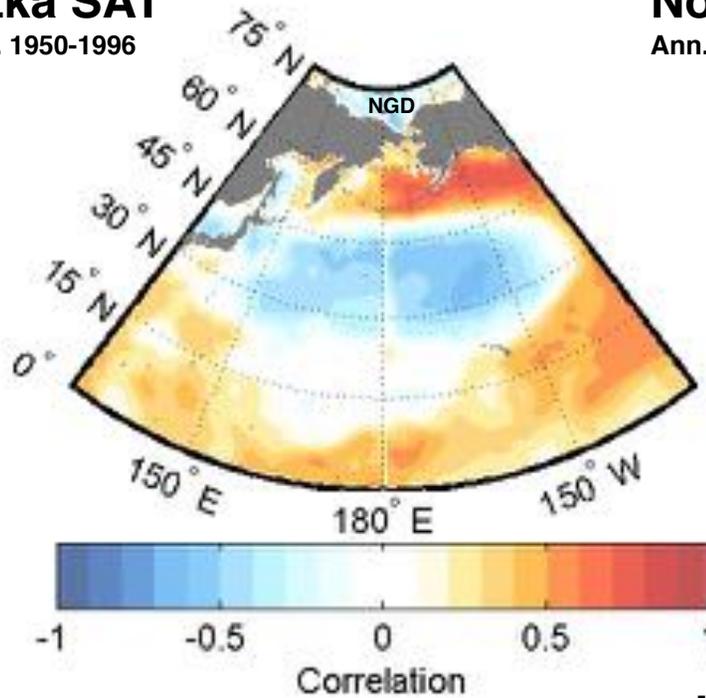


Sitka – Killisnoo SAT' composite (DJFM)

Correlation with SST anomaly (annual)

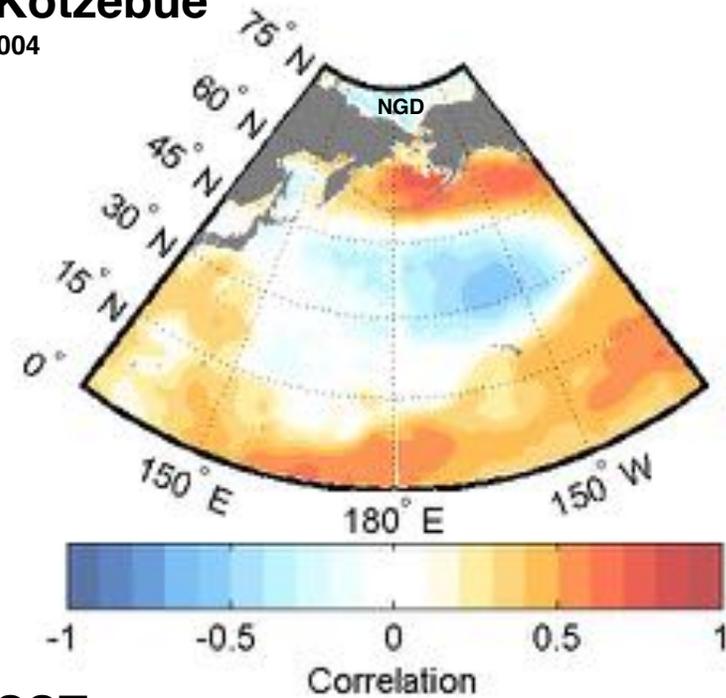
Sitka SAT'

Ann. 1950-1996



Nome/Kotzebue

Ann. 1950-2004



HadISST

Expeditions and other sources

Log of the United States Ship Vincennes Commanded by Fitzgibbon, P. A. Nov.

Blowing the Board Log

REMARKS OF THE DAY Thursday August 16 1855

No.	Time	Wind	Sea	Direction	Force	Barometer	Thermometer	Remarks
1	5	SE	3		2	30.0	57	1st barometer read 30.00 at 5 AM
2	7	SE	3		2	30.0	57	2nd barometer read 30.00 at 7 AM
3	9	SE	3		2	30.0	57	3rd barometer read 30.00 at 9 AM
4	11	SE	3		2	30.0	57	4th barometer read 30.00 at 11 AM
5	1	SE	3		2	30.0	57	5th barometer read 30.00 at 1 PM
6	3	SE	3		2	30.0	57	6th barometer read 30.00 at 3 PM
7	5	SE	3		2	30.0	57	7th barometer read 30.00 at 5 PM
8	7	SE	3		2	30.0	57	8th barometer read 30.00 at 7 PM
9	9	SE	3		2	30.0	57	9th barometer read 30.00 at 9 PM
10	11	SE	3		2	30.0	57	10th barometer read 30.00 at 11 PM
11	1	SE	3		2	30.0	57	11th barometer read 30.00 at 1 AM
12	3	SE	3		2	30.0	57	12th barometer read 30.00 at 3 AM
13	5	SE	3		2	30.0	57	13th barometer read 30.00 at 5 AM
14	7	SE	3		2	30.0	57	14th barometer read 30.00 at 7 AM
15	9	SE	3		2	30.0	57	15th barometer read 30.00 at 9 AM
16	11	SE	3		2	30.0	57	16th barometer read 30.00 at 11 AM
17	1	SE	3		2	30.0	57	17th barometer read 30.00 at 1 PM
18	3	SE	3		2	30.0	57	18th barometer read 30.00 at 3 PM
19	5	SE	3		2	30.0	57	19th barometer read 30.00 at 5 PM
20	7	SE	3		2	30.0	57	20th barometer read 30.00 at 7 PM
21	9	SE	3		2	30.0	57	21st barometer read 30.00 at 9 PM
22	11	SE	3		2	30.0	57	22nd barometer read 30.00 at 11 PM
23	1	SE	3		2	30.0	57	23rd barometer read 30.00 at 1 AM
24	3	SE	3		2	30.0	57	24th barometer read 30.00 at 3 AM
25	5	SE	3		2	30.0	57	25th barometer read 30.00 at 5 AM
26	7	SE	3		2	30.0	57	26th barometer read 30.00 at 7 AM
27	9	SE	3		2	30.0	57	27th barometer read 30.00 at 9 AM
28	11	SE	3		2	30.0	57	28th barometer read 30.00 at 11 AM
29	1	SE	3		2	30.0	57	29th barometer read 30.00 at 1 PM
30	3	SE	3		2	30.0	57	30th barometer read 30.00 at 3 PM
31	5	SE	3		2	30.0	57	31st barometer read 30.00 at 5 PM
32	7	SE	3		2	30.0	57	32nd barometer read 30.00 at 7 PM
33	9	SE	3		2	30.0	57	33rd barometer read 30.00 at 9 PM
34	11	SE	3		2	30.0	57	34th barometer read 30.00 at 11 PM
35	1	SE	3		2	30.0	57	35th barometer read 30.00 at 1 AM
36	3	SE	3		2	30.0	57	36th barometer read 30.00 at 3 AM
37	5	SE	3		2	30.0	57	37th barometer read 30.00 at 5 AM
38	7	SE	3		2	30.0	57	38th barometer read 30.00 at 7 AM
39	9	SE	3		2	30.0	57	39th barometer read 30.00 at 9 AM
40	11	SE	3		2	30.0	57	40th barometer read 30.00 at 11 AM
41	1	SE	3		2	30.0	57	41st barometer read 30.00 at 1 PM
42	3	SE	3		2	30.0	57	42nd barometer read 30.00 at 3 PM
43	5	SE	3		2	30.0	57	43rd barometer read 30.00 at 5 PM
44	7	SE	3		2	30.0	57	44th barometer read 30.00 at 7 PM
45	9	SE	3		2	30.0	57	45th barometer read 30.00 at 9 PM
46	11	SE	3		2	30.0	57	46th barometer read 30.00 at 11 PM
47	1	SE	3		2	30.0	57	47th barometer read 30.00 at 1 AM
48	3	SE	3		2	30.0	57	48th barometer read 30.00 at 3 AM
49	5	SE	3		2	30.0	57	49th barometer read 30.00 at 5 AM
50	7	SE	3		2	30.0	57	50th barometer read 30.00 at 7 AM
51	9	SE	3		2	30.0	57	51st barometer read 30.00 at 9 AM
52	11	SE	3		2	30.0	57	52nd barometer read 30.00 at 11 AM
53	1	SE	3		2	30.0	57	53rd barometer read 30.00 at 1 PM
54	3	SE	3		2	30.0	57	54th barometer read 30.00 at 3 PM
55	5	SE	3		2	30.0	57	55th barometer read 30.00 at 5 PM
56	7	SE	3		2	30.0	57	56th barometer read 30.00 at 7 PM
57	9	SE	3		2	30.0	57	57th barometer read 30.00 at 9 PM
58	11	SE	3		2	30.0	57	58th barometer read 30.00 at 11 PM
59	1	SE	3		2	30.0	57	59th barometer read 30.00 at 1 AM
60	3	SE	3		2	30.0	57	60th barometer read 30.00 at 3 AM
61	5	SE	3		2	30.0	57	61st barometer read 30.00 at 5 AM
62	7	SE	3		2	30.0	57	62nd barometer read 30.00 at 7 AM
63	9	SE	3		2	30.0	57	63rd barometer read 30.00 at 9 AM
64	11	SE	3		2	30.0	57	64th barometer read 30.00 at 11 AM
65	1	SE	3		2	30.0	57	65th barometer read 30.00 at 1 PM
66	3	SE	3		2	30.0	57	66th barometer read 30.00 at 3 PM
67	5	SE	3		2	30.0	57	67th barometer read 30.00 at 5 PM
68	7	SE	3		2	30.0	57	68th barometer read 30.00 at 7 PM
69	9	SE	3		2	30.0	57	69th barometer read 30.00 at 9 PM
70	11	SE	3		2	30.0	57	70th barometer read 30.00 at 11 PM
71	1	SE	3		2	30.0	57	71st barometer read 30.00 at 1 AM
72	3	SE	3		2	30.0	57	72nd barometer read 30.00 at 3 AM
73	5	SE	3		2	30.0	57	73rd barometer read 30.00 at 5 AM
74	7	SE	3		2	30.0	57	74th barometer read 30.00 at 7 AM
75	9	SE	3		2	30.0	57	75th barometer read 30.00 at 9 AM
76	11	SE	3		2	30.0	57	76th barometer read 30.00 at 11 AM
77	1	SE	3		2	30.0	57	77th barometer read 30.00 at 1 PM
78	3	SE	3		2	30.0	57	78th barometer read 30.00 at 3 PM
79	5	SE	3		2	30.0	57	79th barometer read 30.00 at 5 PM
80	7	SE	3		2	30.0	57	80th barometer read 30.00 at 7 PM
81	9	SE	3		2	30.0	57	81st barometer read 30.00 at 9 PM
82	11	SE	3		2	30.0	57	82nd barometer read 30.00 at 11 PM
83	1	SE	3		2	30.0	57	83rd barometer read 30.00 at 1 AM
84	3	SE	3		2	30.0	57	84th barometer read 30.00 at 3 AM
85	5	SE	3		2	30.0	57	85th barometer read 30.00 at 5 AM
86	7	SE	3		2	30.0	57	86th barometer read 30.00 at 7 AM
87	9	SE	3		2	30.0	57	87th barometer read 30.00 at 9 AM
88	11	SE	3		2	30.0	57	88th barometer read 30.00 at 11 PM
89	1	SE	3		2	30.0	57	89th barometer read 30.00 at 1 AM
90	3	SE	3		2	30.0	57	90th barometer read 30.00 at 3 AM
91	5	SE	3		2	30.0	57	91st barometer read 30.00 at 5 AM
92	7	SE	3		2	30.0	57	92nd barometer read 30.00 at 7 AM
93	9	SE	3		2	30.0	57	93rd barometer read 30.00 at 9 AM
94	11	SE	3		2	30.0	57	94th barometer read 30.00 at 11 PM
95	1	SE	3		2	30.0	57	95th barometer read 30.00 at 1 AM
96	3	SE	3		2	30.0	57	96th barometer read 30.00 at 3 AM
97	5	SE	3		2	30.0	57	97th barometer read 30.00 at 5 AM
98	7	SE	3		2	30.0	57	98th barometer read 30.00 at 7 AM
99	9	SE	3		2	30.0	57	99th barometer read 30.00 at 9 AM
100	11	SE	3		2	30.0	57	100th barometer read 30.00 at 11 PM

Distance per Log 268 3/4 miles
 Latitude, S. E. 71° 50' 30" A
 Longitude, E. 170° 00' 00" B
 Latitude observed 71° 51' 30" A
 Longitude observed 170° 00' 00" B
 Current
 Direction of surface current

US North Pacific XX

Log of the *Vincennes*,
 Aug. 16, 1855. North of Herald
 Island (71°N).

Standard US Navy form:
 hourly SAT, SST, BP, Wx

“A barrier of ice extending from South to NW – Within 2 miles of the ice. Sent lookouts aloft – weather clear. Could see a radius of 30 miles...”

+ Royal Navy, Russian Navy expeditions
 (i.e. Cook, HMS *Blossom*, *Plover*,
Rattlesnake, *Investigator*, *Enterprise*)

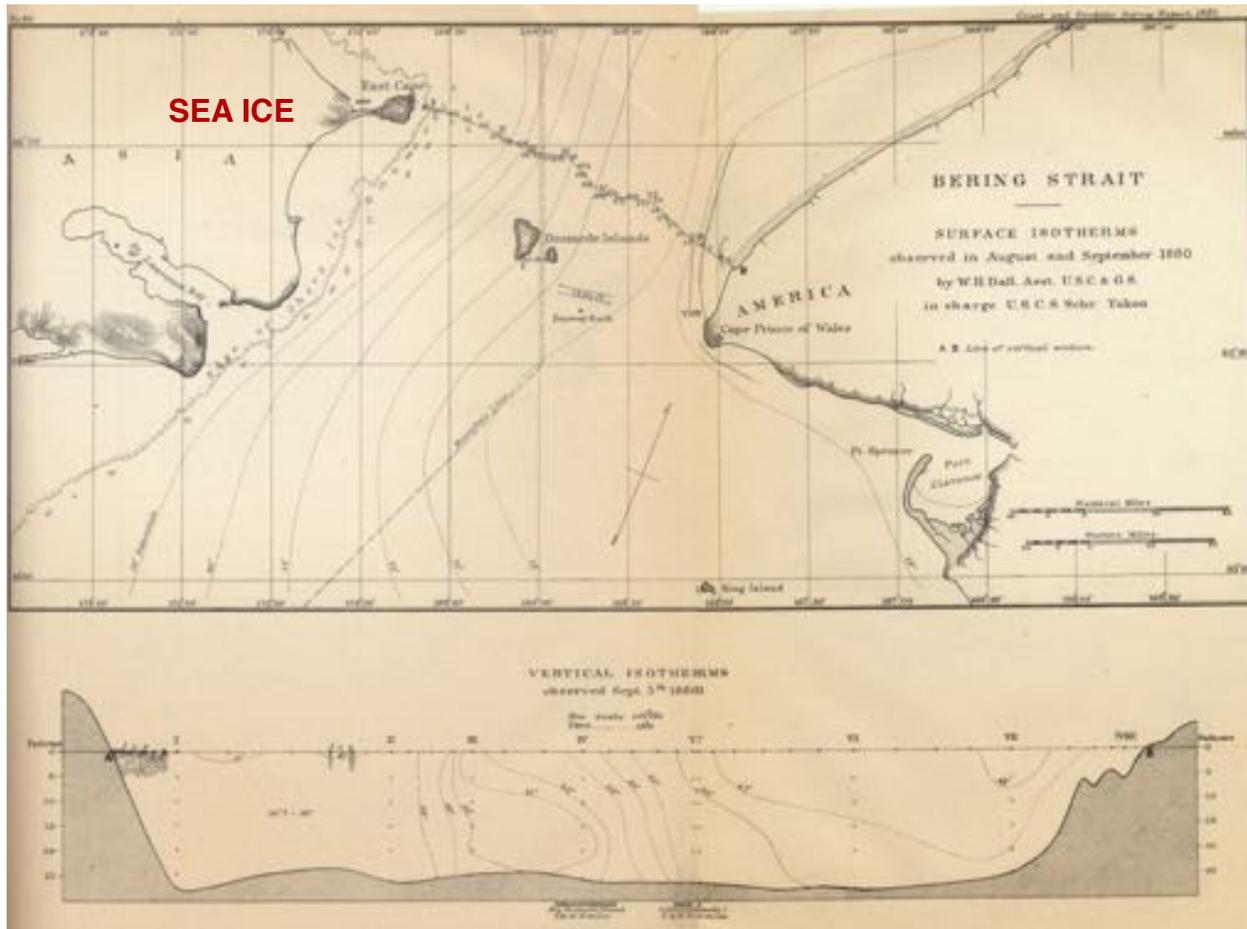
Photo # NH 66524-KN Lithograph – “U.S. Sloop of War Vincennes, 20 Guns”



USS *Vincennes*

US National Archives, microfilm M-88

US Coast Survey



**First Bering Strait
transect by W. Dall
Sept. 5, 1880**



USCS Yukon

...we sailed for Bering Strait, arriving off East Cape about 6 A.M. of the 5th of September. Broken ice intervened between us and the shore, and the bight southward was packed full of ice. We could not approach nearer to the shore than four miles. William Dall, in American Journal of Science

Bering Sea Patrol



Map as of 1896 (US Navy Hydrographic Office HO-1531)



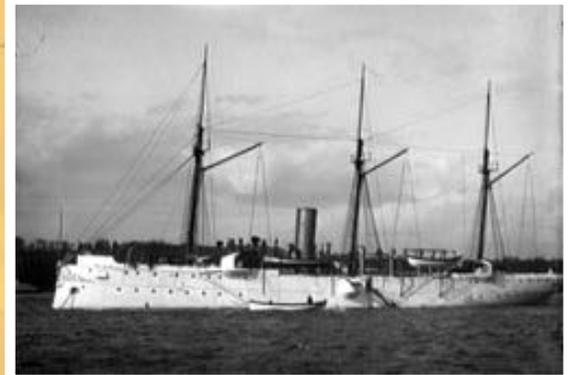
USRC *Thomas Corwin*

Photo: U. Alaska Anchorage Archive



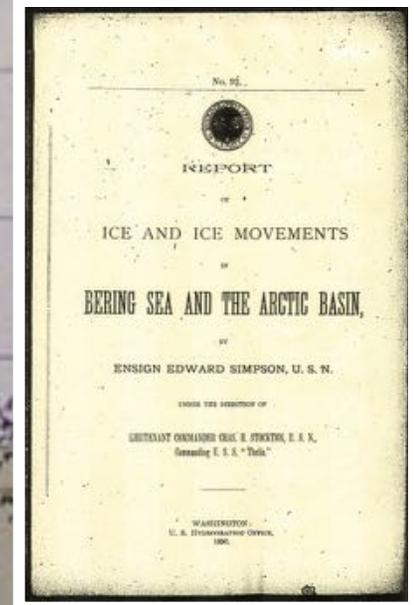
USRC *Bear*

Photo: Nome Historical Museum



USS *Yorktown*

US Hydrographic Office Report, 1890

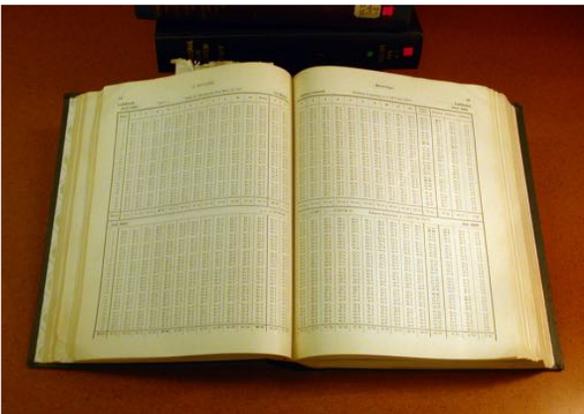


August-September ice edge
1879, 1885, 1886, 1887, 1888, 1889

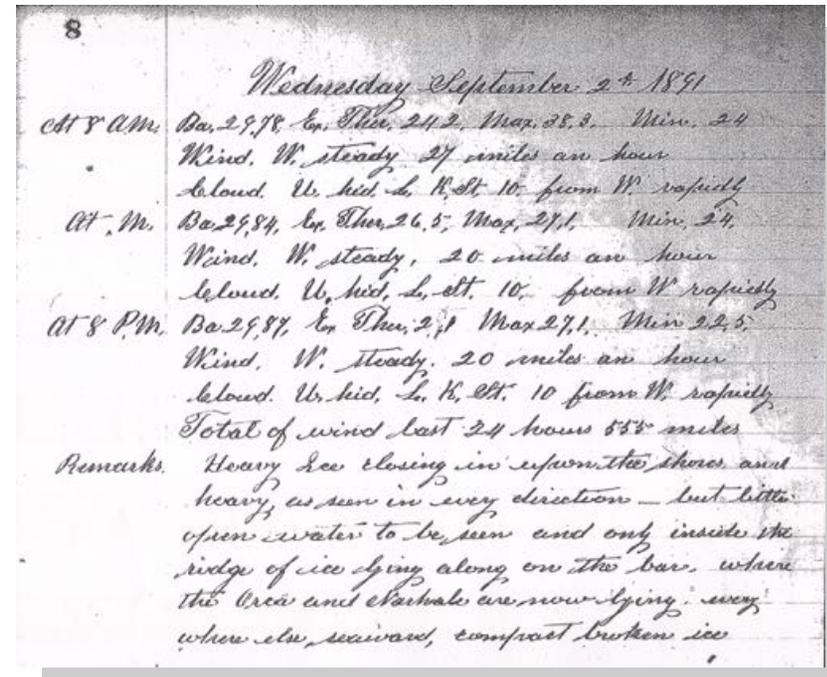
1st IPY & G^{OV}T Refuge observations at Point Barrow, 1881–1883; 1891–1893–1896



IPY-1 station (later used by Pacific Steam Whaling Company)



All IPY-1 records have been digitized

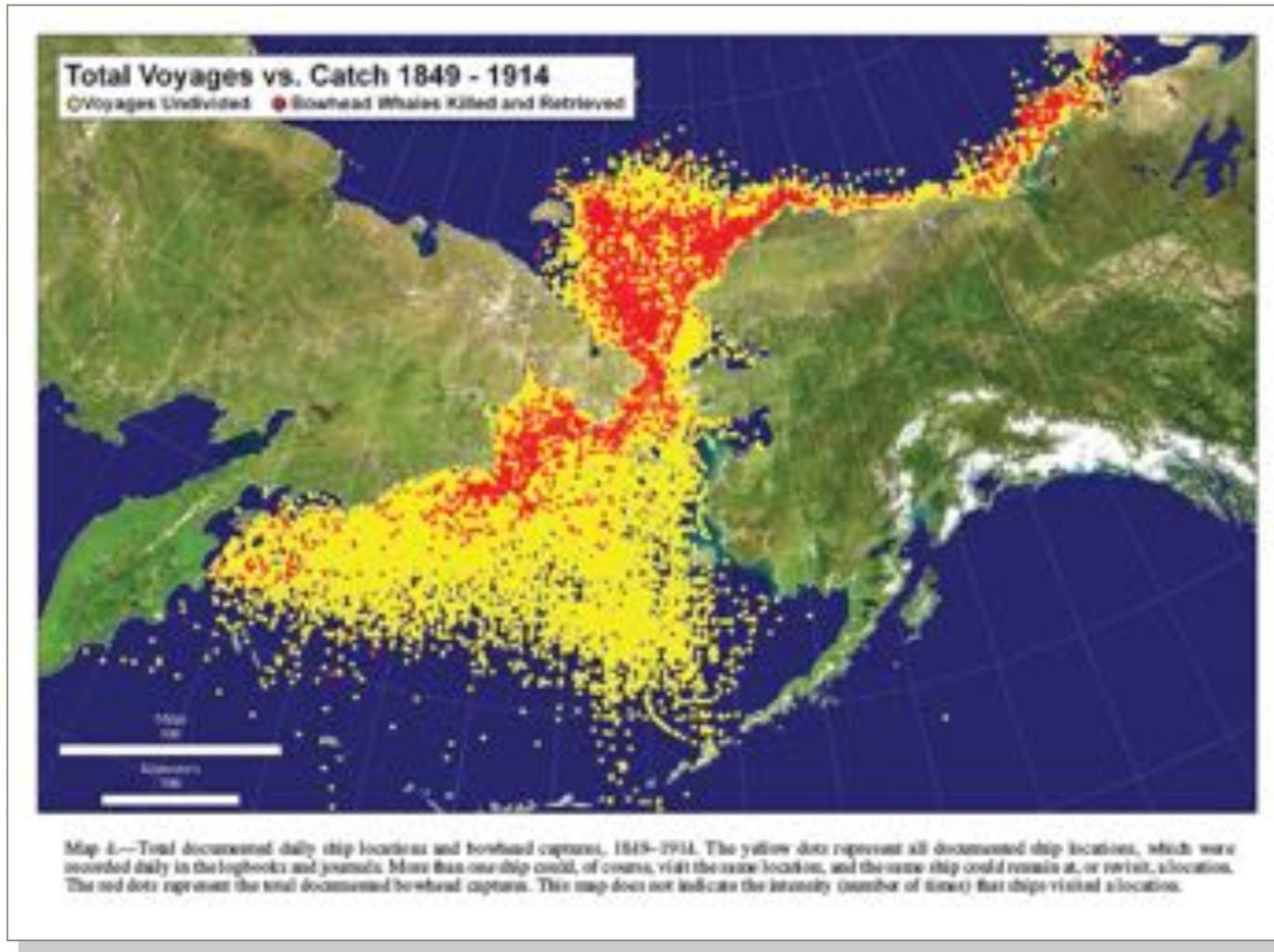


2 September 1891: Heavy ice closing in upon the shores and heavy as seen in every direction.

National Archives microfilm

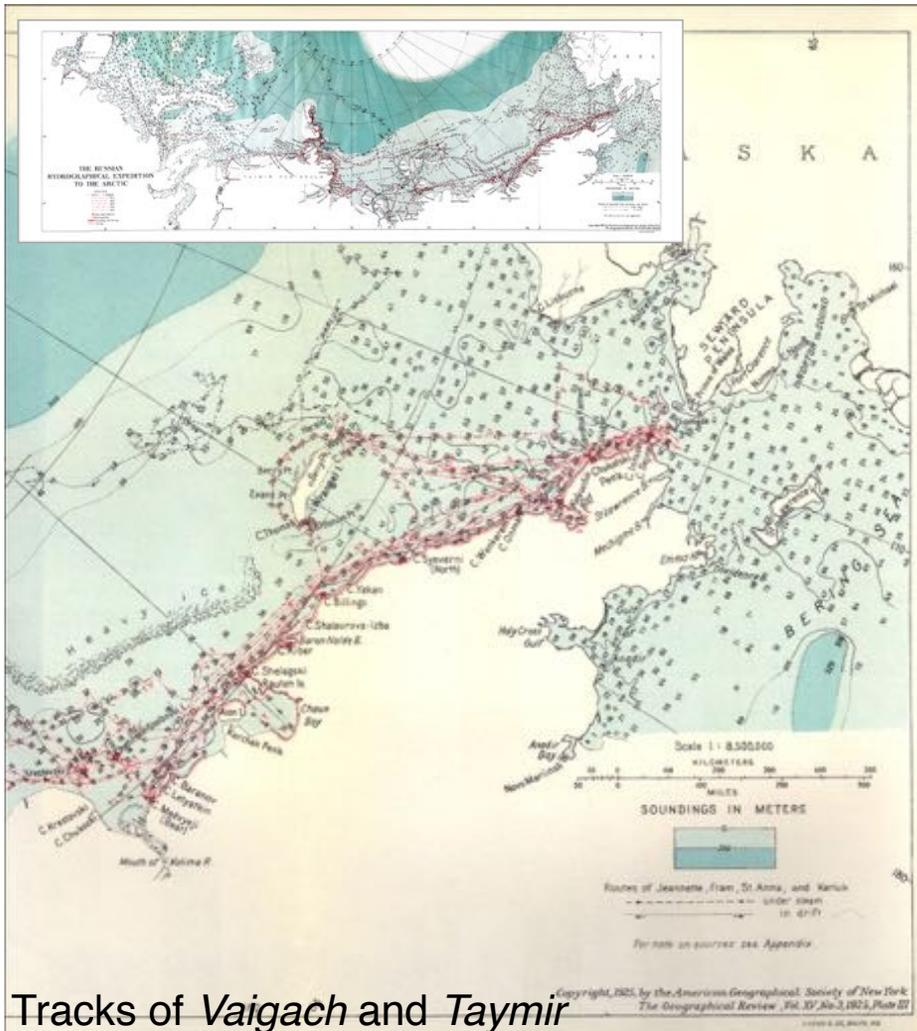
Refuge building became Brower's Restaurant and is still in existence.

Biogeography of bowhead whale fishery



Sea ice remarks also extracted from logs but not as yet published

Russian Hydrographical Expedition to the Arctic, 1910–1915



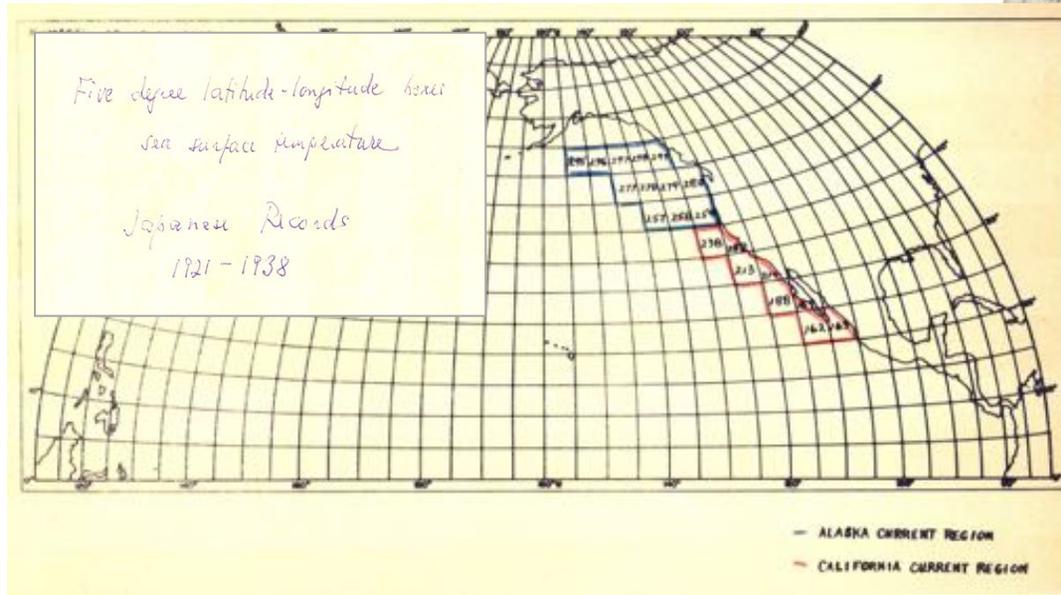
Vaigach near Wrangel Island, 1913



Taymir in winter quarters, 1914

Do data still exist?

Kobe SST records, 1921-1938



Gift of Dr. Gunnar Roden,
Research Prof. Emeritus
Univ. of Washington

SEA SURFACE TEMPERATURES (°C)

Five degree square 295; 50-55N, 150-155W

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1921	4.5												
22	4.8	3.9	3.9	4.1	5.0	7.4	8.3	12.9	12.8	8.2	6.0	5.1	6.8
23	4.7	3.2	4.2	5.2	7.1	10.3	12.2	11.4	9.6	7.2	5.8	7.1	7.4
24	6.1	6.1	3.7	4.5	6.2	7.4	10.3	12.9	12.0	8.5	6.7	4.4	6.6
25	3.4	3.5	3.2	3.1	5.6	7.4	10.6	12.7	10.9	8.2	6.7	4.4	6.6
26	3.1	1.3	2.0	3.4	5.6	7.4	10.6	12.7	10.9	8.2	6.7	4.4	6.6
	5.2	4.3	4.0	4.5	6.0	8.6	10.7	13.0	12.4	10.7	8.3	4.6	6.6
	5.1	4.5	2.6	3.8	6.0	8.6	10.7	13.0	12.4	10.7	8.3	4.6	6.6
	4.4	4.3	3.3	4.0	5.0	6.8	8.9	10.6	10.0	8.4	5.6	5.4	7.9
	4.8	4.6	3.2	4.0	4.8	6.9	9.2	10.5	10.2	8.5	5.6	4.8	6.4
	3.4	3.5	3.7	4.7	5.4	7.7	10.1	11.1	11.8	9.5	6.6	5.8	6.5
	4.2	2.6	3.7	3.3	4.7	7.4	9.3	11.6	11.8	8.6	6.2	4.0	6.8
	4.3	2.8	4.0	3.6	5.1	7.1	9.0	11.6	10.9	10.0	6.8	5.3	6.7
	4.2	3.5	3.5	3.6	5.1	7.1	9.0	11.6	10.9	10.0	6.8	5.3	6.7
	4.9	3.7	4.0	4.2	4.3	6.3	8.5	10.5	10.3	7.7	6.0	4.6	6.2
	4.0	3.8	4.7	5.2	7.3	9.6	12.0	12.3	9.2	6.2	5.1	6.8	7.1
	4.6	4.6	5.5	6.0	9.8	12.1	14.0	12.8	11.5	8.5	6.7	8.5	6.8
	4.3	3.8	5.0	5.3	7.4	8.9	11.1	11.6	10.6	6.8	4.4	7.1	6.2
	4.5	2.6	4.8	5.4	6.3	9.5	13.1	10.6	8.6	6.7	5.7	6.8	7.4
	3.9	3.5	4.2	5.3	7.3	9.7	12.1	11.6	9.3	6.9	5.2	7.0	6.8

Five degree square 296; 50-55N, 145-150W

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
33	3.4	3.8	4.6	5.6	8.1	10.0	13.3	12.8	8.4	7.3	4.9	7.1	7.6
34	4.3	3.8	5.2	5.4	8.2	11.0	12.9	11.4	9.8	7.5	6.3	7.7	7.7
35	4.2	5.4	6.7	8.2	11.4	13.5	12.1	8.6	7.6	5.3	7.3	7.3	7.3
	4.0	4.0	5.6	8.4	10.9	13.6	11.9	9.3	7.4	4.5	7.4	7.4	7.4
	4.1	3.5	4.6	6.5	7.4	9.4	12.3	13.0	11.4	7.6	6.2	7.4	7.4
	4.9	5.3	6.6	9.2	10.7	13.3	13.2	10.7	8.6	7.3	8.5	7.3	8.5
	4.3	4.8	5.8	7.6	10.9	11.9	10.8	8.9	5.9	5.7	7.4	7.4	7.4
	4.8	4.8	5.8	8.2	10.6	11.2	11.2	9.2	7.0	5.6	7.4	7.4	7.4
	4.4	4.8	5.8	8.2	10.6	11.2	11.2	9.2	7.0	5.6	7.4	7.4	7.4
	4.1	4.1	4.9	8.5	10.2	11.7	12.0	9.9	7.5	6.8	7.8	7.8	7.8
	4.3	4.2	5.6	8.1	9.8	11.9	12.1	9.7	7.0	5.1	7.5	7.5	7.5
	33	5.5	4.9	4.3	4.2	5.6	8.1	9.8	11.9	12.1	9.7	7.0	7.5
34	3.6	4.2	3.6	5.4	5.1	6.9	9.6	11.8	11.1	10.7	7.5	6.0	7.0
35	4.3	4.7	4.4	5.4	4.8	6.6	8.4	10.9	10.6	8.6	7.0	5.2	7.1
36	5.4	4.6	4.6	5.9	6.9	9.9	12.5	14.2	13.1	11.8	9.5	8.1	8.9
37	6.2	4.8	4.7	4.8	5.9	8.4	10.2	11.3	12.4	11.0	7.8	5.5	7.8
38	5.2	5.4	2.7	4.7	5.7	6.8	9.6	13.3	12.2	9.2	7.4	6.1	7.4
Mean	4.9	4.4	4.1	4.9	5.8	8.0	10.3	12.5	12.1	9.9	7.5	5.9	7.5

Concluding thoughts:

Sitka record is probably unique in the North Pacific – Arctic in terms of quality, length, and potential completeness

Navy and Revenue Cutter records seem to have good potential

Wealth of sea ice data still needs to be brought out

Contributions for:

RUSALCA (joint NOAA program with Russian Academy, RF Navy Hydrographic Office, and other partners)

Climate Data Modernization Program (CDMP) & Int'l Env. Data Rescue Program (IEDRO)

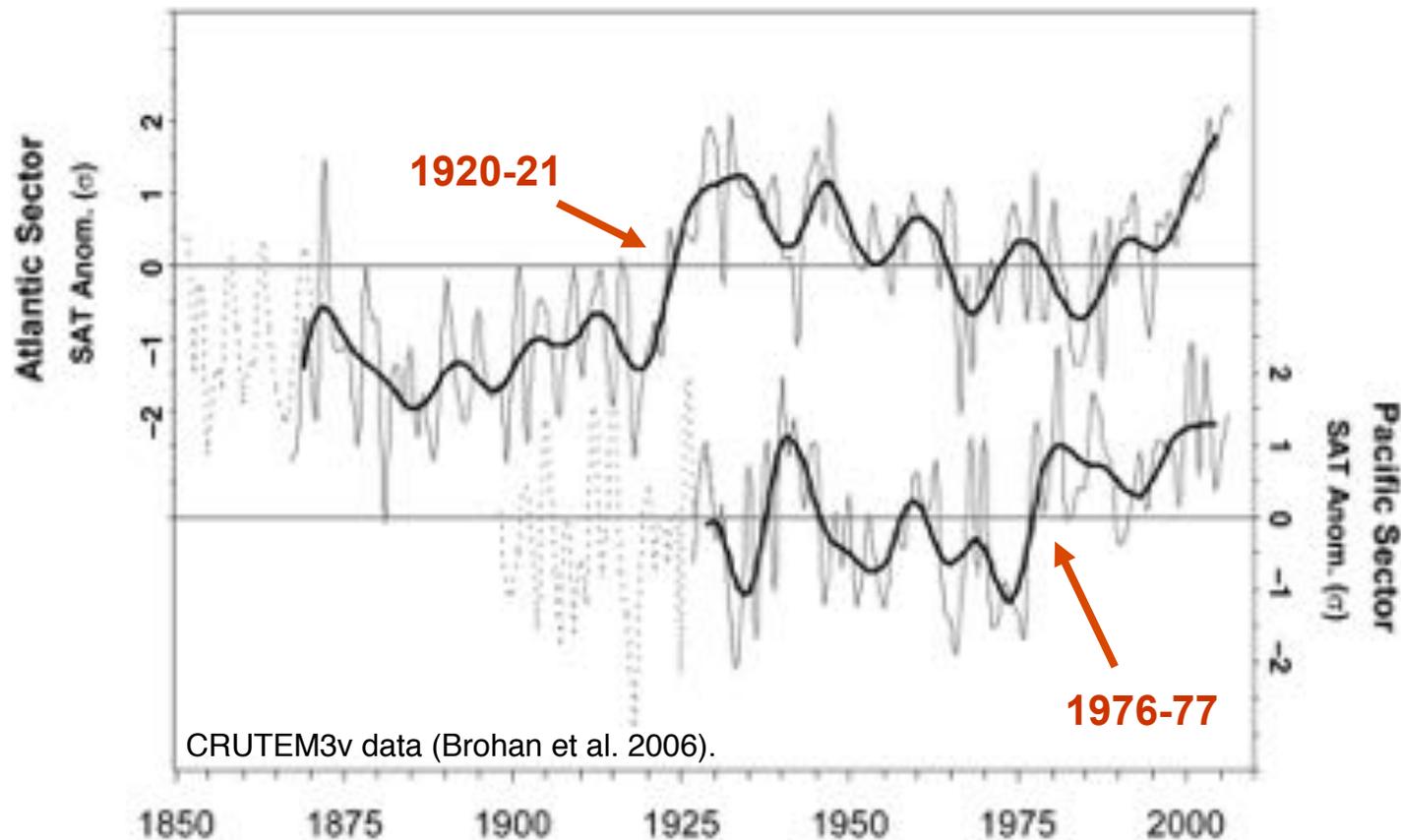
Extended reanalysis (ACRE, 20th CR, SiRCA)

Need to work on data/information management beforehand

Collaborators welcome

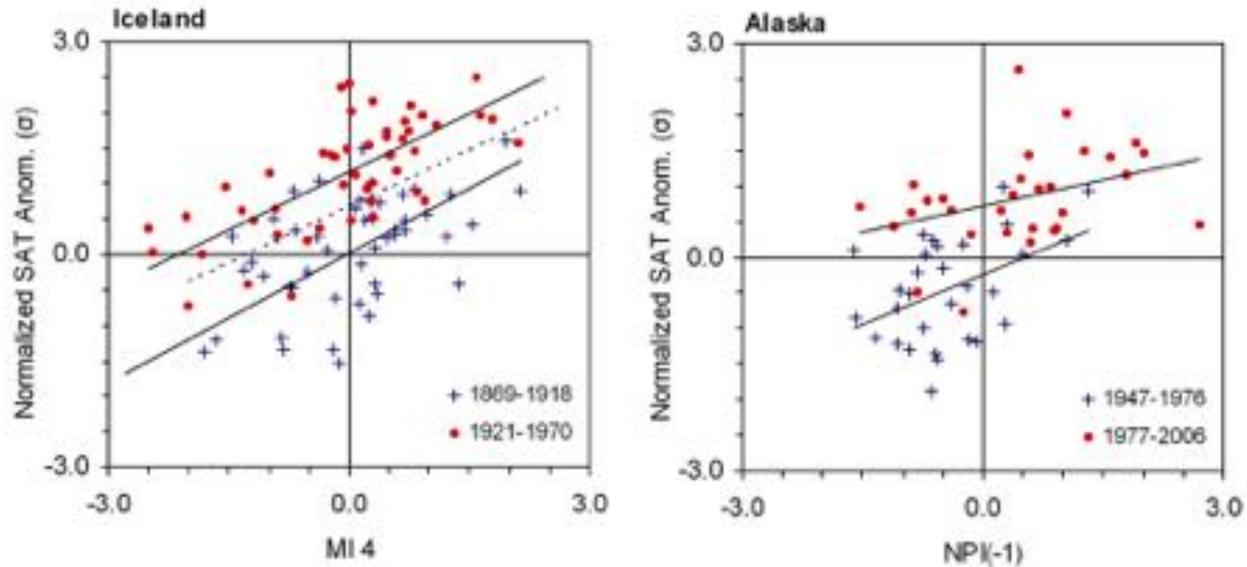
Supplemental Material

Regionally distinct SAT curves



Winter (DJFM) SAT anomalies from land-based stations north of 60° N in the Atlantic sector (90° W – 45° E) and Pacific sector (135° E – 90° W)

Systematic influence



The consistency of correlation coefficients as y-intercepts shift is an indicator of systematic forcing in the system.

F. Litke

