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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James E. Overland

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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, 1790s-1867

9 locations with met. records

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

Original records destroyed?

Records of the PCO

Sitka Observatory in 1865
Sitka: Kupffer series Jan. 1833 – Oct. 1842

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Document scanning courtesy of Alaska State Library Historical Collections
Sitka: PCO series, May 1847 – Oct. 1867

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Available online from NOAA Central Library
Sitka: U.S. Coast Survey - Army Signal Service, 1867–1877

Excellent discussion of metadata
Indicates ultimate availability
Data once in Coast Survey archive
What a Sitka T’ composite might look like

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

US North Pacific XX
Log of the *Vincennes*,

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*)
...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*
August-September ice edge
1879, 1885, 1886, 1887, 1888, 1889
1st IPY & GOVTV Refuge observations at Point Barrow, 1881–1883; 1891–1893–1896

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

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

All IPY-1 records have been digitized
Biogeography of bowhead whale fishery

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

Transehe (1925) Geographical Review

Do data still exist?
Hydrological Observations of the 2\textsuperscript{nd} IPY Sea Expeditions, 1932–33

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)

CRUTEM3v data (Brohan et al. 2006).
Systematic influence

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