Volunteers use historic US ship logbooks to uncover Arctic climate data

March 29 2013, by Hannah Hickey

The U.S.S. Bear, a predecessor of the Coast Guard that patrolled the Alaskan coast. Credit: Coast Guard Museum NW / Frye Collection

(Phys.org) —Citizen-scientists around the world are poring through digital versions of 19th century logbooks of mariners who sailed from Pacific Northwest and California ports to explore the Arctic and chart the newly acquired Alaskan territories.

Changes in the Arctic climate are bringing new interest in those historic explorers' observations. A volunteer effort launched last fall, headed by University of Washington climate scientist Kevin Wood with the support of the National Archives, enlists the help of citizen-scientists to examine digitized scans of the log entries and transcribe the information.

While the handwriting is too difficult for computers to decipher, human volunteers can extract the meaning from the decades-old pen strokes to add them to the climate record.

This month, for example, volunteers transcribing pages from their home computers completed the logbooks from the doomed U.S.S. Jeannette expedition, which left San Francisco in the summer of 1879 bound for the North Pole. The ship soon became trapped in thick ice and drifted for almost two years, during which time the 33-member crew maintained the boat, hunted seals and polar bears – and recorded hourly scientific observations.

The observations help to reveal past weather and climate.

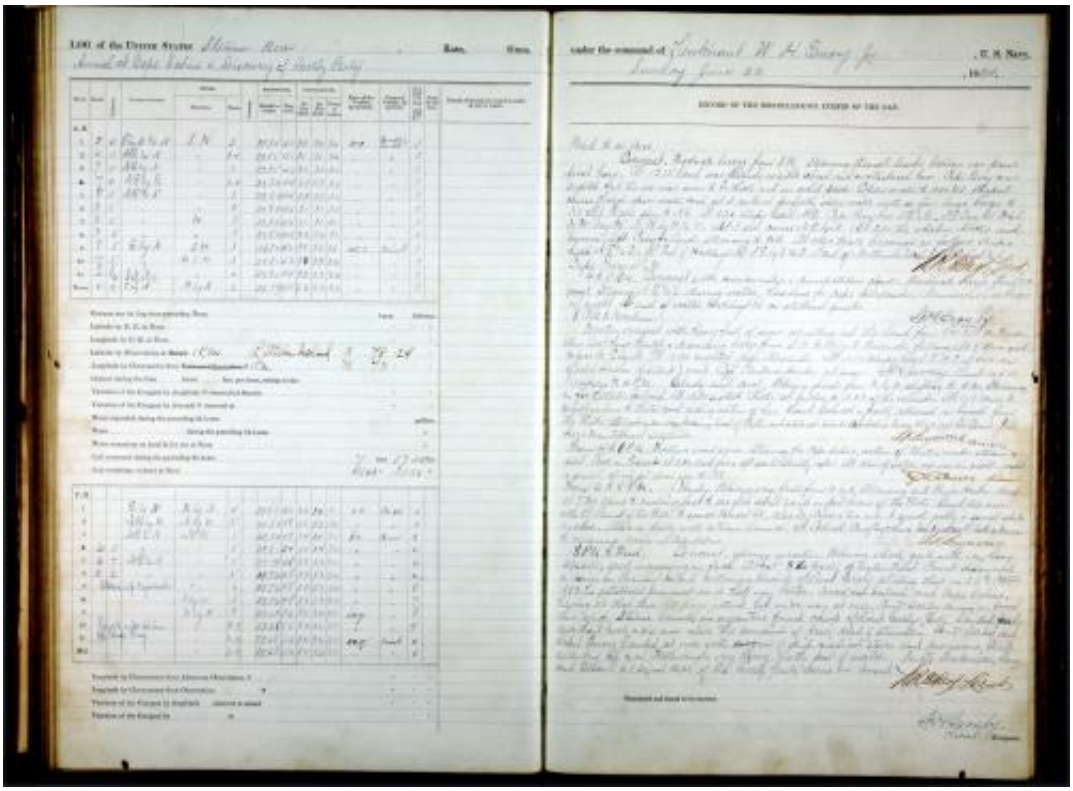
"When we see events like Superstorm Sandy, Hurricane Katrina and the recent melt in the Beaufort Sea, people want to know: Has this ever happened before? And that turns out to be a hard question to answer," Wood said.

Before arriving at the UW in 2004, Wood worked for 25 years as a merchant mariner, so he has firsthand knowledge of maritime weather observations. He also has a longtime interest in studying the Arctic as a climate scientist at the Joint Institute for the Study of the Atmosphere and Ocean, a research center that is a partnership between the UW and the National Oceanic and Atmospheric Administration.

In 2010, Wood attended a scientific meeting and met Philip Brohan, a

climate scientist at the U.K.'s national weather office who had just launched the Old Weather project to transcribe World War I-era Royal Navy logbooks. The two discussed extending it to the U.S. fleet.

Wood approached the National Archives, and an interagency collaboration to allow NOAA access to the logs was established in 2011. OldWeather – Arctic launched last October.



A June 22, 1884 logbook entry for the U.S.S. Bear. Credit: National Archives

Two interns now work at the U.S. National Archives in Washington, D.C., taking archival-quality digital images of each page. So far, the team has photographed more than 275,000 pages containing some 23 million new oceanic, atmospheric and sea-ice observations. The team is

ready to add more than 20 ships to the existing fleet of 16. Wood expects that all of the logbooks from 60-some Navy, Coast Guard and Coast Survey ships that traveled to the Arctic before 1950 will be scanned by the end of this year.

Transcriptions are under way thanks to more than 16,000 active Old Weather volunteers, mainly science and history buffs from the U.S., the U.K. and other countries. Volunteers first create an account with Zooniverse, a site that hosts citizen-science projects, and then select Old Weather. A tutorial explains where to find the weather and other information and how to enter it into the database. Volunteers begin as cadets, and then move up through the ranks to lieutenant and captain as they complete transcriptions.

The site's community forums are active, Wood said. When volunteers discover an unusual incident – say, somebody trying to jump ship through a porthole – they head to the forum to compare notes to find out where that person eventually ended up.

"A lot of people are motivated by being able to see the history unfolding in real time," Wood said.

And there are other surprises – the interns recently discovered pressed flowers collected on Whidbey Island, Wash., wedged between the pages of an 1891 entry.

Wood and Brohan will analyze the weather observations in completed transcriptions, focusing on the period between 1854 and 1950.

The climate data comes when it's badly needed, and when it can be particularly useful to scientists. Just five years ago, Wood said, researchers relied on gridded weather observations, so a few new data points gleaned from ship records would be nice, but only a drop in the

bucket. Now, sophisticated computer programs can use observations to reconstruct the whole Earth's atmosphere, and even sparse data points can recreate the weather for an entire region.

Wood is also collaborating with polar scientists at the UW's Applied Physics Laboratory to add historic sea-ice observations that will help to extend their Arctic sea ice model back into the late 19th and early 20th centuries. Wood notes that the U.S.S. Jeannette became encased in 20-foot-thick sea ice in water that is now ice-free in summer.

"I think these logbooks may change people's perspective on just how dramatic the current melt back is," he said.

As with other citizen-science projects, volunteers will be credited on publications. The data is also being added to the International Comprehensive Ocean-Atmosphere Data Set, for use by scientists worldwide.

The crowdsourced transcriptions are the biggest component of the Arctic Rediscovery Project, a broader investigation led by Wood into historic records of Arctic sea ice and climate.

Related projects include:

- A UW Information School Master's student who last summer created a digital gallery of photos from Seattle's Coast Guard Museum Northwest.
- New York high school students looking to see whether housings used around thermometers in the past could have skewed the temperature measurements (so far, luckily, it looks like they don't).
- An upcoming project that will hire students to turn sea-ice

descriptions transcribed by Old Weather volunteers into data points.

Ships that spent time in the Arctic represent less than one-third of the National Archives' collection of more than a quarter-million logbooks, which Wood hopes will someday be fully transcribed. A recent collaboration with the New Bedford Whaling Museum will add whaling logbooks to the Old Weather project.

"I think the U.S. has the largest reservoir of marine meteorological data in the world," Wood said. "This is an opportunity for people to contribute, in a meaningful way, to understanding the global climate."

More information: Wood's blog post, "Roaring, buzzing, wheezing and shrieking," includes 19th century sailors' descriptions of sea-ice sounds. An accompanying video adds actual sea-ice noises recorded by UW polar scientist Kate Stafford.

Provided by University of Washington

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