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

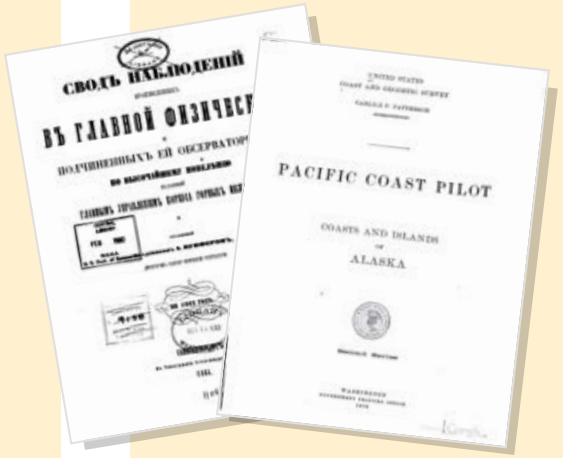
Para-meteorology (river ice...)

Descriptive & visual records

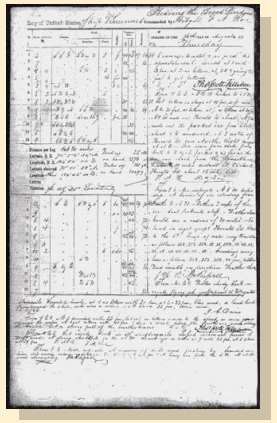
Biogeographic reports

Proxy data (ice cores...)

Sources



Publications & official reports



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

Photo / image collections

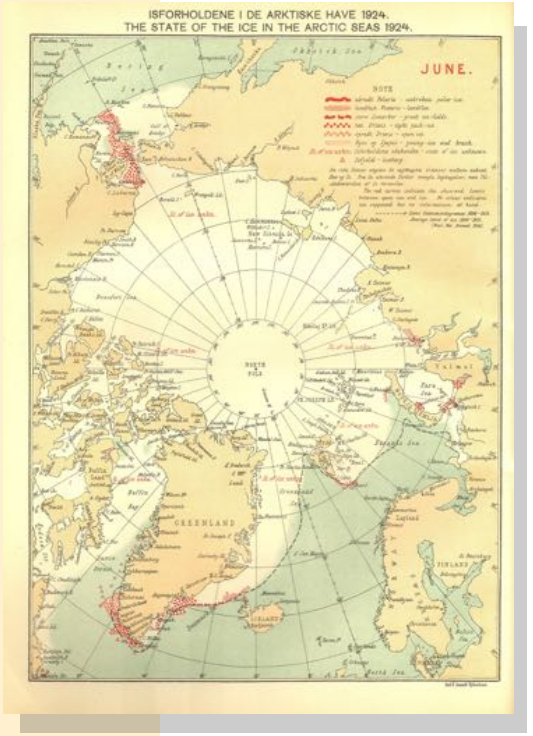
Products –

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

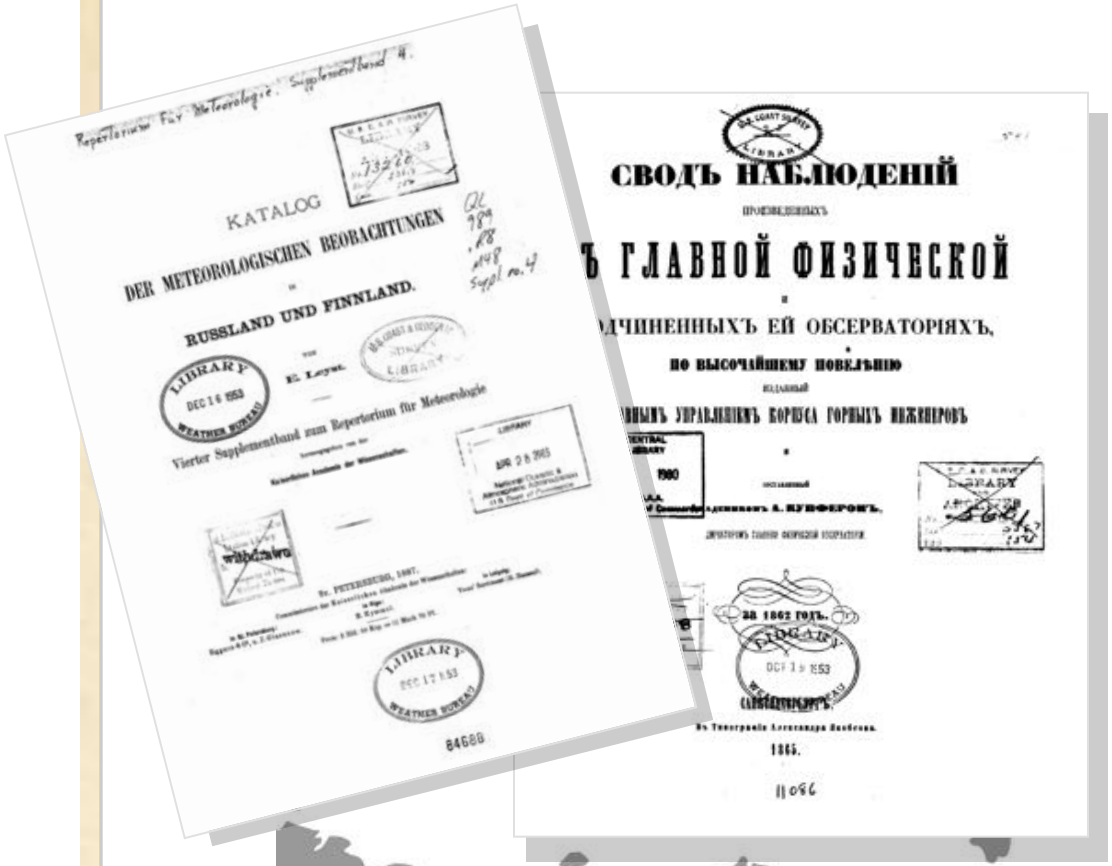
Evaluation & analysis



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

USRC *Thomas Corwin*, Nome, 1 June 1901

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

OBSERVATIONS MÉTÉOROLOGIQUES,

FAITES À SITKA, SUR LA CÔTE N.O. DE L'AMÉRIQUE. LATITUDE 57° 3' LONGITUDE 222° 37' À L'EST DE PARIS).

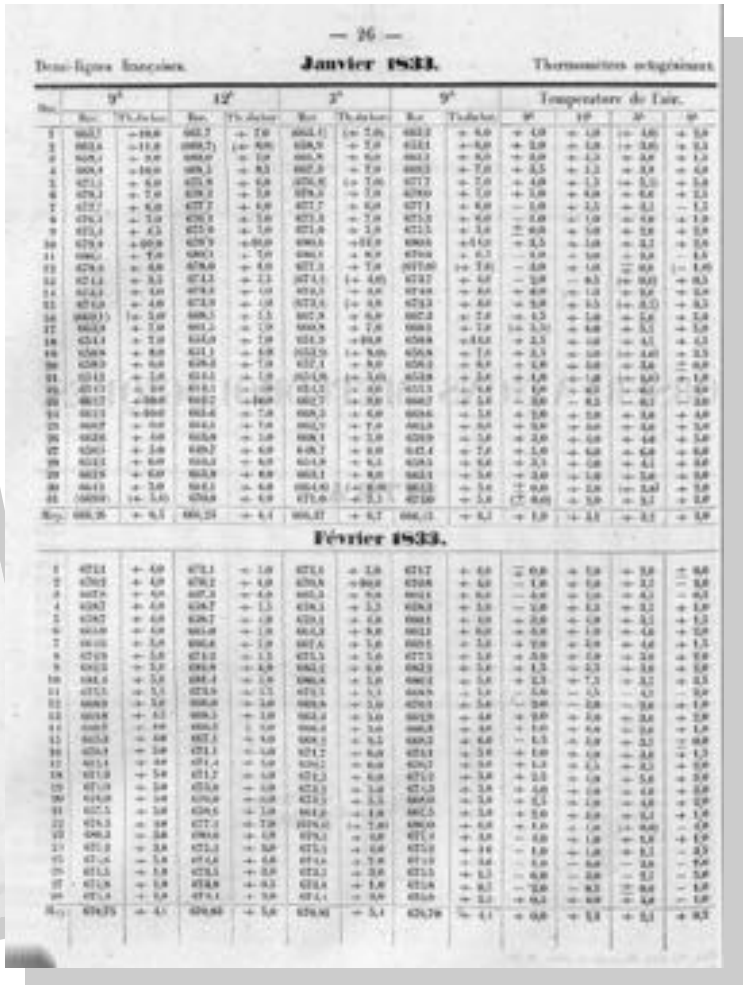
ET CALCULÉES

PAR

A. T. KUPFFER.

Lu le 12 Octobre 1846.)

L'Académie des Sciences, toujours prête à seconder son zèle pour conseils, mais souvent même de ses moyens pécuniaires, les investigations scientifiques, qui peuvent devenir utiles à la connaissance du vaste Empire de Russie, a profité depuis longtemps de l'esprit éclairé, avec lequel les officiers de nos Colonies sur la côte NO. de l'Amérique sont dirigés. Autrefois encore à la fondation d'un observatoire magnétique et météorologique à Sitka, preuve brillante de l'intérêt, que les sciences d'observation ont inspiré à la Direction de la Compagnie russo-américaine, l'Académie a mis à la disposition de M. de Wrangel, Gouverneur de ces Colonies de 1830 à 35, devenu si célèbre par son voyage dans le Nord de la Sibérie, quelques appareils météorologiques, pour entreprendre une série d'observations sur la pression barométrique et la température de l'air, et la direction des vents dans ces contrées, si peu connues encore. Ces observations, com-



— 26 —

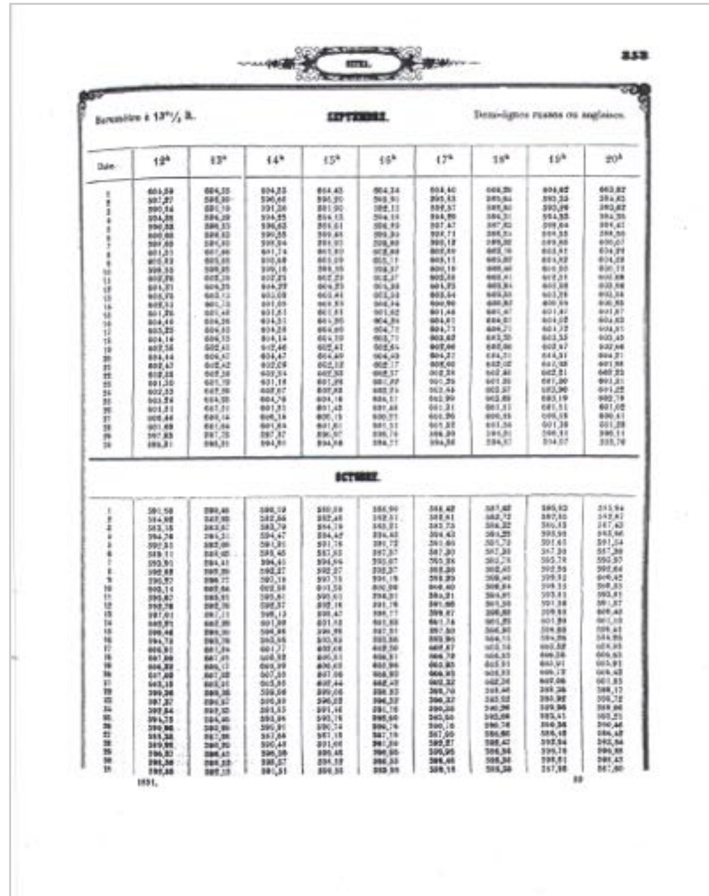
Deux-lignes françoises. **Janvier 1833.** Thermomètre octogésimal.

Température de l'air.

Février 1833.

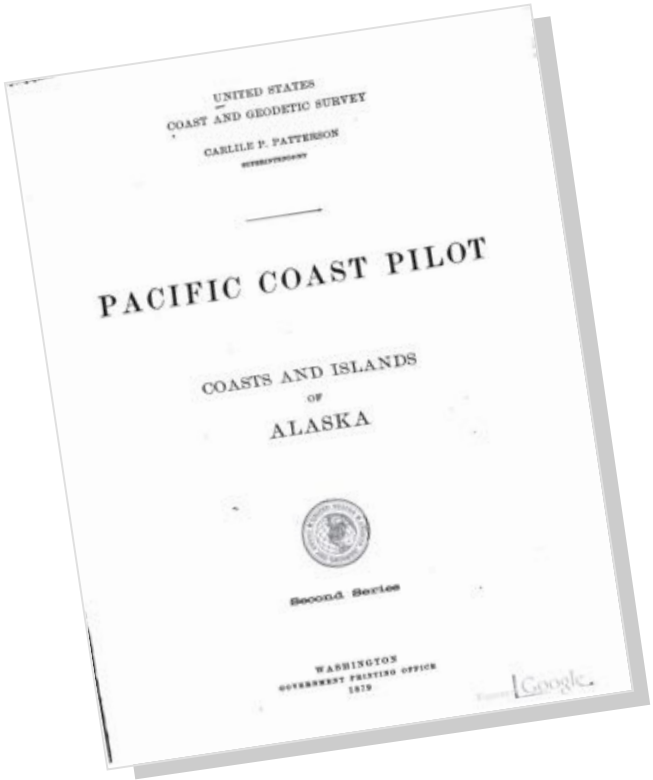
Document scanning courtesy of Alaska State Library Historical Collections

Sitka: PCO series, May 1847 – Oct. 1867



Available online from NOAA Central Library

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

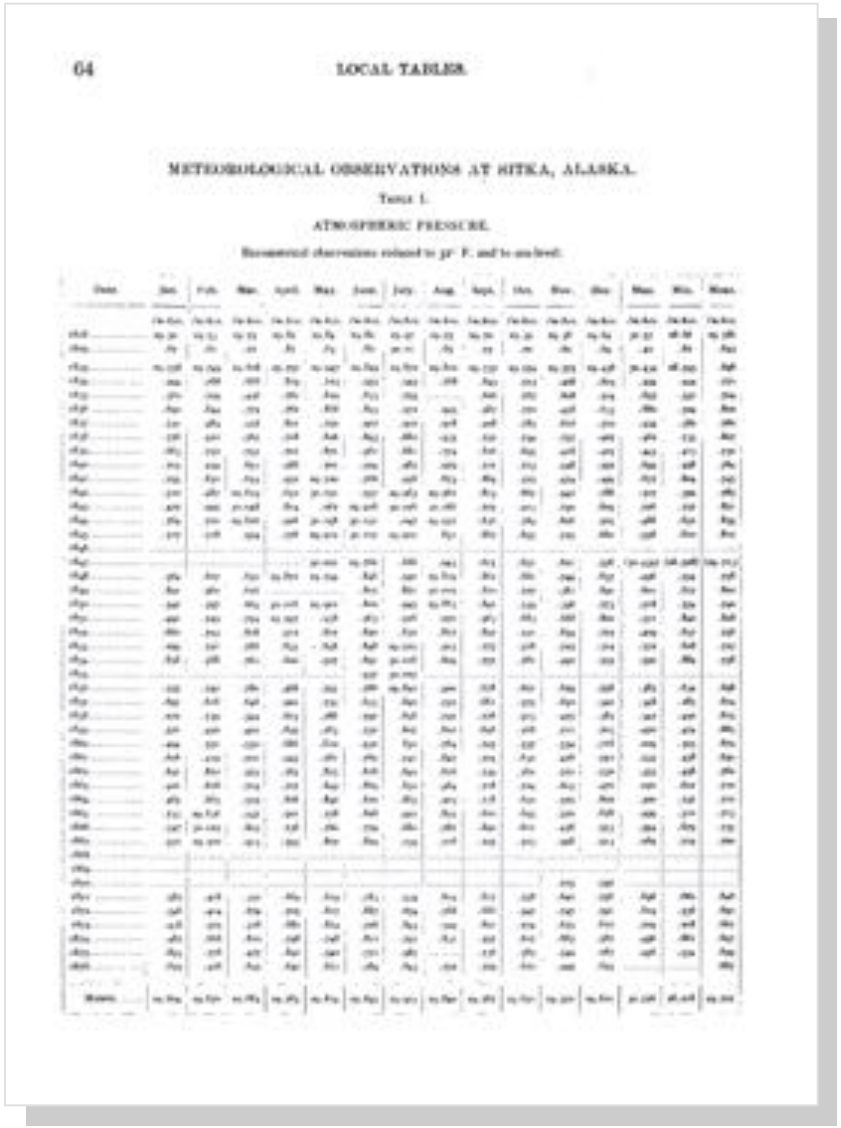

UNITED STATES
COAST AND GEODETIC SURVEY
CARLILE P. PATTERSON

PACIFIC COAST PILOT

COASTS AND ISLANDS
OF
ALASKA

Second Series

WASHINGTON
GOVERNMENT PRINTING OFFICE
1879


64 LOCAL TABLES.

METEOROLOGICAL OBSERVATIONS AT SITKA, ALASKA.

TABLE I.

ATMOSPHERIC PRESSURE.

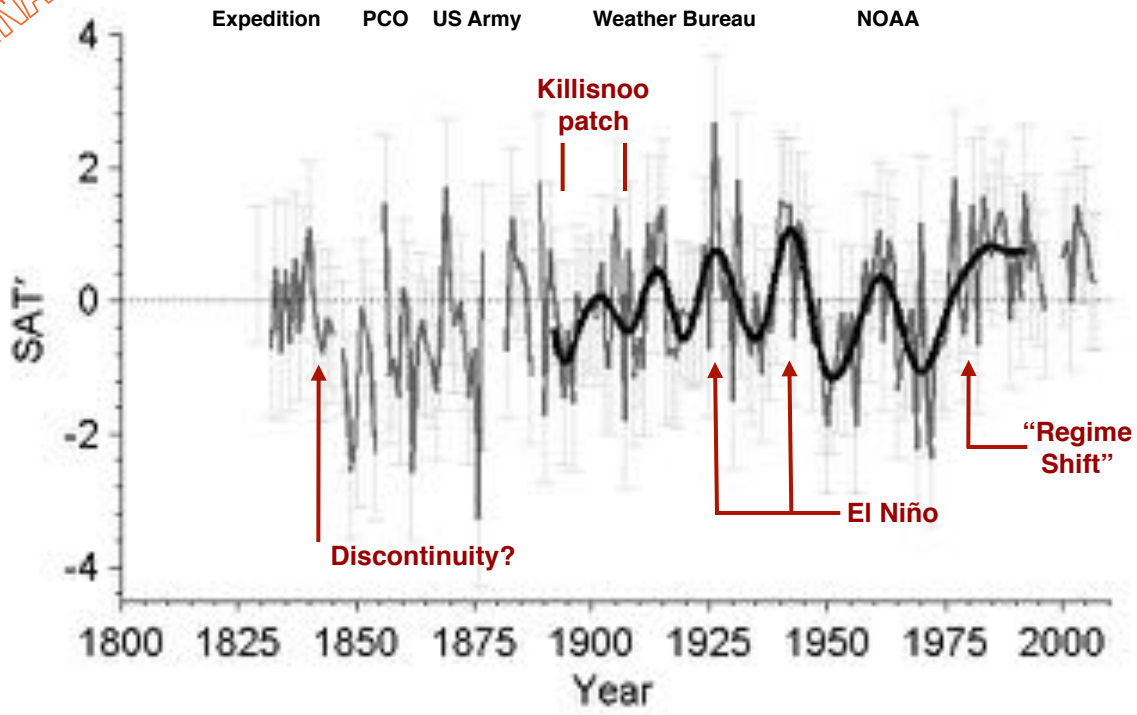
Excellent discussion of metadata

Indicates ultimate availability

Data once in Coast Survey archive

What a Sitka T' composite might look like

PRELIMINARY

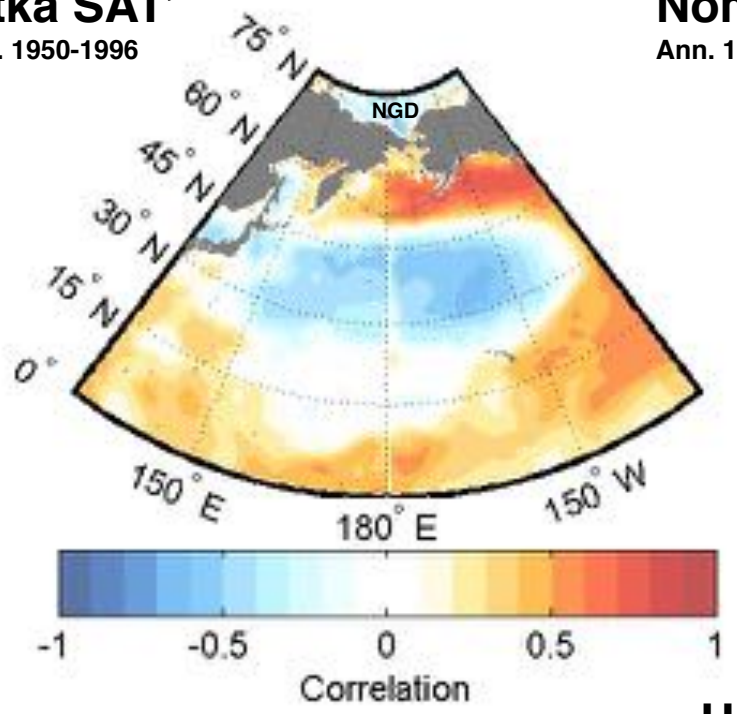


Sitka – Killisnoo SAT' composite (DJFM)

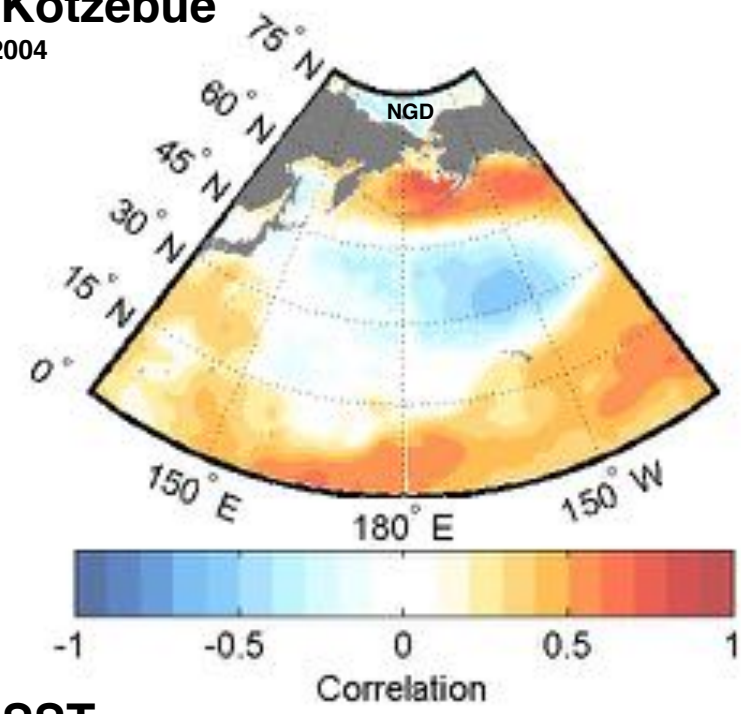
Raw data courtesy of Tom Royer

Correlation with SST anomaly (annual)

Sitka SAT'
Ann. 1950-1996

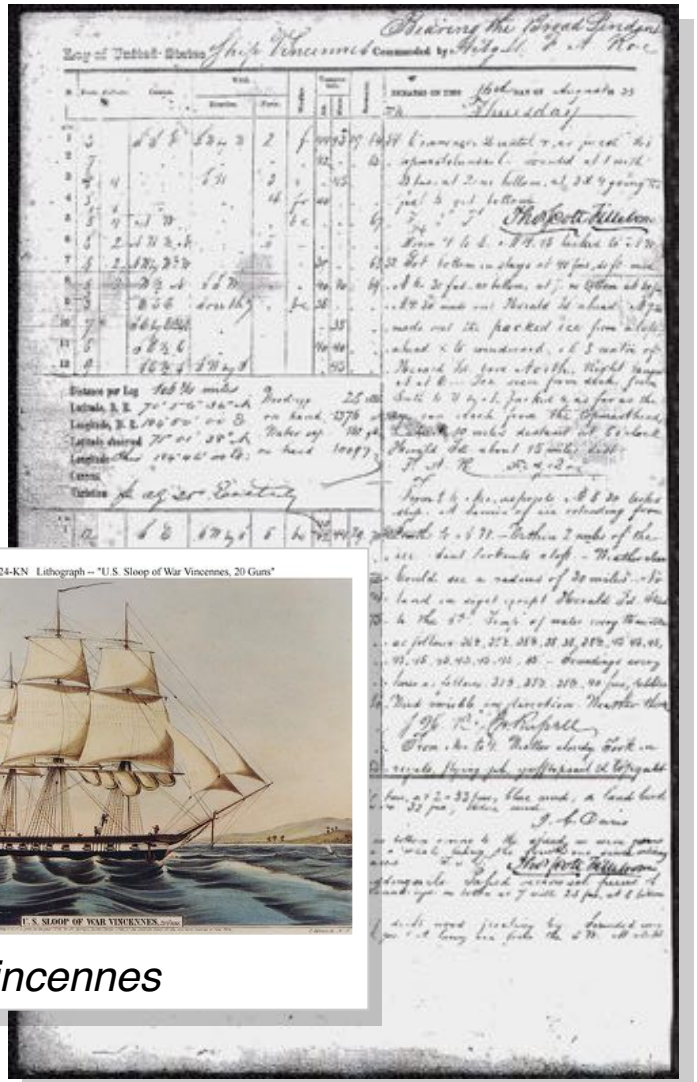


Nome/Kotzebue
Ann. 1950-2004



HadISST

Expeditions and other sources



USS *Vincennes*

US National Archives, microfilm M-88

US North Pacific XX

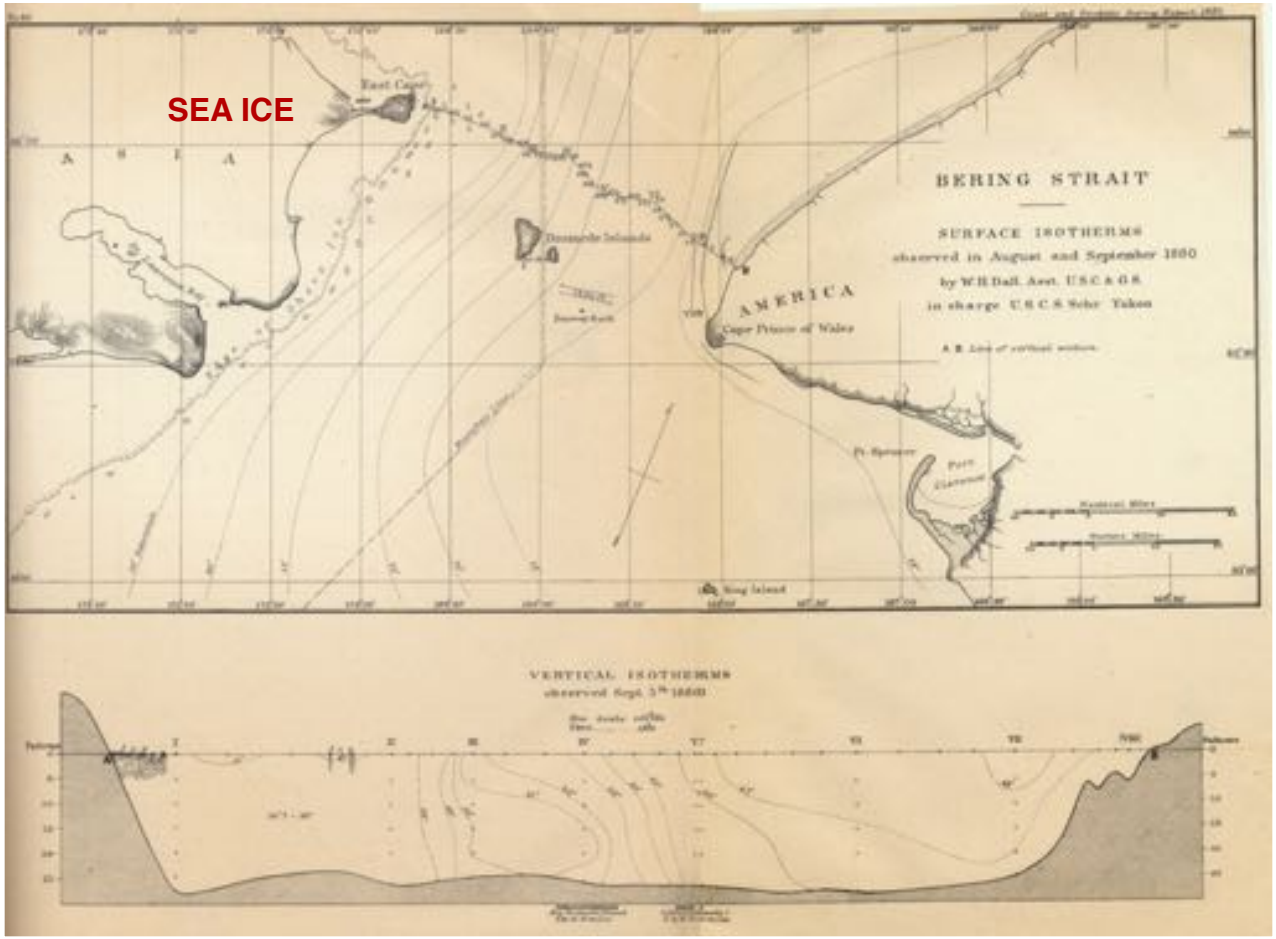
Log of the *Vincennes*, Aug. 16, 1855. North of Herald Island (71°N).

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*)

US Coast Survey

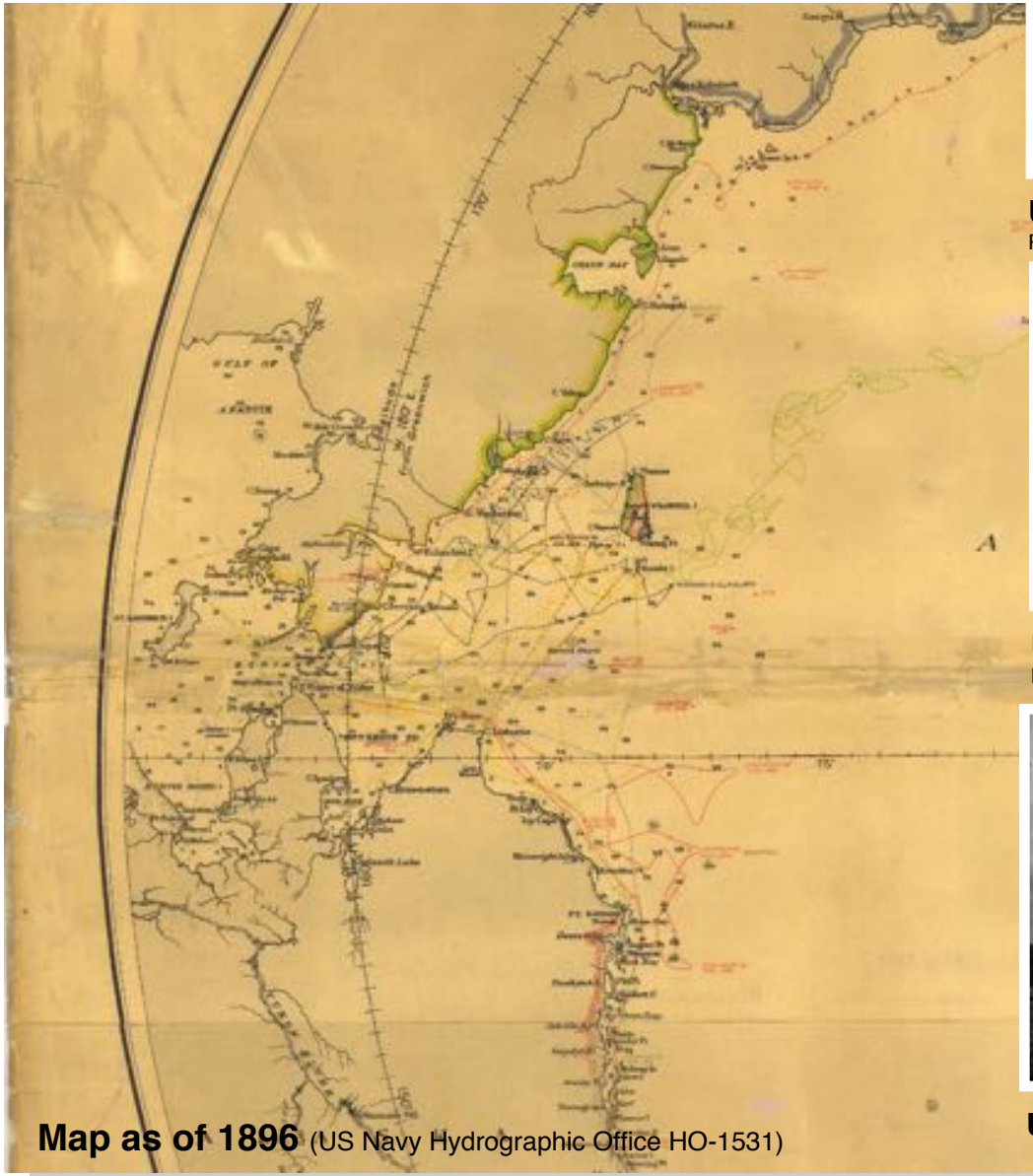


First Bering Strait transect by W. Dall Sept. 5, 1880

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



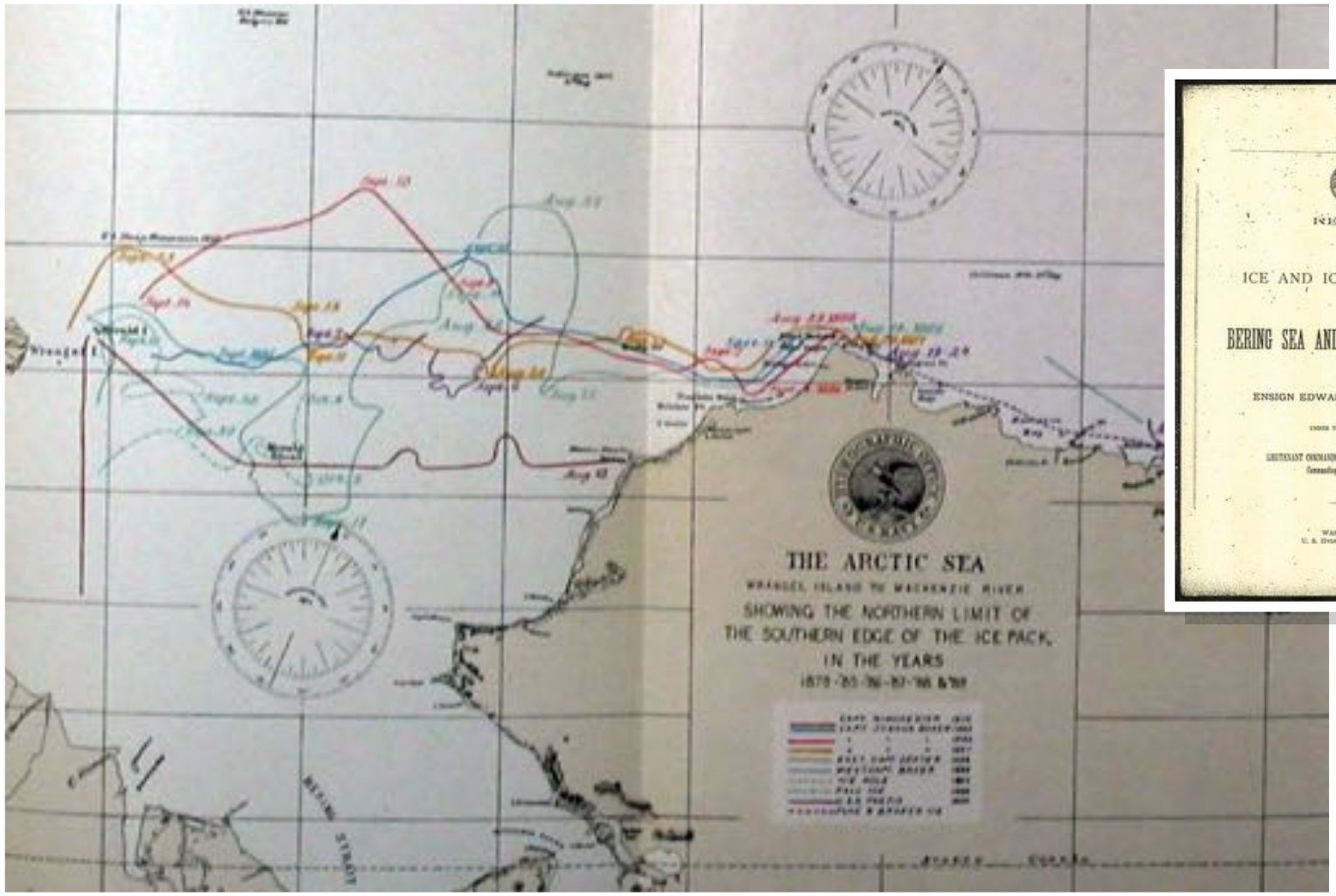
Map as of 1896 (US Navy Hydrographic Office HO-1531)

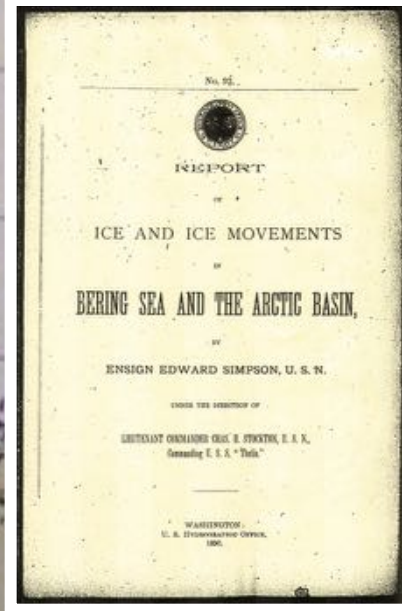
USRC *Thomas Corwin*
Photo: U. Alaska Anchorage Archive

USRC *Bear*
Photo: Nome Historical Museum

USS *Yorktown*

US Hydrographic Office Report, 1890

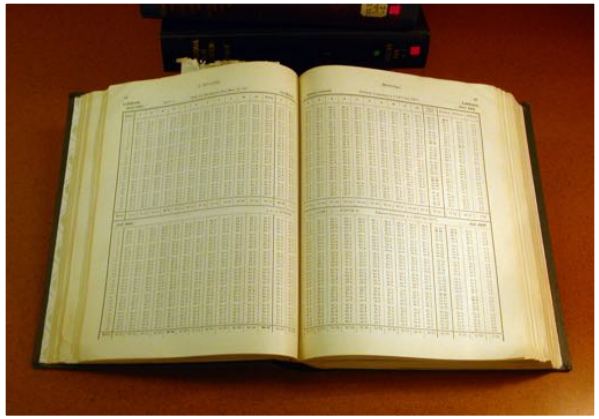



REPORT
ON
ICE AND ICE MOVEMENTS
IN
BERING SEA AND THE ARCTIC BASIN,
BY
ENSIGN EDWARD SIMPSON, U. S. N.

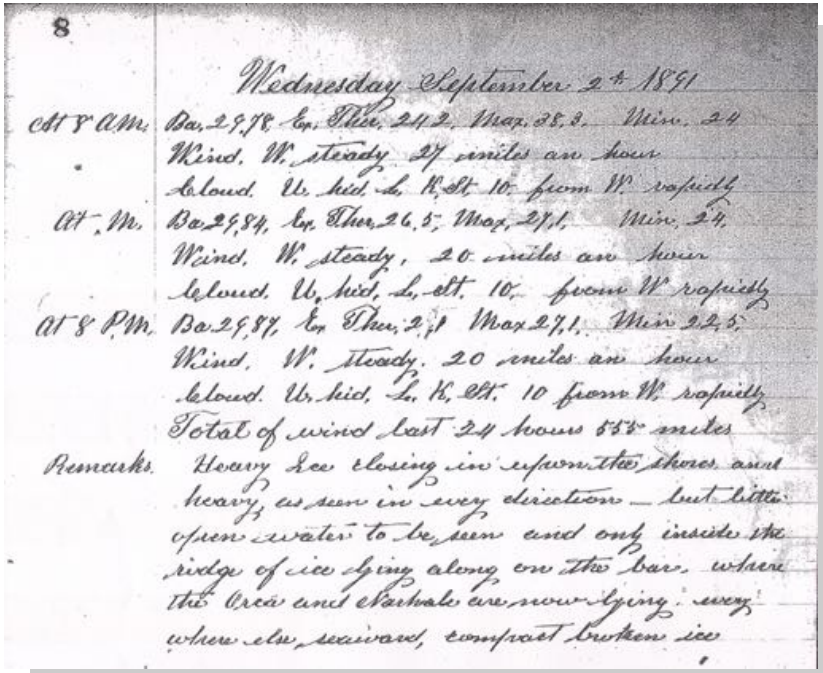
August-September ice edge
1879, 1885, 1886, 1887, 1888, 1889

1st IPY & GOVT 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



8

Wednesday September 2d 1891

At 8 AM. Ba. 29,78 Ex. Ther. 24.2. Max. 38.3. Min. 24
Wind. W. steady 27 miles an hour
Cloud. Ub. bid. L. K. St. 10. from W. rapidly

At M. Ba. 29,84, Ex. Ther. 26.5. Max. 27,1. Min. 24.
Wind. W. steady, 20 miles an hour
Cloud. Ub. bid. L. St. 10. from W rapidly

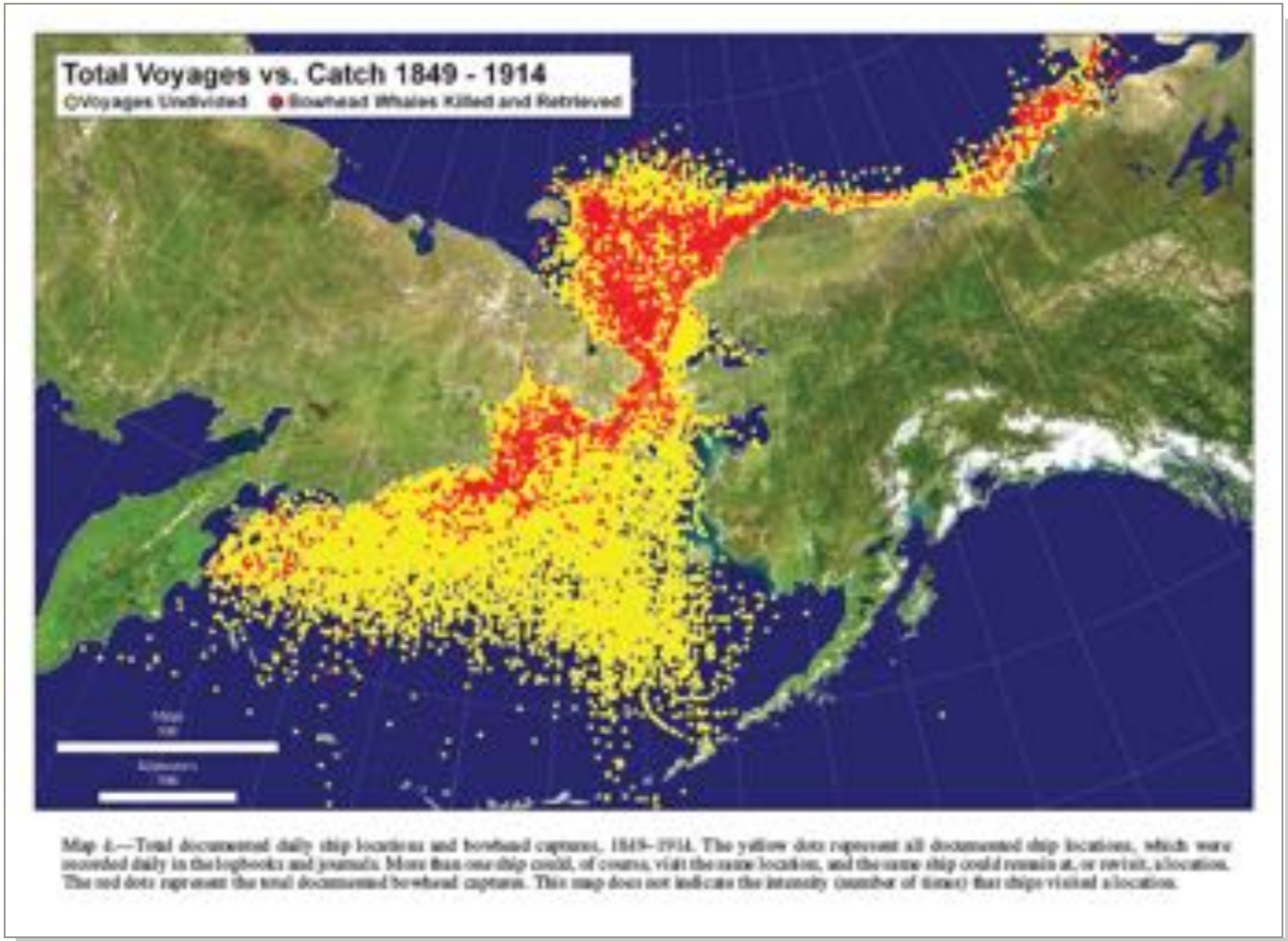
At 8 P.M. Ba. 29,87, Ex. Ther. 2,1 Max 27,1. Min 22.5.
Wind. W. steady. 20 miles an hour
Cloud. Ub. bid. L. K. St. 10 from W. rapidly
Total of wind last 24 hours 553 miles

Remarks. Heavy Ice closing in upon the shores and heavy, as seen in every direction — but little open water to be seen and only inside the ridge of ice lying along on the bar, where the Orca and Narhals are now lying: every where else seaward, compact broken ice

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

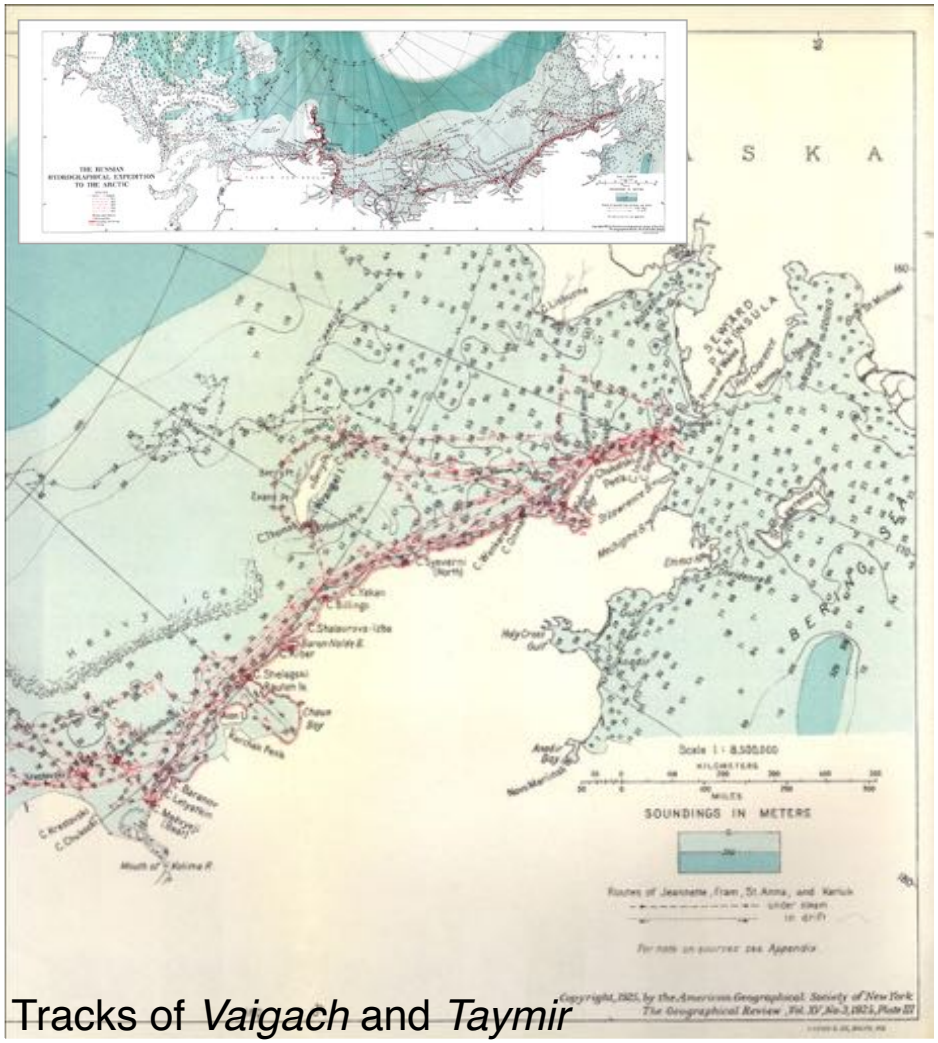


Map 4.—Total documented daily ship locations and bowhead captures, 1849–1914. The yellow dots represent all documented ship locations, which were recorded daily in the logbooks and journals. More than one ship could, of course, visit the same location, and the same ship could remain at, or revisit, a location. The red dots represent the total documented bowhead captures. This map does not indicate the intensity (number of times) that ships visited a location.

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

Bockstoce (2005) *Marine Fisheries Review*

Russian Hydrographical Expedition to the Arctic, 1910–1915



Tracks of *Vaigach* and *Taymir*

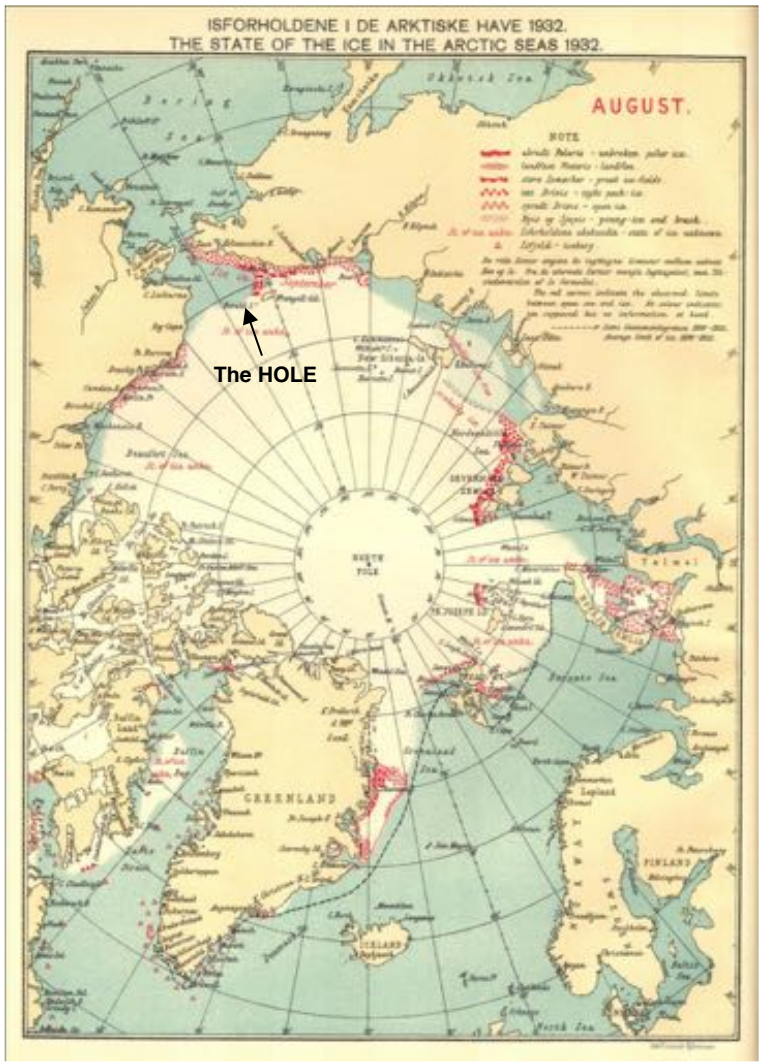
***Vaigach* near Wrangel Island, 1913**

***Taymir* in winter quarters, 1914**

Do data still exist?

Transehe (1925) *Geographical Review*

ГИЦРОПОГИЧЕСКИЕ НАБПЮДЕИЯ МОРСКИХ ЗКСПЕДИЦИЙ 2-ГО МРГ, 1932-33 Г.



Dansk Nautisk-Meteorologisk Aarbog (1901-1956)

Hydrological Observations of the 2nd IPY Sea Expeditions, 1932–33

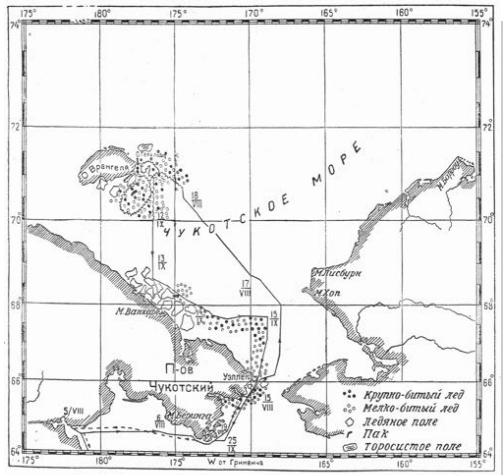


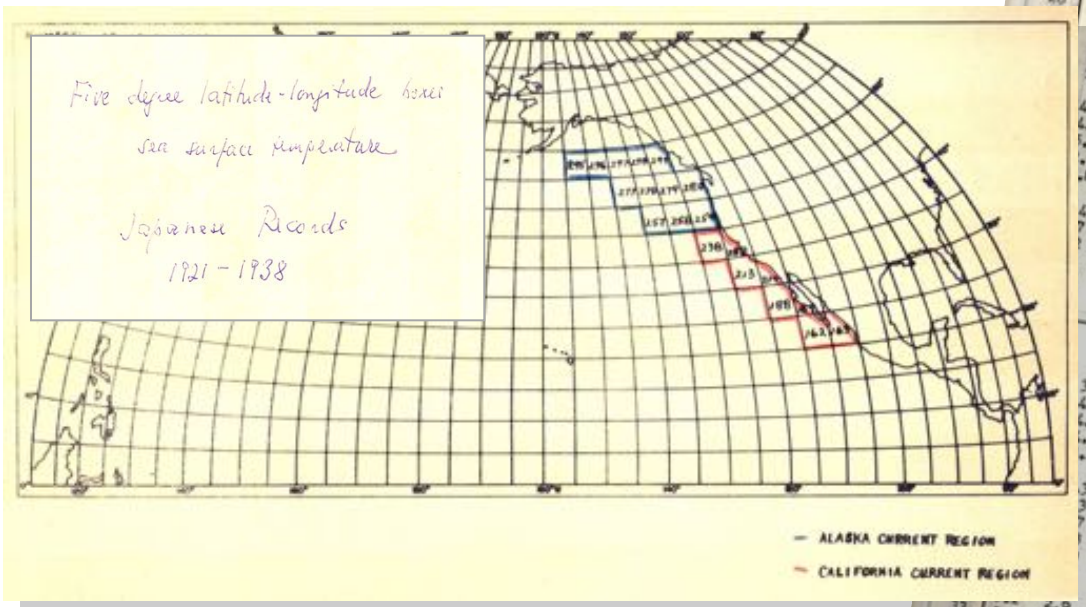
Рис. 9. Ледовая карта экспедиции АКО в 1932 г. на пароходе „Совет".
Составил В. В. Ахматов

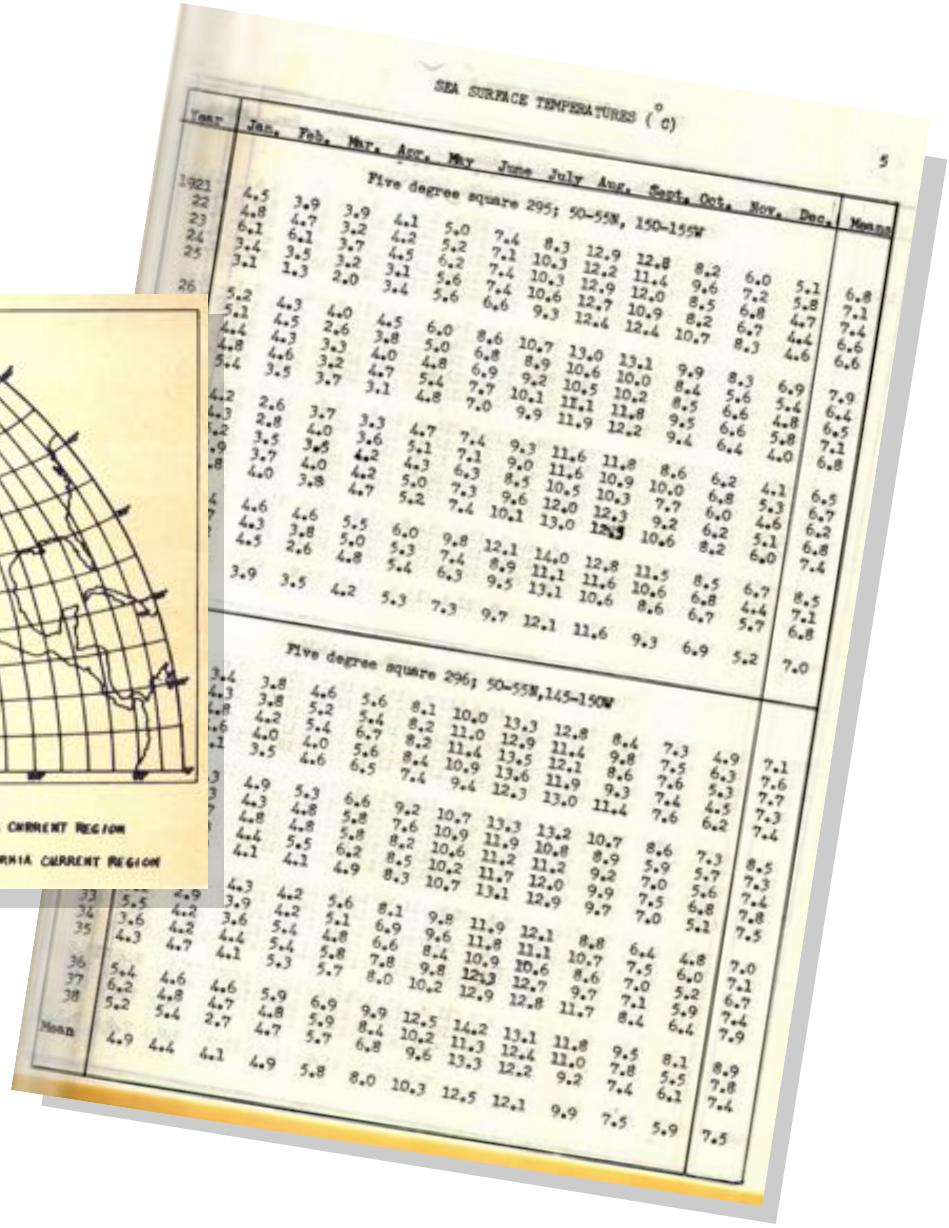
Ice map from the *Soviet*
Aug. 10 – Sep. 23, 1932

A. Sibiryakov under jury-rigged sails after loss of propeller shaft near North Cape

Multiple ships & stations

Kobe SST records, 1921–1938





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

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)

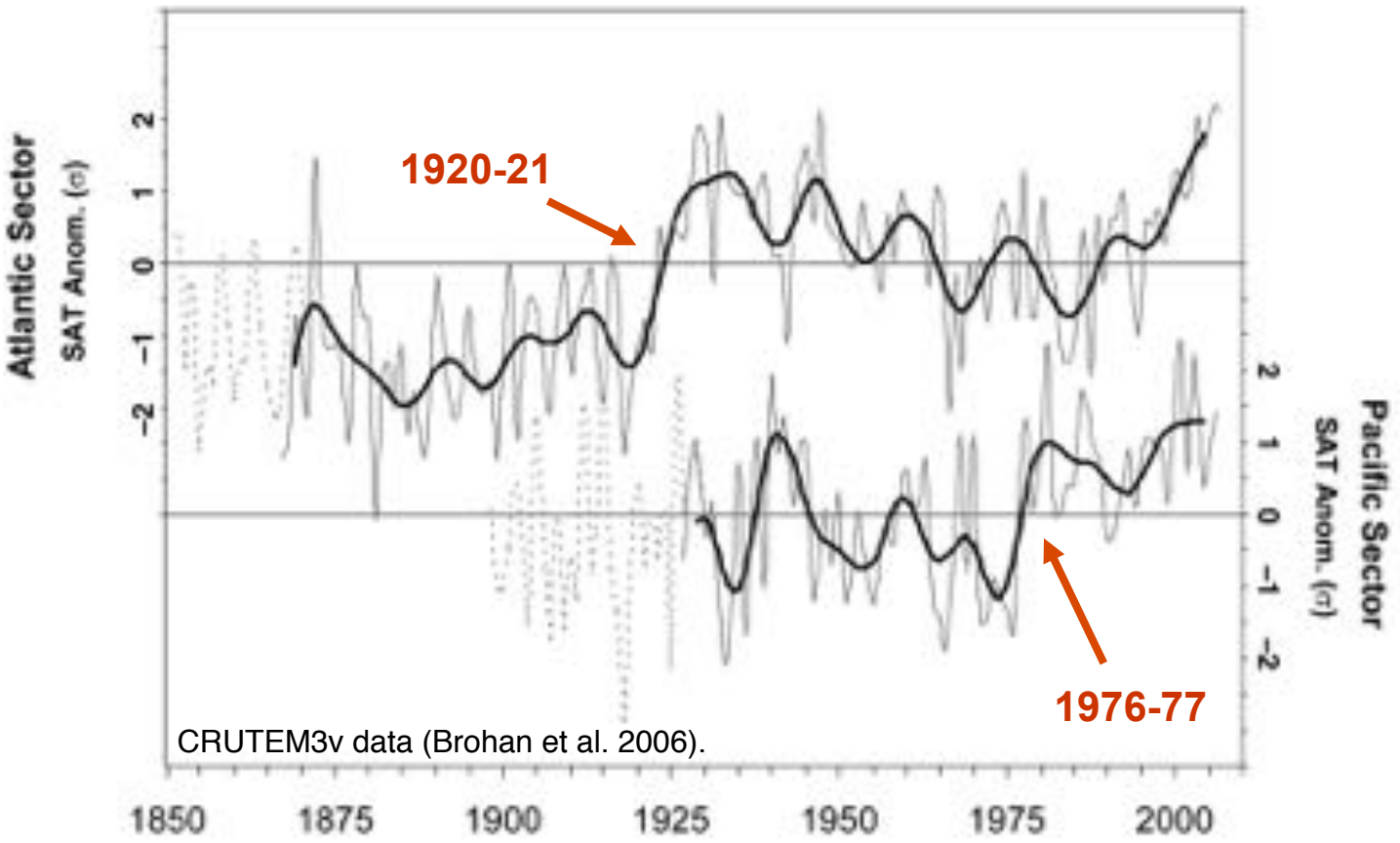
Extended reanalysis (ACRE, 20th CR, SiRCA)

Need to work on data/information management beforehand

Collaborators welcome

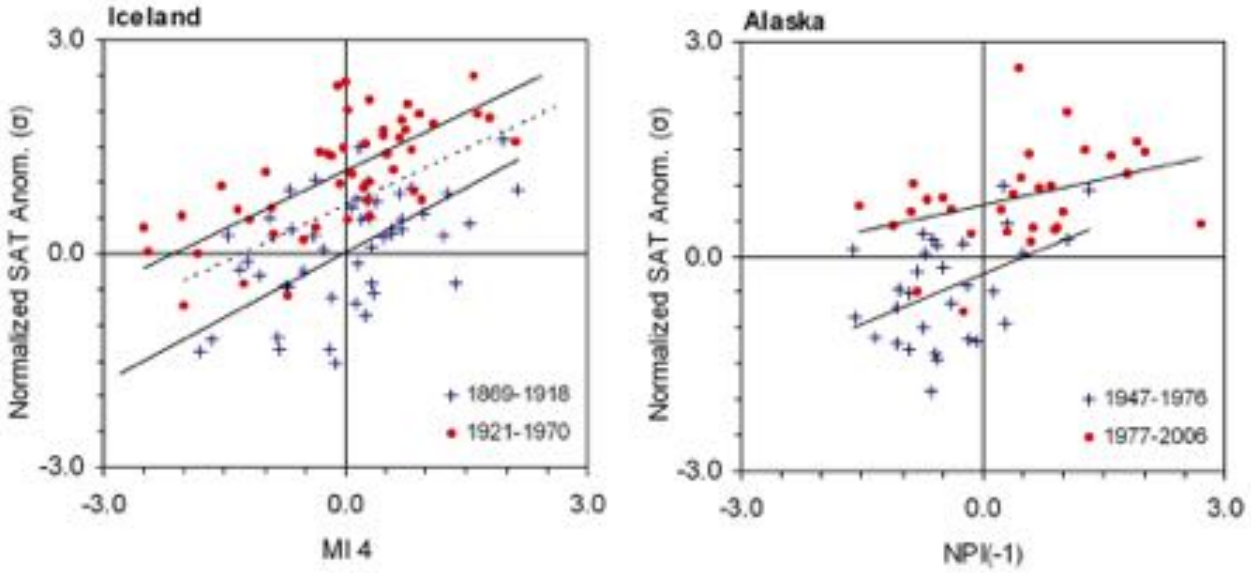
Supplemental Material

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