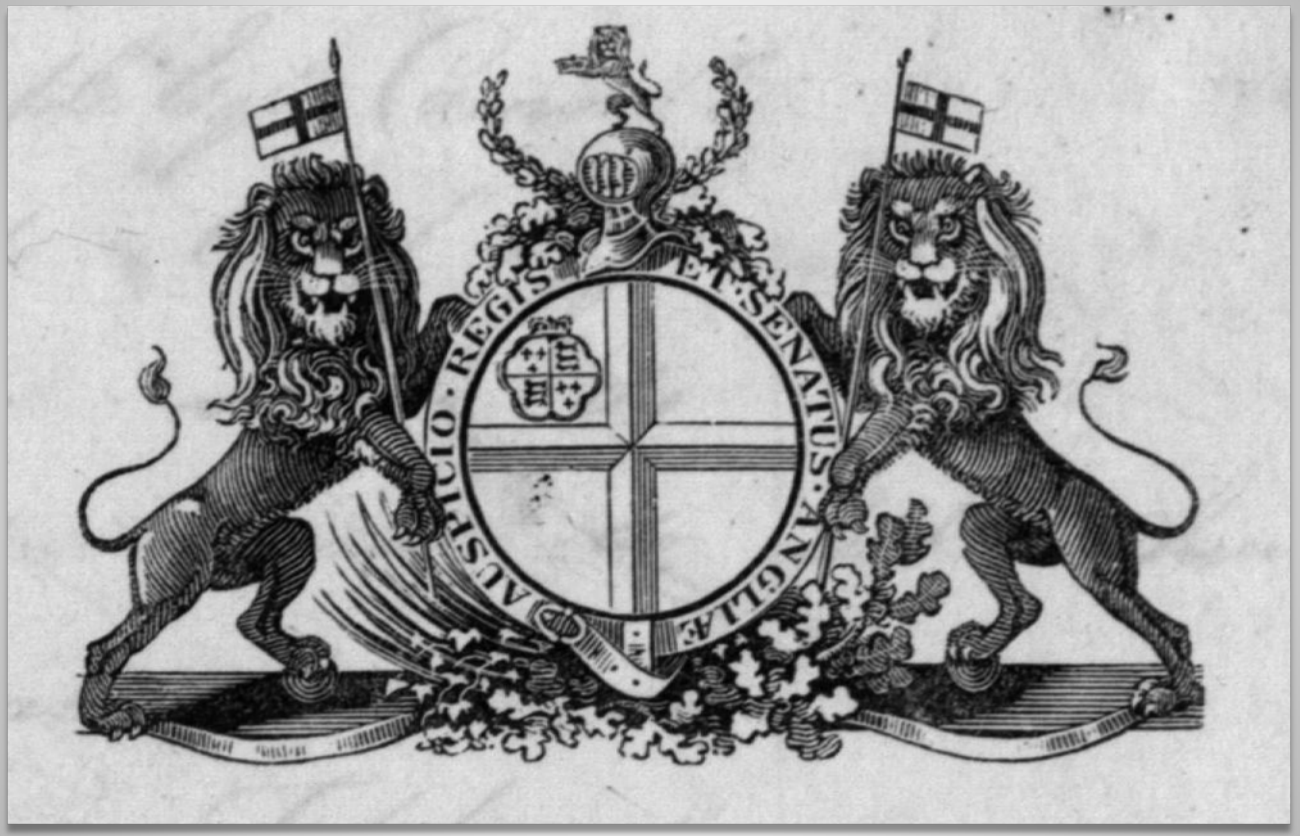
English East India Company Logbooks – Significant Contributions to History and Science



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Tom Ross
Philip Brohan
Clive Wilkinson

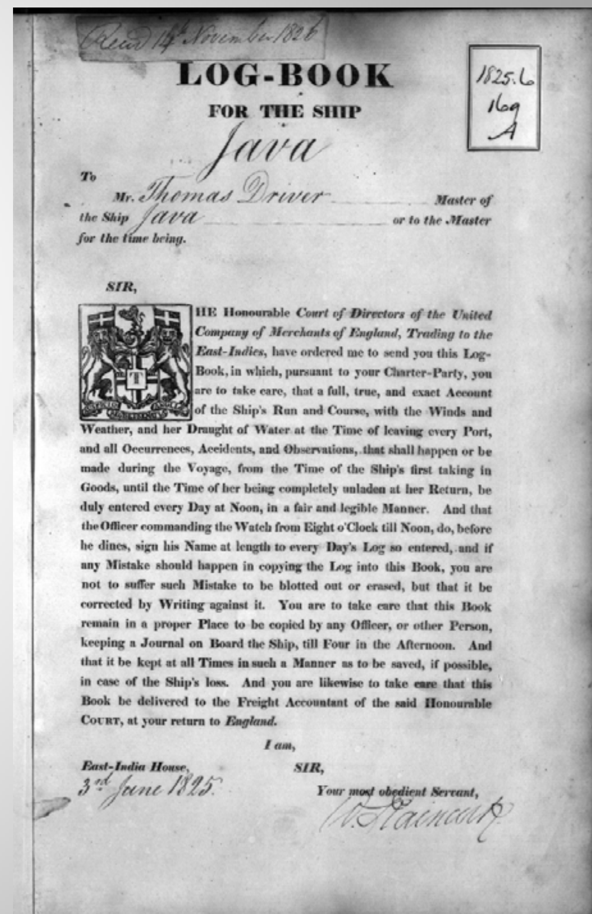
Outline

- Project Introduction
- Observation Distribution and Preliminary Analysis Results
- Sympiesometer
- Tropical Cyclones
- Historical Events and Interesting Voyages
- Data Availability
- Life on board an EEIC Ship

The Indiaman ‘Thomas Coutts’ by James Miller Huggins, c1836; National Maritime Museum, Greenwich, London

Project Introduction

- Multi-group effort to catalog, image and digitize
- Goals:
  - Preserve EEIC logs
  - Capture early daily instrumental surface weather observations from the late 18th & early 19th centuries
- Original Logbooks held at the British Library (BL)
- POR 1789-1834
- 1235 logbooks imaged
- 893 logbooks with instrumental data digitized
- 273,000+ daily observations



Rec'd 14th November 1826

1825.6
169
A

LOG-BOOK

FOR THE SHIP

Java

To

Mr. Thomas Driver Master of the Ship Java or to the Master *for the time being.*

SIR,

THE Honourable *Court of Directors of the United Company of Merchants of England, Trading to the East-Indies*, have ordered me to send you this Log-Book, in which, pursuant to your Charter-Party, you are to take care, that a full, true, and exact Account of the Ship's Run and Course, with the Winds and Weather, and her Draught of Water at the Time of leaving every Port, and all Occurrences, Accidents, and Observations, that shall happen or be made during the Voyage, from the Time of the Ship's first taking in Goods, until the Time of her being completely unladen at her Return, be duly entered every Day at Noon, in a fair and legible Manner. And that the Officer commanding the Watch from Eight o'Clock till Noon, do, before he dines, sign his Name at length to every Day's Log so entered, and if any Mistake should happen in copying the Log into this Book, you are not to suffer such Mistake to be blotted out or erased, but that it be corrected by Writing against it. You are to take care that this Book remain in a proper Place to be copied by any Officer, or other Person, keeping a Journal on Board the Ship, till Four in the Afternoon. And that it be kept at all Times in such a Manner as to be saved, if possible, in case of the Ship's loss. And you are likewise to take care that this Book be delivered to the Freight Accountant of the said Honourable COURT, at your return to *England.*

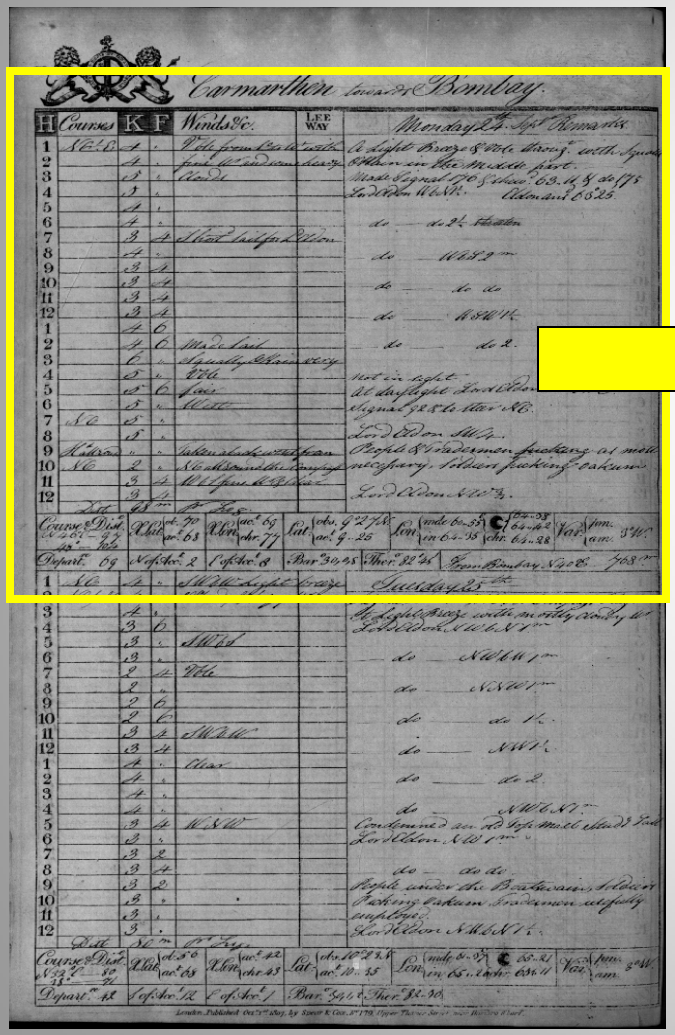
I am,

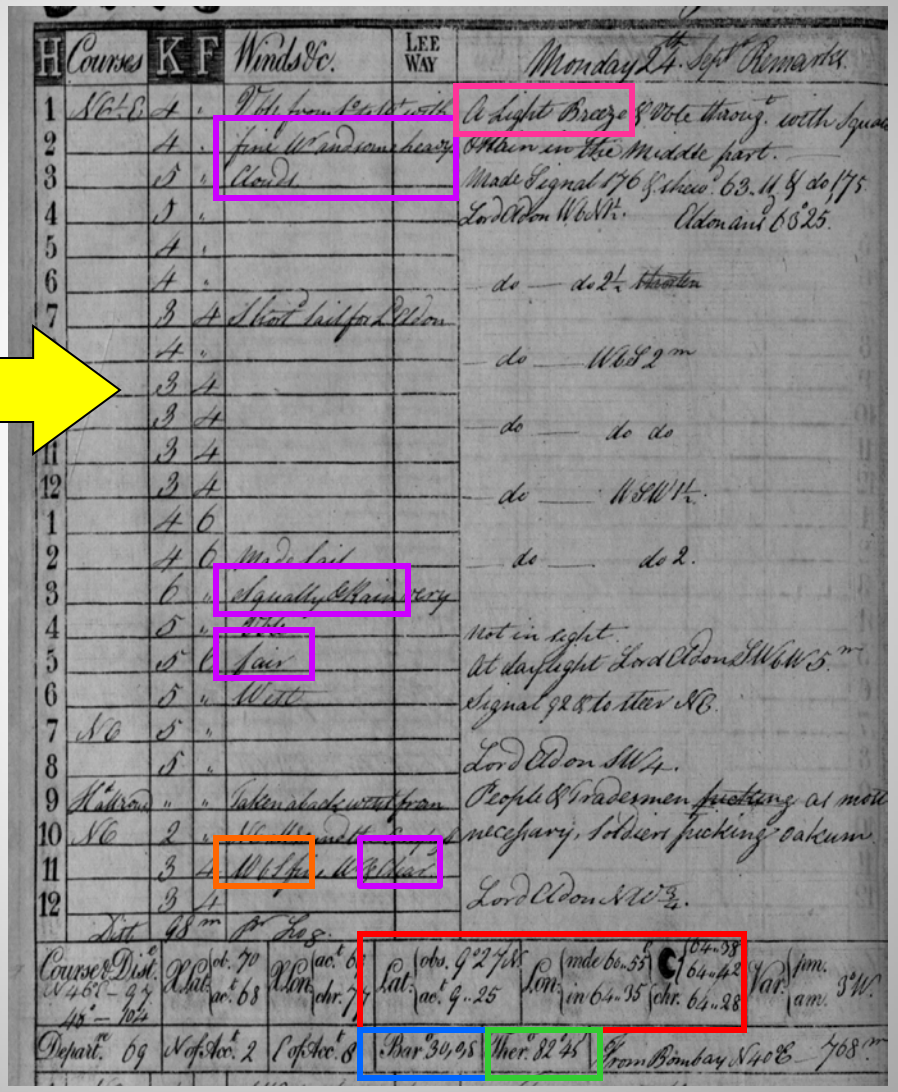
SIR,

Your most obedient Servant,

East-India House,
3rd June 1825.

EEIC sample logbook image with primary elements being digitized

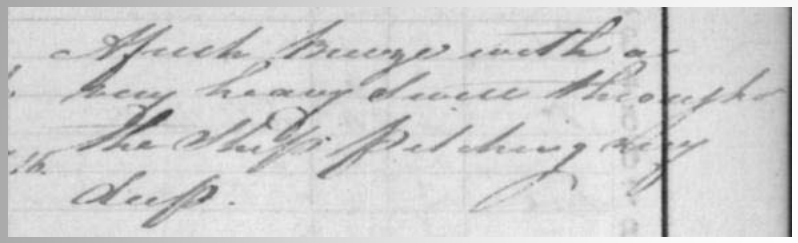


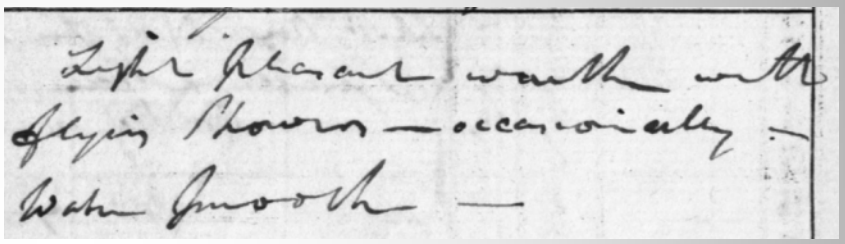


- Lat/Long (noon)
- Barometer (noon)
- Air Temperature (noon)
- Wind Direction (closest to noon)
- Wind Force (closest to noon)
- State of Weather/Visibility (all available)
- State of Sea (all available; none pictured)

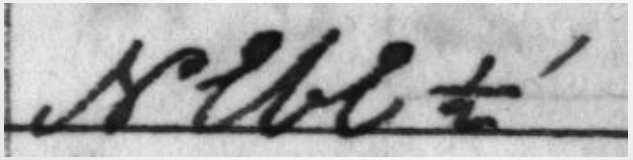
What are the main difficulties associated with capturing EEIC data?

1. Legibility and lots of writing (sometimes really bad), rather than just numerical values

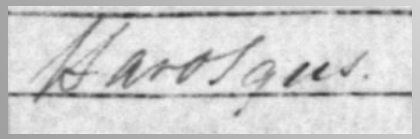




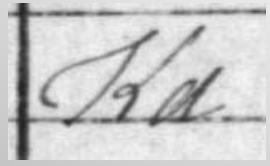
2. Ships bearings easily confused with wind directions



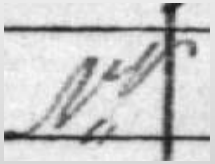
3. Observer abbreviations:



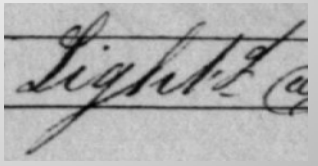
Hard Squalls



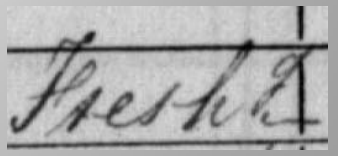
Tacked



Northerly



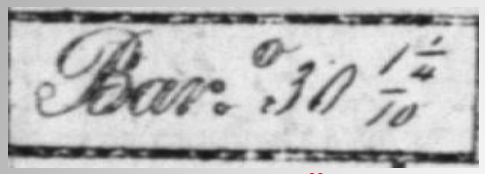
Lightning



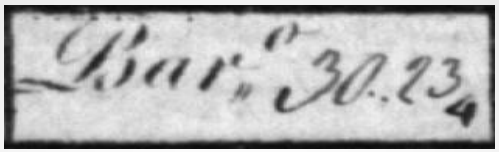
Freshening

Difficulties, Continued

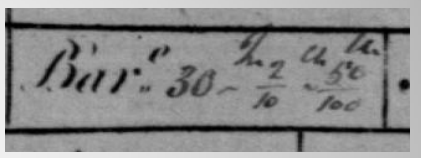
4. Various representations of decimal values:



30.125”

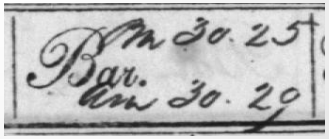


30.275”



30.250”

5. Noon observations not taken at noon:

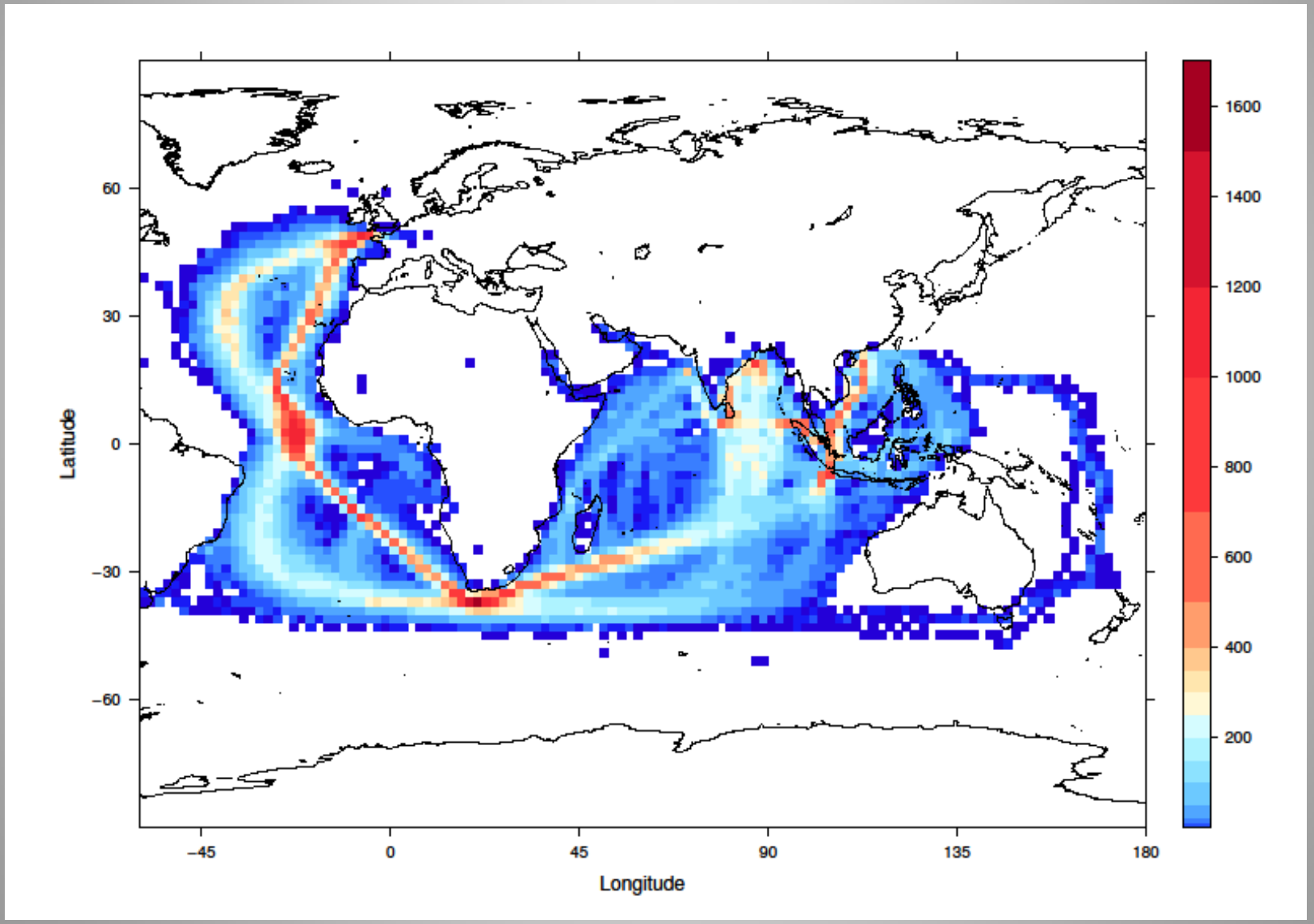


AM/PM - True time of observation unknown

Preliminary finds

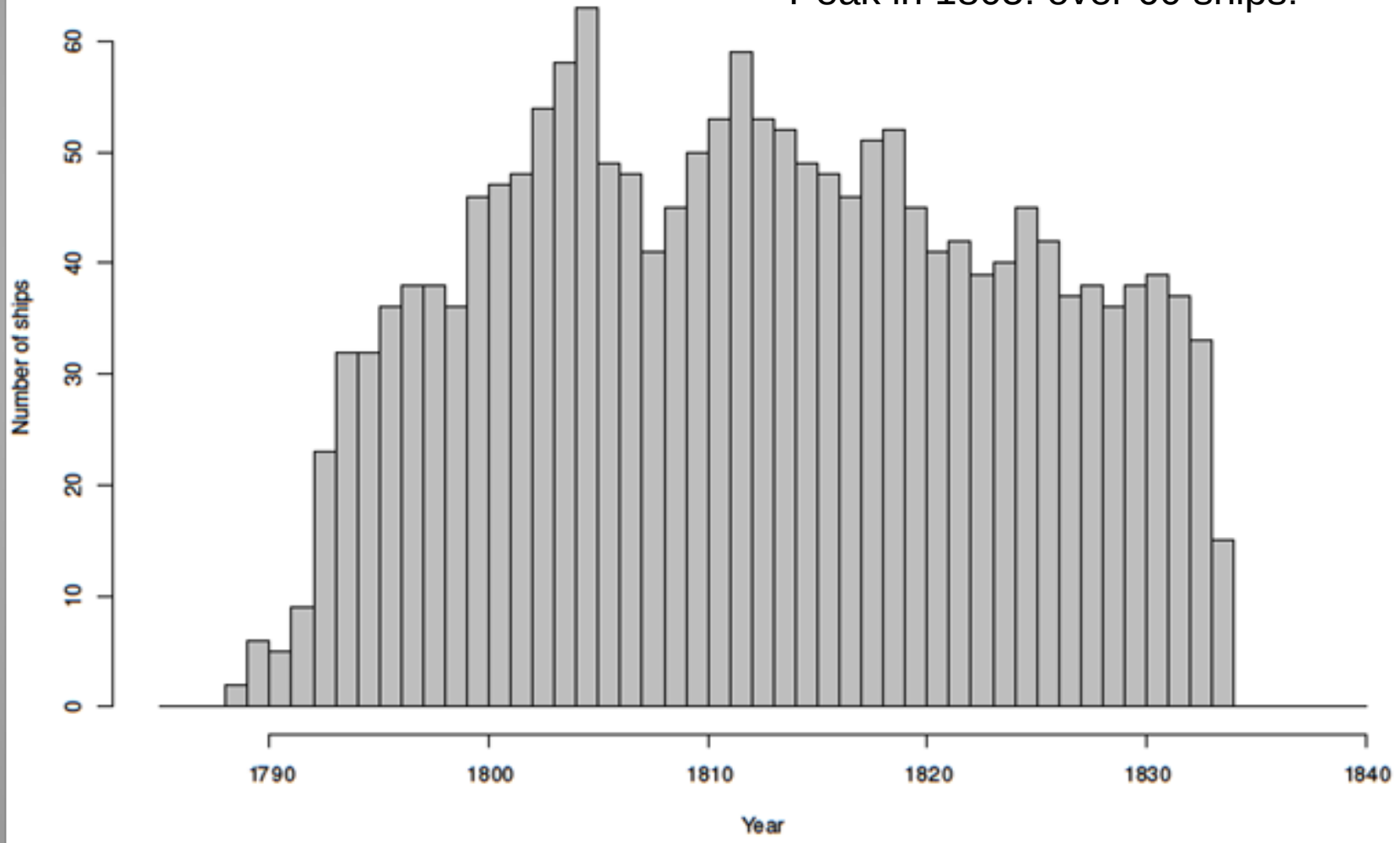
Spatial distribution

• Easy to see the most common routes traveled and where the most observations were taken



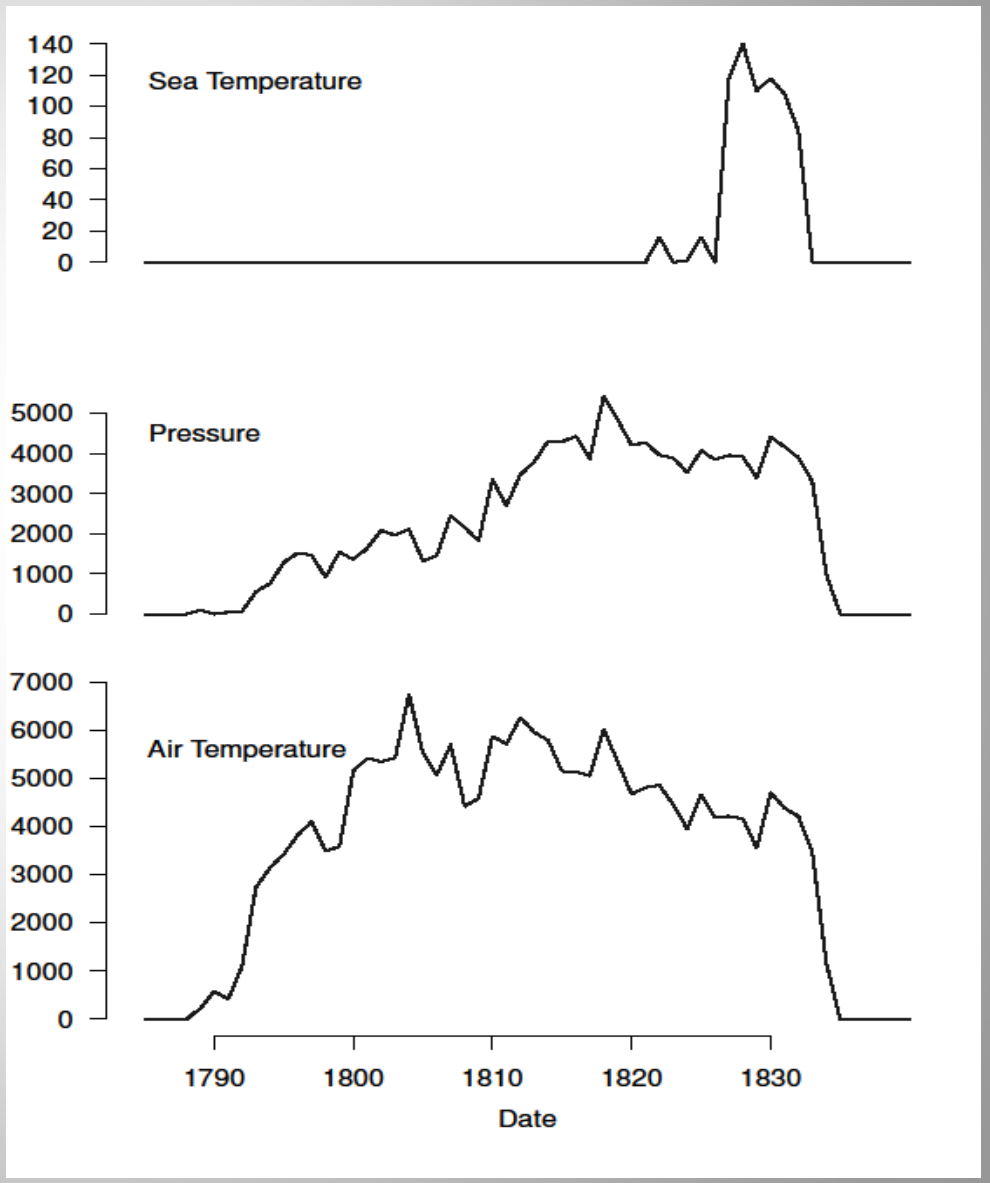
Temporal Coverage

Number of ships operating per year –
Peak in 1805: over 60 ships!

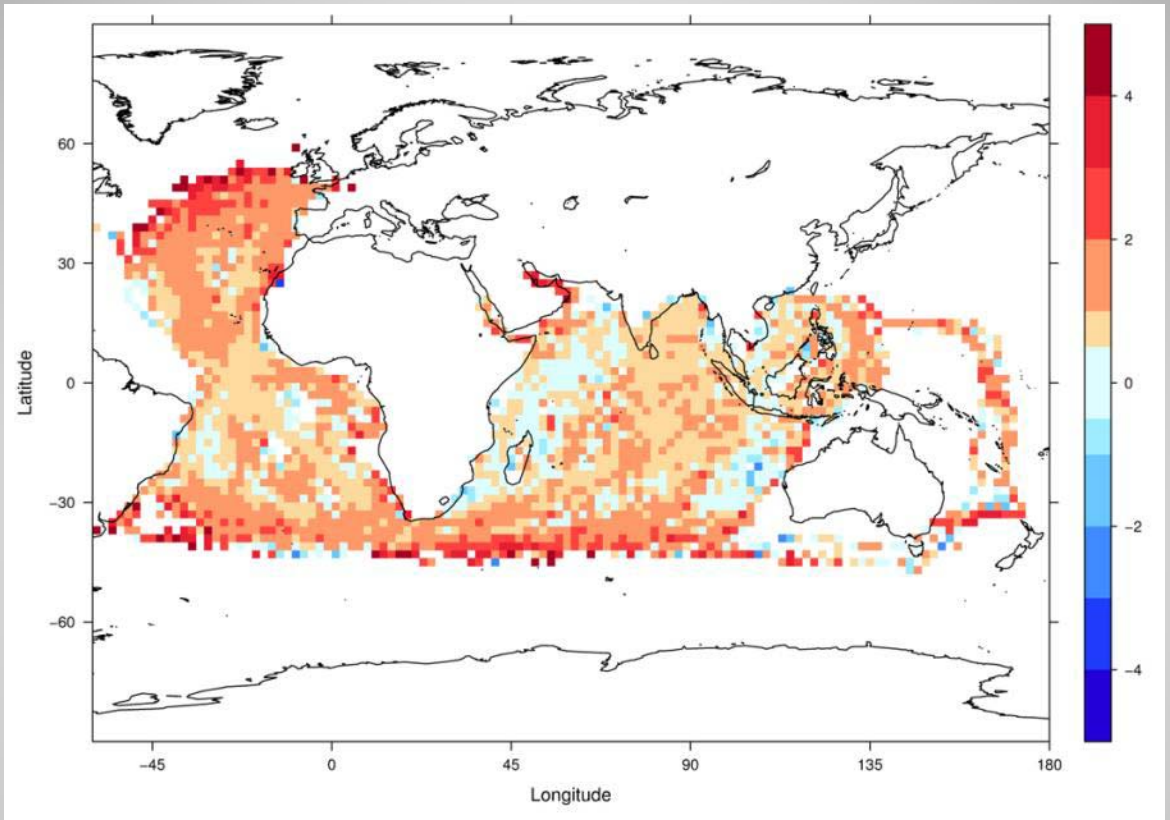


Observations per year for SST, Pressure, and Air Temperature

- 273,000+ total observations
- Number of Air Temperature obs peak in 1804
  - Many more temps than pressure obs in the earlier period
- Were thermometers cheaper?
- Around 1815, ships were consistently taking pressure and temperature readings together

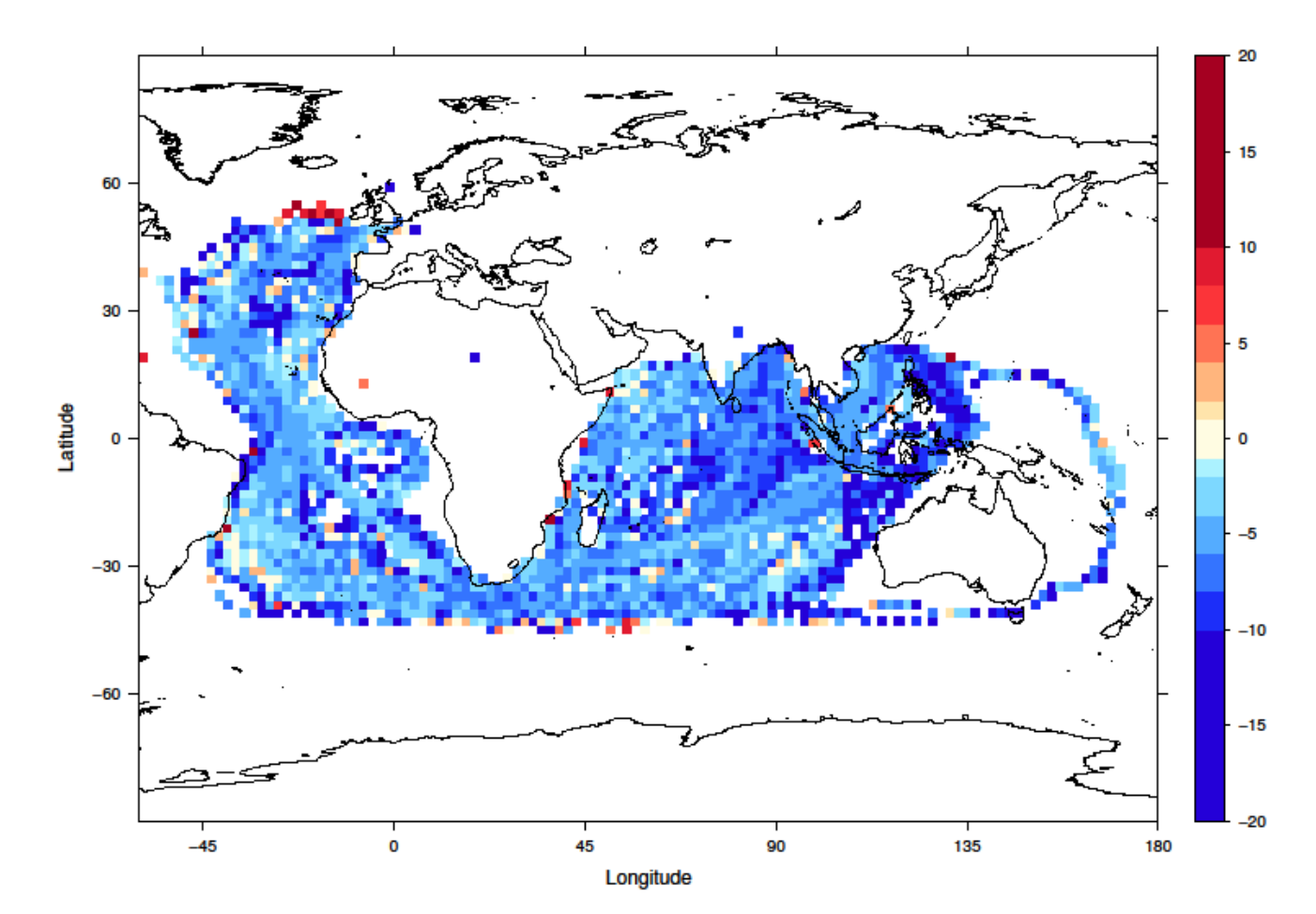


Temperature Anomalies



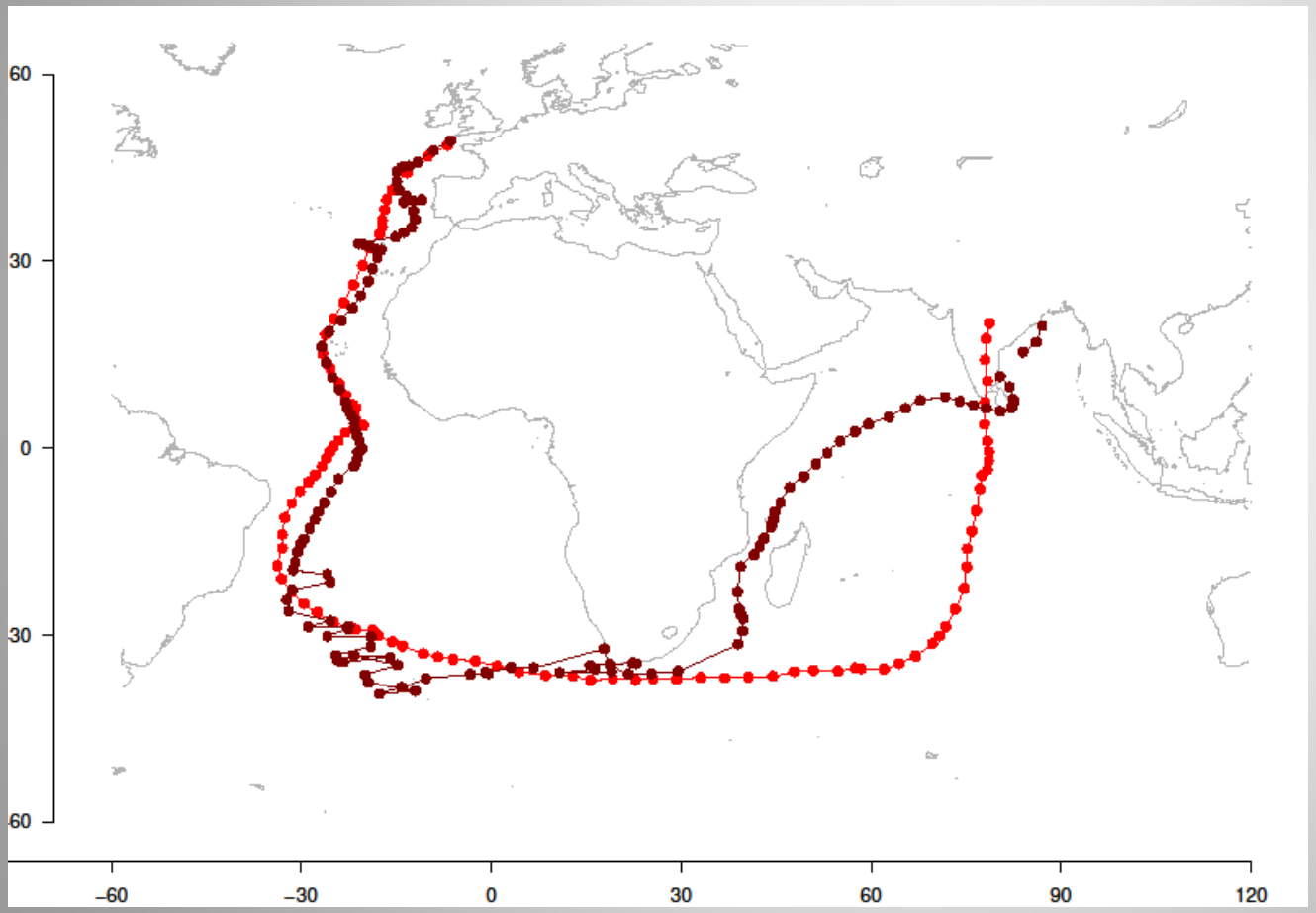
- Truncated mean air-temperature anomaly (observation minus HadNAT2 climatology) in each 2 by 2 square.
- A positive AT anomaly expected due to ship heating and inadequate thermometer screens.
  - Possiblity also exists that thermometer recorded was ‘Attached’ thermometer in the cabin

Pressure Anomalies



Mean pressure anomaly (observation minus HadSLP2 climatology) in each 2 by 2 square. Observations are consistently low.

Longitude Errors of the *Marquis of Wellington*



- Outward voyages in 1813 (dark red) and 1819 (light red).
- 1813 – Irratic course due to use of different longitude methods, i.e. chronometer and dead reckoning
- 1819 – Possibly headed to Calcutta, and likely accumulated a systematic longitude error over the course of the voyage

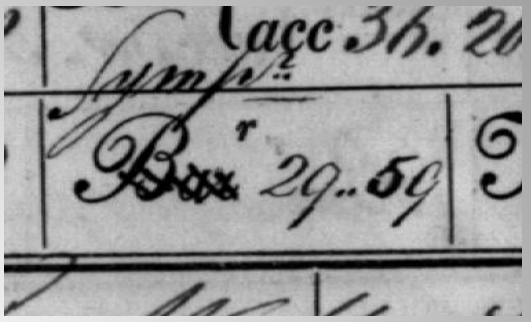
Sympiesometer

- A mercury-less marine barometer containing colored almond oil and hydrogen gas
- More sensitive, but less accurate, than a mercurial barometer
- Used to detect rapid changes in pressure to quickly alert of soon-to-change weather conditions.

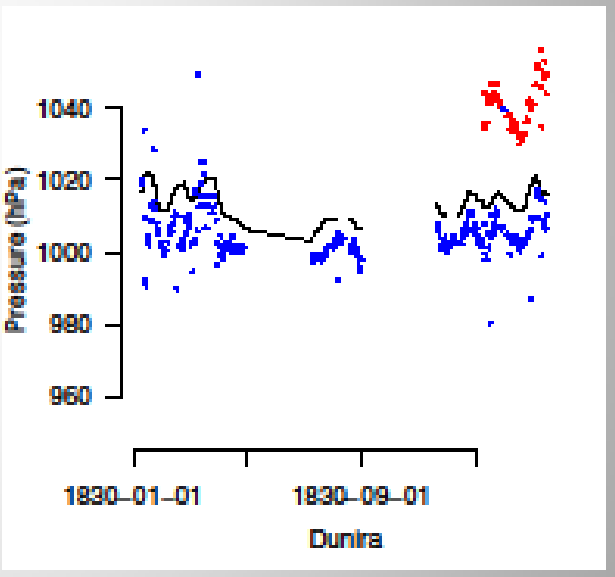
Sympiesometer by T. Winter, c1850.

Sympiesometer

- 31 logs identified with sympiesometer observations
  - 8 of the logs are from 2 ships
    - 4 Voyages *Earl of Balcarras*
    - 4 Voyages *Duchess of Athol*
- 30 of 31 have both barometer and sympiesometers recorded simultaneously…..would make a small, but great comparison study
  - 3 logs with < 10 observations of sympiesometer
- Large possibility exists that sympiesometers were sometimes used as the standard barometer without being disclosed as such



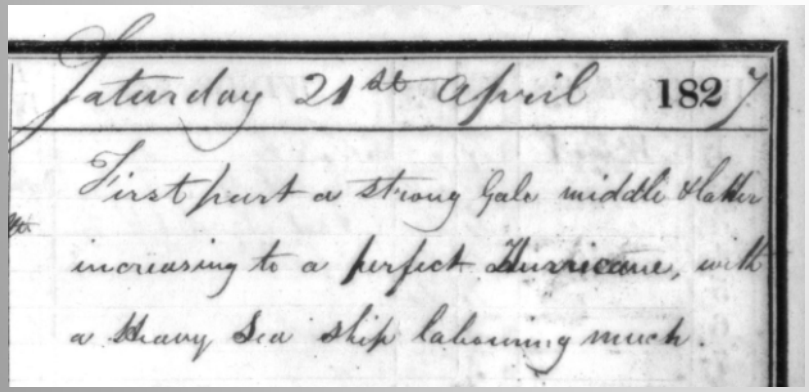
Easily identifiable when recorded as 'Symp'



1830 voyage of EEIC vessel *Dunira*. Poor agreement between barometer (blue) and sympiesometer (red) values. Standard barometer is in much better agreement with modern climatology (black; ERA-40) than the sympiesometer.

Tropical Cyclone Discovery

- Large potential exists to identify undocumented tropical cyclones
- One potential so far:


Saturday 21st April 182[illegible]
First part a strong Gale middle & latter increasing to a perfect Hurricane, with a Heavy Sea ship labouring much.

Lady Melville near Madagascar (S. Indian Ocean)

Date	Wind Force (EIC)	Wind Force (Beaufort)	Pressure (inches of mercury)
04/17/1827	Fresh Trade	6	30.10
04/18/1827	Fresh Trade	6	29.98
04/19/1827	Pleasant Breeze	4	29.80
04/20/1827	Strong Gale	9	29.54
04/21/1827	Hard Gale	10	
	Perfect Hurricane	12(?)	**28.70** (lowest recorded)
04/22/1827	Hard Gale	10	28.80
			29.00
			29.30
04/23/1827	Strong Gale	9	29.35
			29.70
04/24/1828	Hard Gale	10	29.70
			29.50
04/25/1828	Hard Gale	10	29.50
	Perfect Hurricane	12(?)	
	Hard Gale	10	29.10
04/26/1827	Fresh Gales	8	29.10
	Fresh Breeze	5	29.60
04/27/1827	Fresh Breeze	5	30.00
04/28/1827	Fresh Breeze	5	30.20

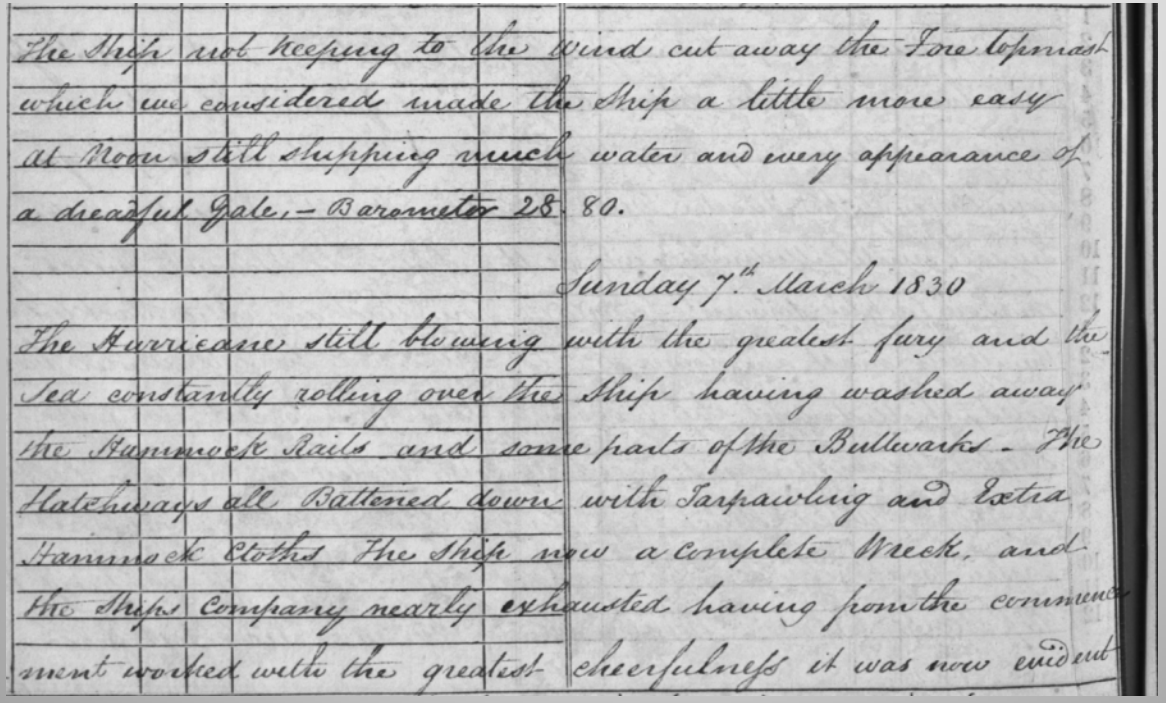
Tropical Cyclone Discovery, Continued:

- Already identified:
  - *Duke of York 2*, May 21, 1833
    - "In 1833 an extraordinarily powerful cyclone near Kedgeree, India, produced a minimum pressure reading of 26.30 inches (891 mb) on board the British merchant ship *Duke of York*."

    Longshore, David. 2008. Encyclopedia of hurricanes, typhoons, and cyclones. New York: Facts on File, Inc., pp. 113.
  - *Lord Amherst*, May 21, 1833

Tropical Cyclone Discovery, Continued:

- Already identified:
  - *Bridgewater 5*, begins March 5, 1830
    - 4 pages of notes on the encounter covering multiple days. The ship was nearly destroyed. 16 guns and 60 chests of tea had to be tossed overboard, not to mention the severe damage to the rest of the vessel. The ship was later condemned and abandoned in Calcutta.
    - Lowest noon pressure recorded: 28.80”

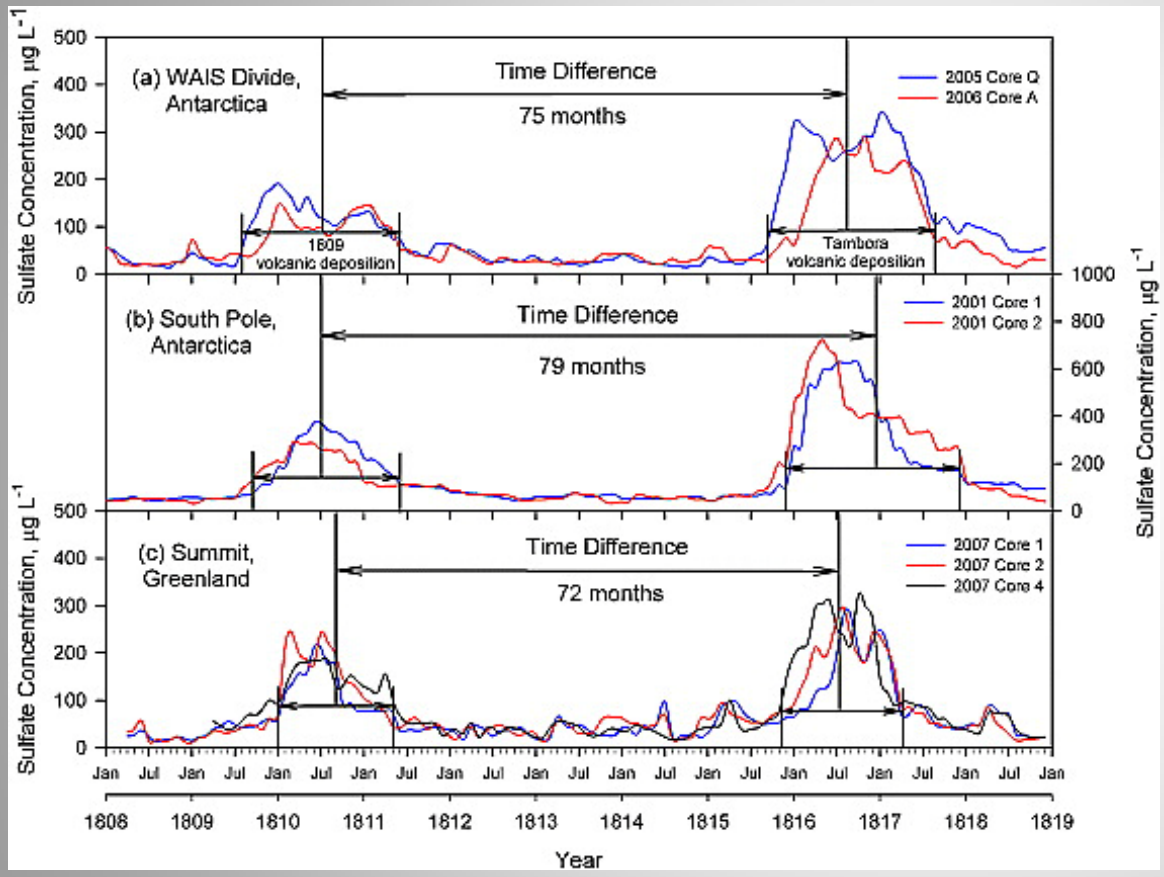


The Ship not keeping to the wind cut away the Fore topmast which was considered made the Ship a little more easy at Noon still shipping much water and very appearance of a dreadful Gale. – Barometer 28. 80.

Sunday 7th. March 1830

The Hurricane still blowing with the greatest fury and the Sea constantly rolling over the Ship having washed away the Hammock Rails and some parts of the Bulwarks. The Hatchways all Battened down with Tarpawling and Extra Hammock Cloths The Ship now a complete Wreck, and the Ships Company nearly exhausted having from the commencement worked with the greatest cheerfulness it was now evident

Tambora Eruption - Indonesia
10 April 1815



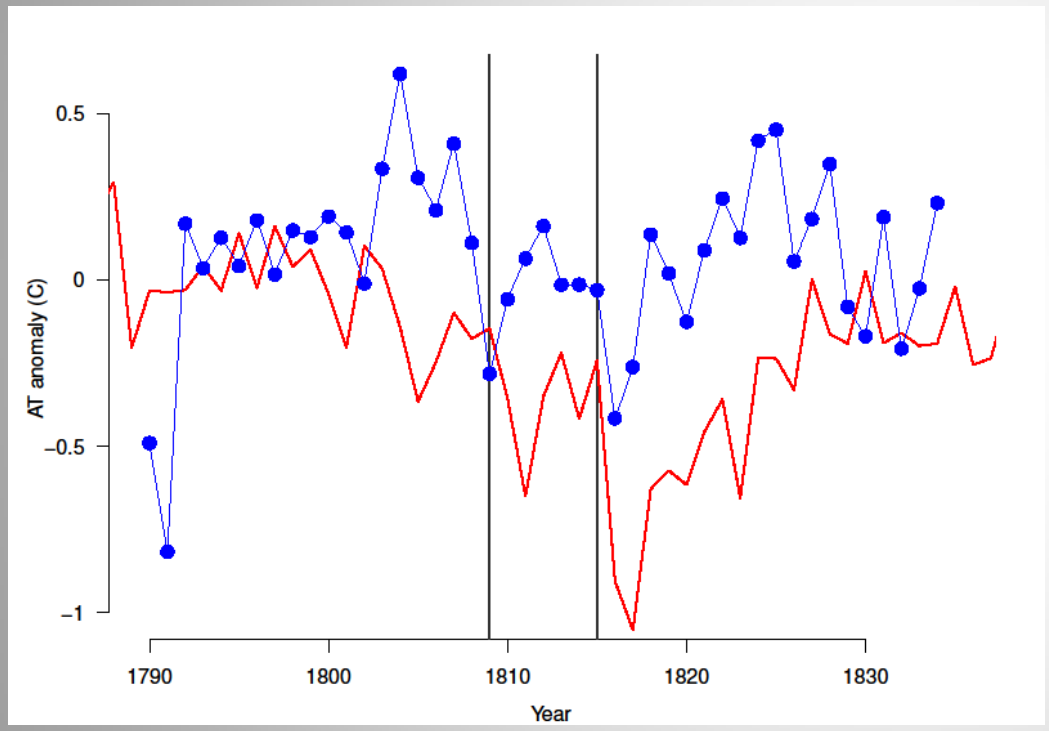
Sulfate concentrations from ice core samples believed to be from volcanic eruptions in ~1809 and 1815 (Tambora)

Source:
Cole-Dai, J., D. Ferris, A. Lanciki, J. Savarino, M. Baroni, and M. H. Thiemens (2009), Cold decade (AD 1810–1819) caused by Tambora (1815) and another (1809) stratospheric volcanic eruption, Geophys. Res. Lett., 36, L22703, doi:10.1029/2009GL040882.

- Major volcanic eruption believed to have had severe global impacts
- 1816 was the 'Year without a summer' in the Northern Hemisphere
  - Worst famine of the 19th Century
- Do the EEIC obs agree? Did the Southern Hemisphere experience the same conditions?
- What about 1809?

  Can the EEIC obs help with climate questions surrounding this volcanic event and high sulfate concentrations in global ice cores?

EEIC vs. HadCM3 – Tambora and 1809 events



Grey = Eruptions1809,1815
Blue = EEIC mean temperature anomalies
Red = HadCM3 (simulation) temperature anomalies

- Significant drop in temps for the HadCM3 1816-1817 correlating to the aftermath of Tambora
- Drop in EEIC temps also evident, but not as significant as with HadCM3.
- 1809 event dated to March-June 1808 based on sudden cooling in Malaysian temperature data (Chenoweth, 2001)
  - EEIC temps begin dropping in 1807??
  - Max marine air temp cooling in 1811 in HadCM3
- Better agreement with Tambora, but many questions surrounding 1809.

Chenoweth, M. (2001), Two major volcanic cooling episodes derived from global marine air temperature, AD 1807–1827, *Geophys. Res. Lett.*, 28(15), 2963–2966.

Accounts of Famous Maritime Historical Events – Battle of Pulo Aura February 1804

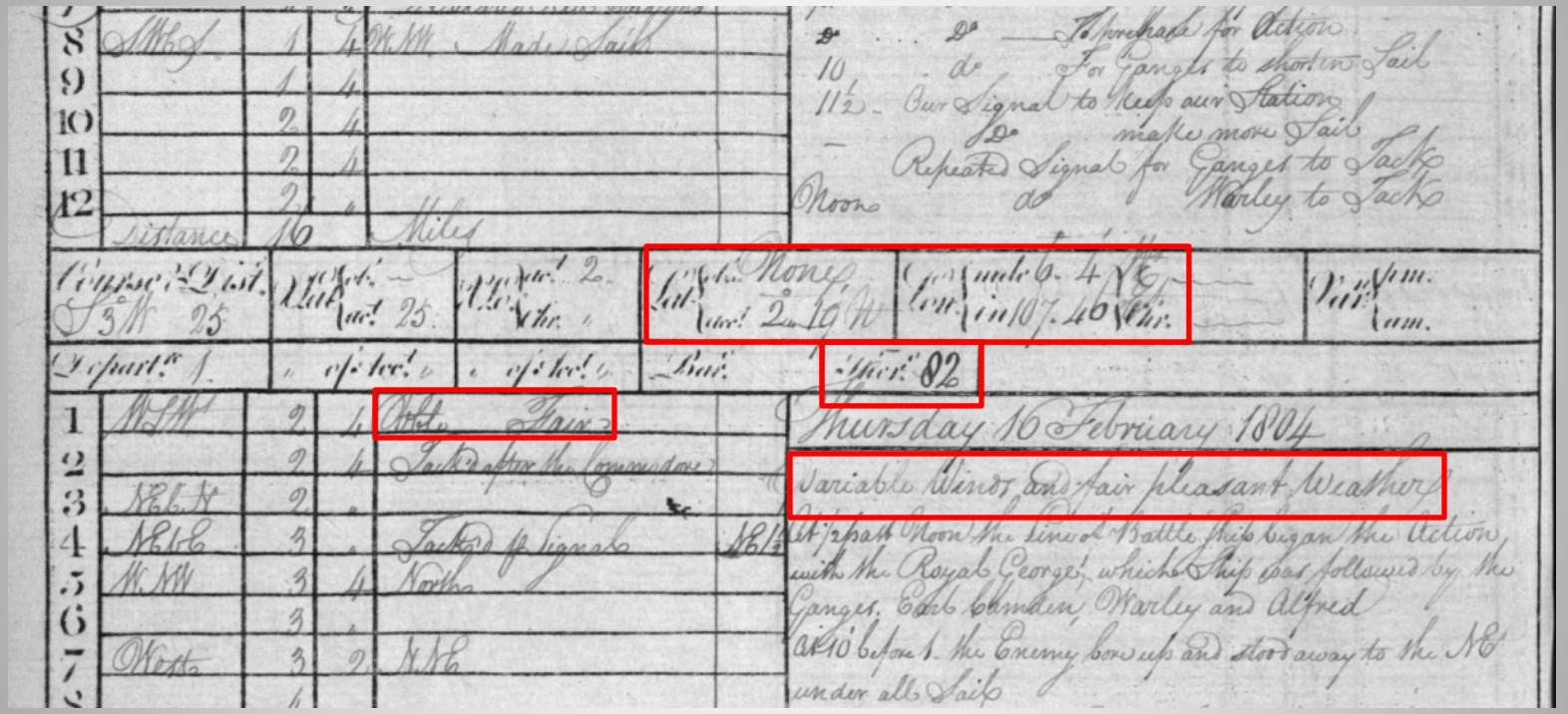
- Brief naval engagement between a large EEIC merchant squadron and a small, heavily-armed mostly French naval squadron during the Napoleonic Wars
  - EEIC Squadron:
    - 16 EEIC vessel
    - 12 EEIC country vessel
    - 1 Portugese vessel
    - 1 Australian vessel

  -- French Squadron (including one Dutch Brig) :
    - 5 heavily armed vessels
- EEIC was able to ward off the mostly French squadron with minimal damage

Battle of Pulo Aura Commodore Dance's Indiamen (centre), protecting the merchant fleet (right), engages Admiral Linois's French squadron (left). Rendering by William Daniell, 1804

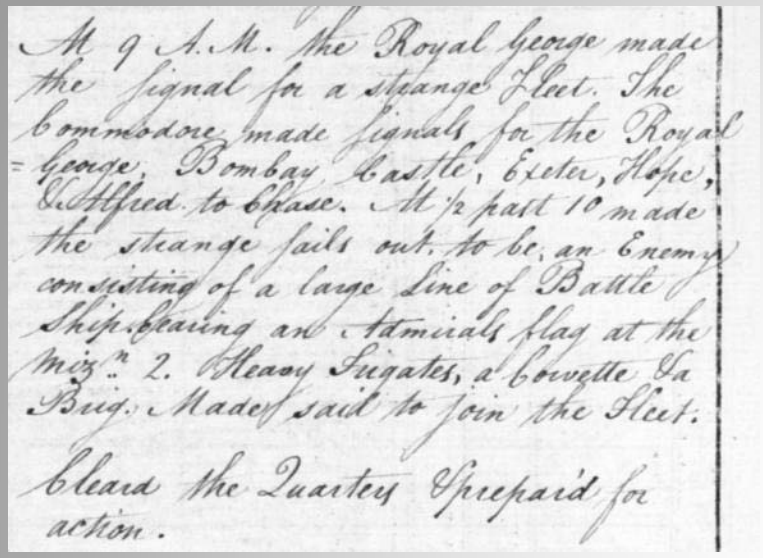
Battle of Pulo Aura - Continued

- 8 logbooks in NCDC archives documenting this battle
  - Limited weather observations during the event.



Excerpt from the *Warren Hastings* (Logbook 9H – 15-16 February 1804) describing the start of the battle ("…1/2 past Noon…" on February 16th Mariner's day – 1pm to 12pm) and also the weather and location reported closest to that time:
Latitude: 2.19N, Longitude: 107.46E (12 noon on February 15)
Air Temperature: 82°F (12 noon on February 15)
Wind: Variable (1 pm on February 16)
Weather: Fair, Pleasant (1pm on February 16)

Battle of Pulo Aura - Continued

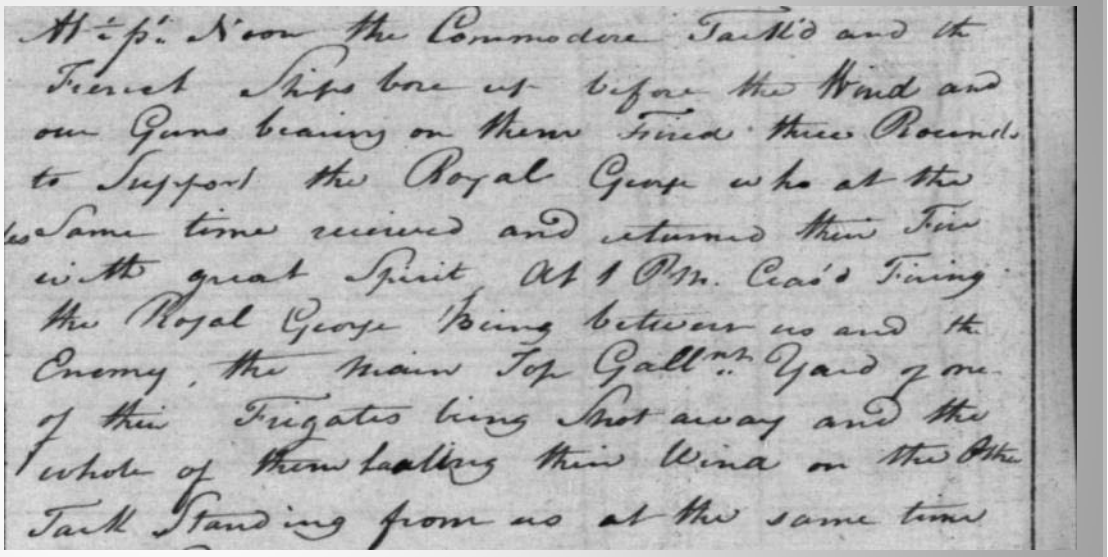

At 9 A.M. the Royal George made the Signal for a Strange Fleet. The Commodore made Signals for the Royal George, Bombay Castle, Exeter, Hope, & Alfred to Chase. At ½ past 10 made the Strange Sails out to be an Enemy consisting of a large Line of Battle Ship bearing an Admirals flag at the Mizn. 2. Heavy Frigates, a Corvette & a Brig. Made Signal to join the Fleet.

Cleard the Quarters & Prepar'd for action.

Alfred 2 (Logbook 140K – 14 February 1804) noting the preparation for battle with the French squadron:

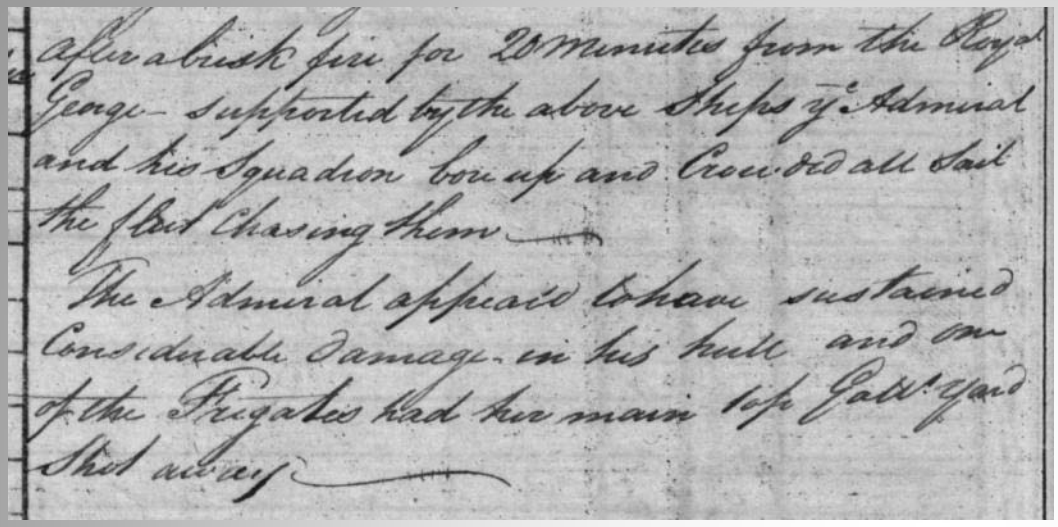
"…made the strange sails out to be an Enemy consisting of a large Line of Battle Ships….2 Heavy Frigates, a Corvette & a Brig…..

Cleared the Quarters & prepar'd for action."


At ½ p'. Noon the Commodore Tack'd and the French Ships bore up before the Wind and our Guns bearing on them Fired three Rounds to Support the Royal George who at the same time received and returned their Fire with great Spirit At 1 P.M. Ceas'd Firing the Royal George being between us and the Enemy, the main Top Gall.t Yard of one of their Frigates being Shot away and the whole of them hauling their Wind on the Starbd Tack Standing from us at the same time

Dorsetshire (Logbook 13B – 16 February 1804) describing firing rounds at the French vessels:
"At ½ p' Noon the Commodore Tack'd and the French Ships bore up before the Wind and our Guns bearing on them Fired three Rounds to Support the *Royal George* who at the same time received and returned their Fire with great Spirit……The main Top Gallant Yard of one of their Frigates being Shot away……."

Battle of Pulo Aura - Continued

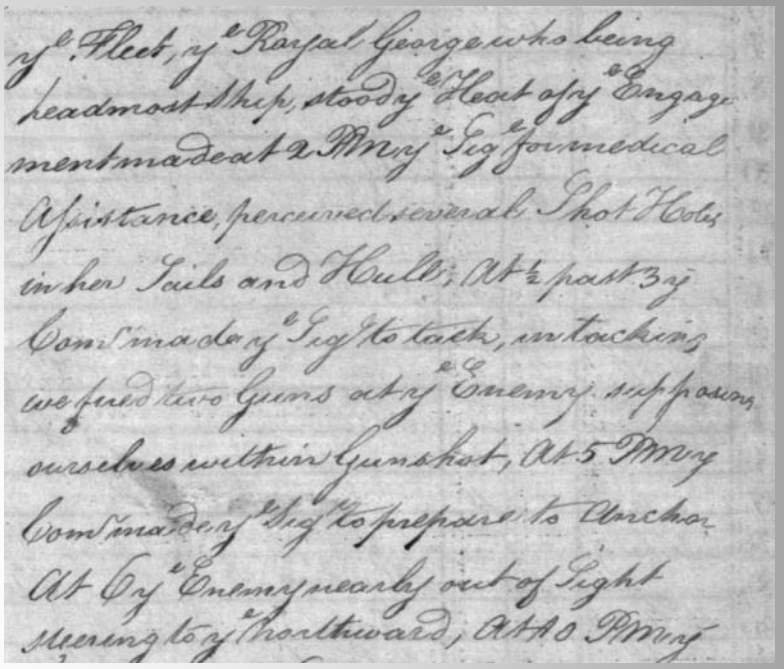

after a brisk fire for 20 minutes from the Royal George supported by the above Ships y^e Admiral and his Squadron bore up and Crowded all Sail the fleet Chasing them

The Admiral appear'd to have sustained Considerable damage in his hull and one of the Frigates had her main top Gall^t yard Shot away

Bombay Castle (Logbook 125J – 16 February 1804) describing the incident and damage to the French Admiral's vessel:

"…After brisk fire for 20 Minutes from the *Royal George* supported by the above Ships y' [e] Admiral and his Squadron bore up and Crowded all Sail the fleet chasing them.

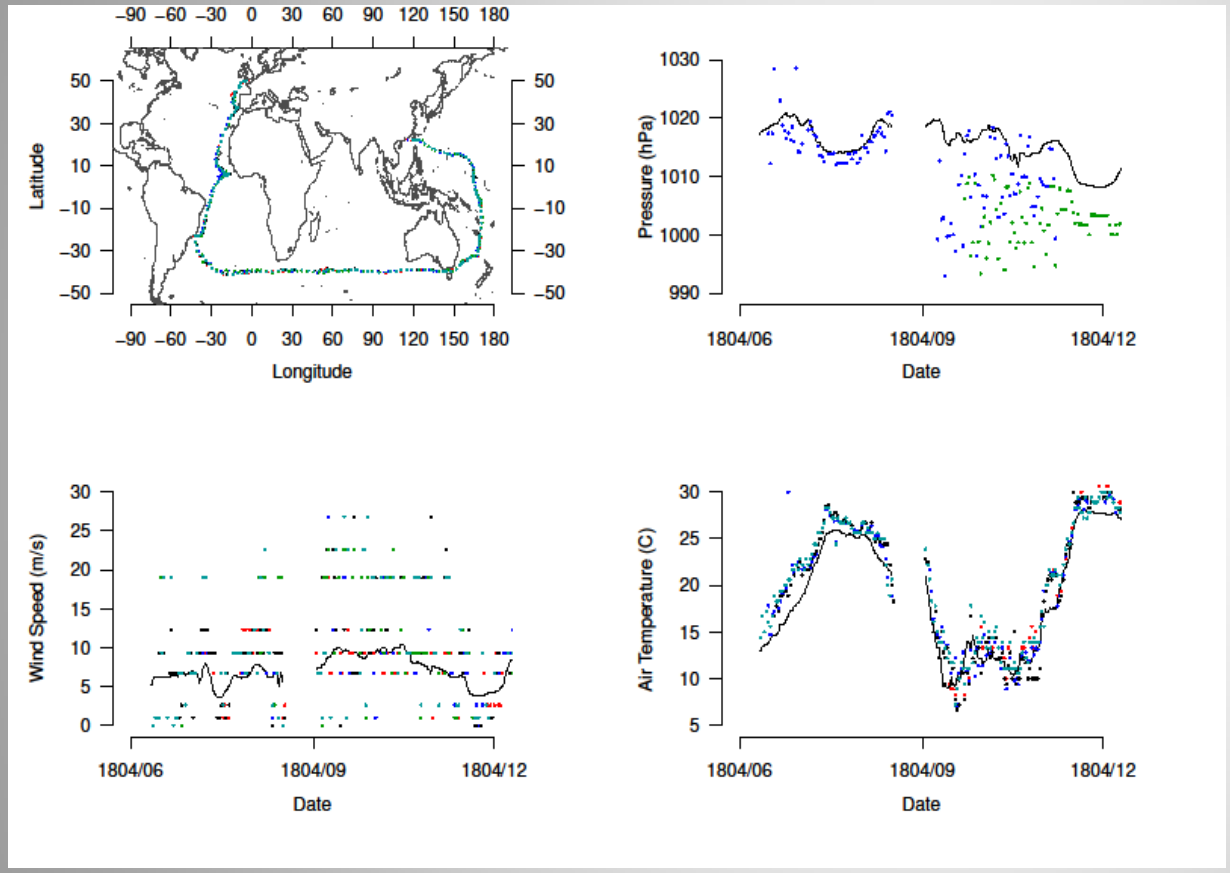
The Admiral appear'd to have sustained Considerable damage in his hull and one of the Frigates had her main top Gall't Yard Shot away….."


y^e Fleet, y^e Royal George who being headmost Ship, stood y^e Heat of y^e Engagement made at 2 PM y^e Sig^l for medical Assistance, perceived several Shot Holes in her Sails and Hull; At ½ past 3 y^e Com^r made y^e Sig^l to tack, in tacking we fired two Guns at y^e Enemy supposing ourselves within Gunshot, At 5 PM y^e Com^r made y^e Sig^l to prepare to Anchor At 6 y^e Enemy nearly out of Sight steering to y^e Northward, At 10 PM y

Earl of Abergavenny 2 (Logbook 341F – 16 February 1804) describes receiving a signal for medical assistance for the Royal George and firing shots at the French:

"…*Royal George* who being the headmost Ship, stood y' [e] Heat of y' [e] Engagement made at 2PM y' [e] Sig'l for medical Assistance, perceived several Shot Holes in her Sails and Hull…..At 1/2 past 3….we fired two Guns at y' [e] Enemy supposing (?) ourselves within Gunshot……."

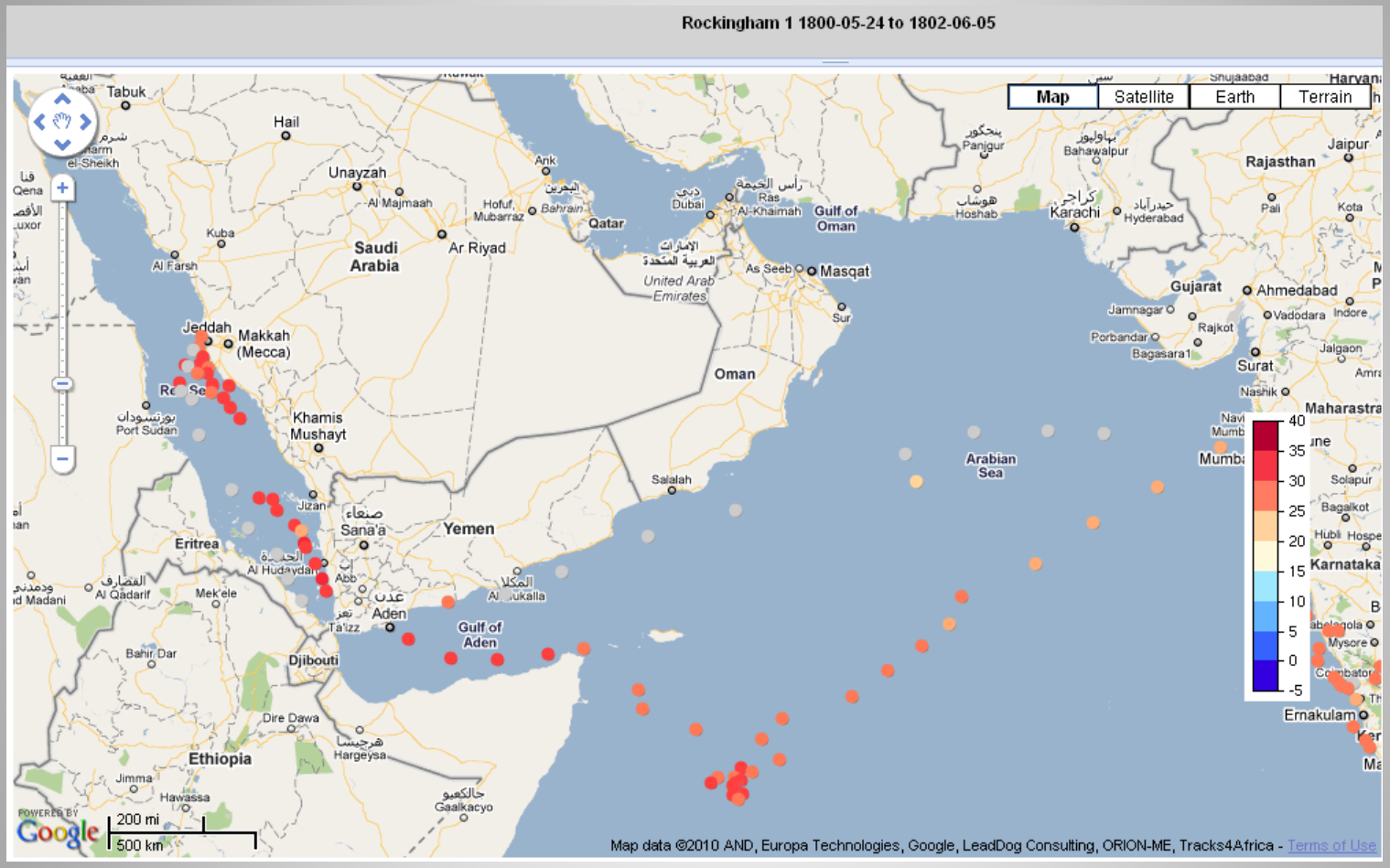
Interesting Voyages - South Pacific



Outbound voyage of the 1804 “Pacific Fleet”

- Route taken to avoid French squadron due to the battle of Pulo-Aura in Indonesia, February 1804
- Ships in Company:
  - *Alnwick Castle*
  - *Arniston*
  - *Ceres 4*
  - *Cuffnells*
  - *Royal Charlotte 5*
  - *Taunton Castle*
- Ocean 5, which left a year earlier, meets this fleet (accidentally?) near the Cape on the return voyage.
- More ships in company at times including ships from the UK Royal Navy (e.g. *HMS Athenian, HMS Albatross*) as well as other EEIC vessels

Interesting Voyages - Red Sea



- Voyage of *Rockingham 1* from Mumbai, India to Jeddah, Saudi Arabia and back to Mumbai before returning to the UK
- Max temperature recorded on this voyage is 33.3°C in the Red Sea

Data Availability

- Data will be sent to ICOADS for inclusion in the next official release
  - Will likely be available as 'preliminary ICOADS data' prior to next dataset release
- At NCDC:
  - Contact me for now
  - In the coming days, raw observations will be available through the NCDC HDSS Access System (HAS) under 'Surface and Marine':

    http://has.ncdc.noaa.gov/pls/plhas/has.dsselect
- Cool visualization tools and animations by Philip Brohan:
  - http://imma.appspot.com/interfaces/imma_edit_test.html
  - http://www.youtube.com/watch?v=DFiF4Qs6LmE

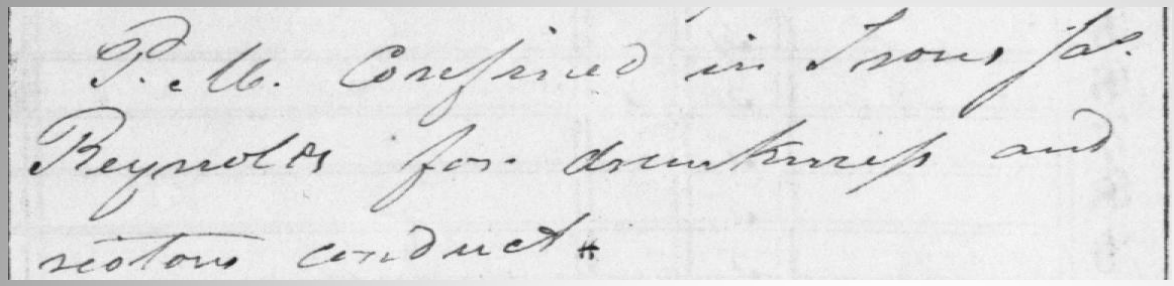
Warning: Pure Reading Pleasure and Entertainment Ahead!

You never know what you will find written in these logbooks.

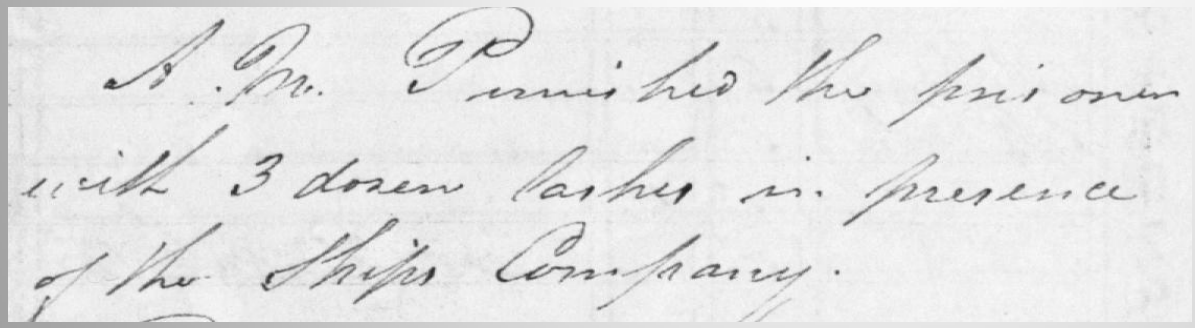
Multiple Disciplines

- Imaging and digitization of the logs will provide useful information for many others outside of the weather/climate community:
  - Genealogists (crew rosters, birth/death information, prisoners, hired workers)
  - Historians (early sailing and navigation, EIC trading/shipping routes, daily life on a ship's long voyage, naval battles)
  - Sailing buffs (early sailing terminology/techniques)
  - Astronomers (astronomical events such as comets, etc)
  - Biologists (records of birds and marine life)

Interesting reads:

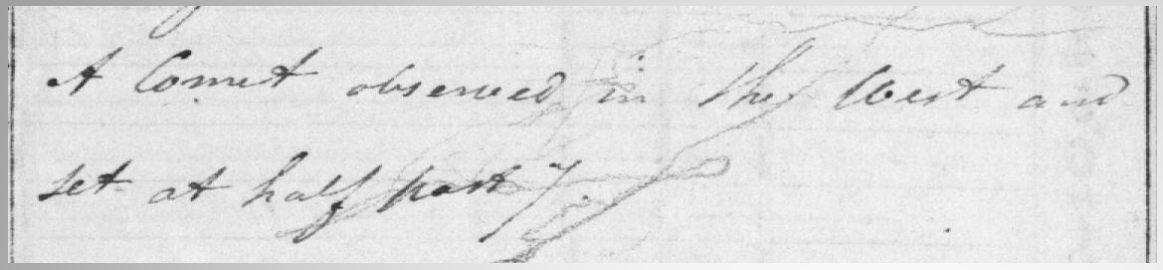

P.M. Confined in Irons Jas. Reynolds for drunkenness and riotous conduct

'P.M. Confined in irons Jas. Reynolds for drunkenness and riotous conduct'
Astell Logbook 12G – 10 March 1820

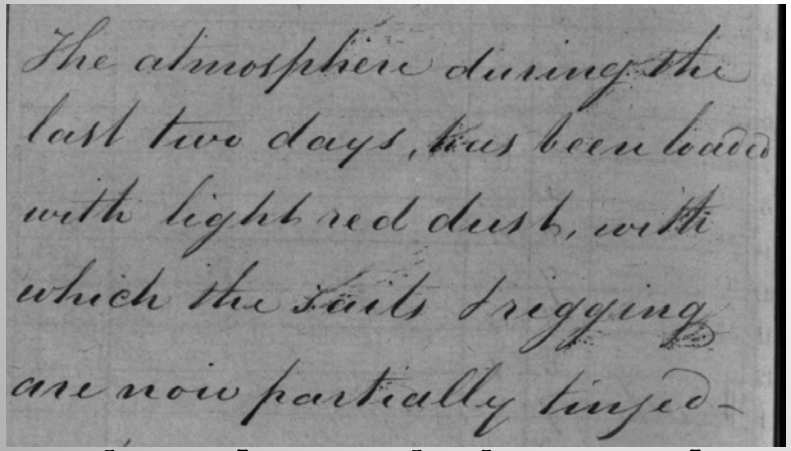

A.M. Punished the prisoner with 3 dozen lashes in presence of the Ships Company.

'A.M. Punished the prisoner with 3 dozen lashes in presence of the Ships Company.'
Astell Logbook 12G – 10 March 1820

Interesting reads:

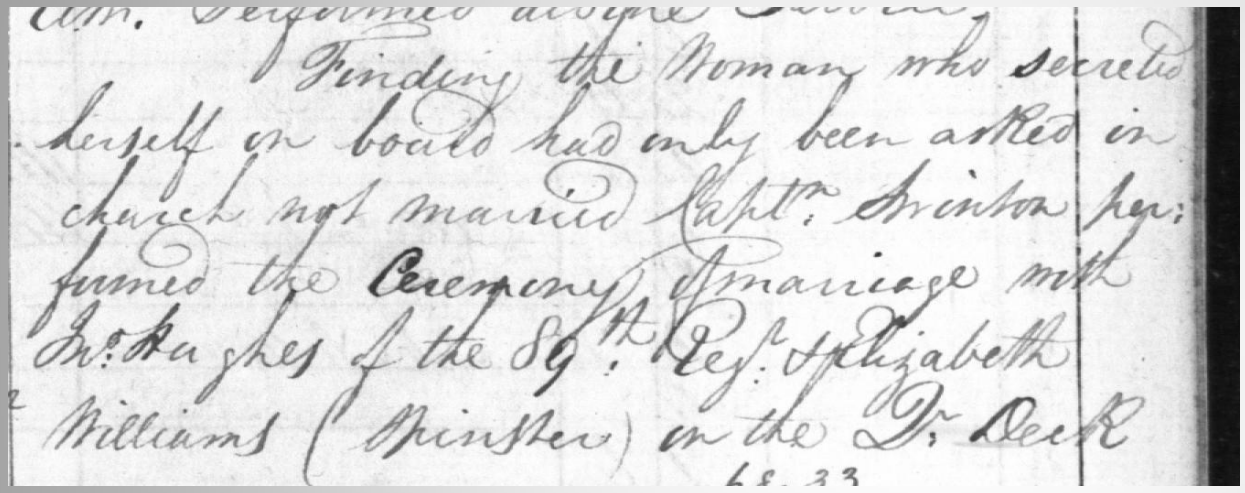

A Comet observed in the West and set at half past 7

'A comet observed in the West and set at half past 7.' – Comet of April 1821
Astell, Logbook 12G – 4 April 1821


The atmosphere during the last two days, has been loaded with light red dust, with which the sails & rigging are now partially tinged –

'The atmosphere during the last two days has been loaded with light red dust, with which the sails & rigging are now partially tinged.'
Minerva 7, Logbook 14T – 1 June 1831

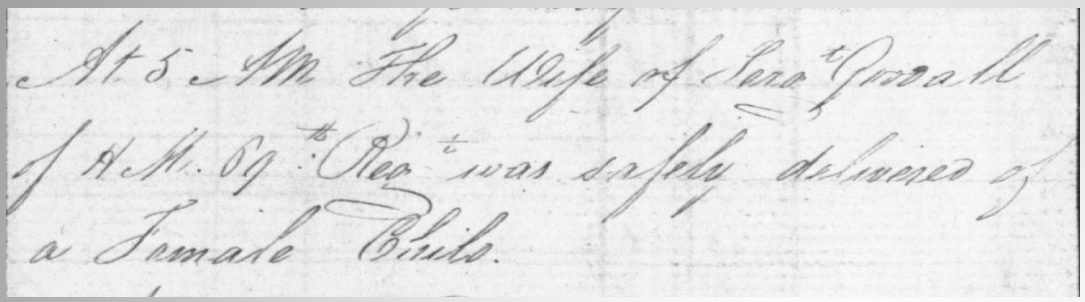
Interesting reads:


Finding the Woman who secreted herself on board had only been asked in church not married Capt. Swinton performed the Ceremony of marriage with Jno. Hughes of the 89th Reg. & Elizabeth Williams (Spinster) on the Qr. Deck

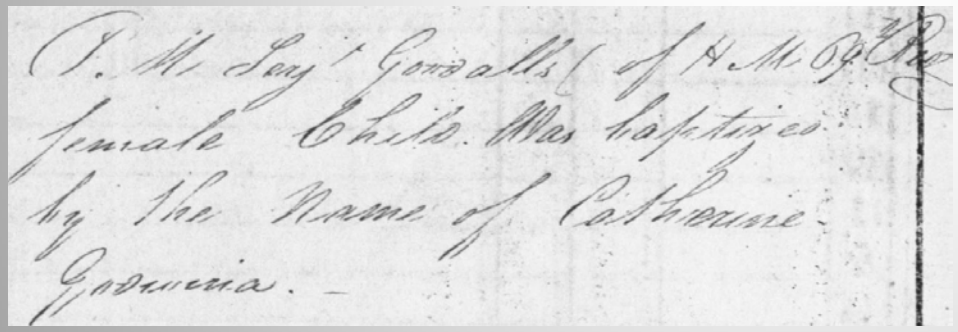
'Finding the woman who secreted herself on board had only been asked in church not married Capt. Swinton performed the Ceremony of marriage with Jno. Hughes of the 89th Reg. & Elizabeth Williams (Spinther) on the Qr. Deck'

Carnatic 3, Logbook 1651 – 7 April 1811

Interesting reads:

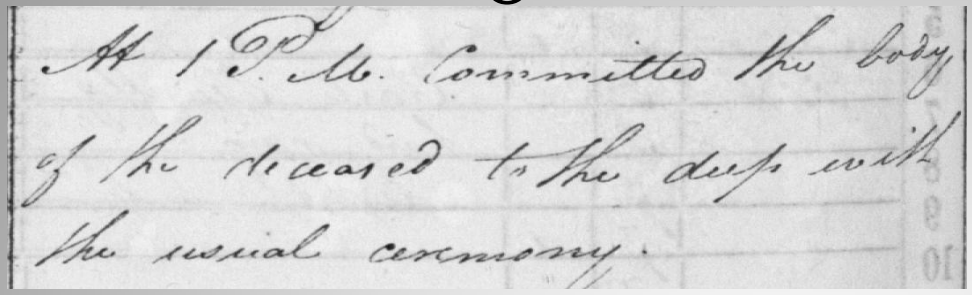

At 5 AM The Wife of Sergt Goodall
of H.M. 69th Reg was safely delivered of
a Female Child.

'At 5 A.M. The Wife of Sergt.Goodall of H.M. 69th Reg. was safely delivered of a Female Child.'
Alfred 2, Logbook 140M – 19 June 1810

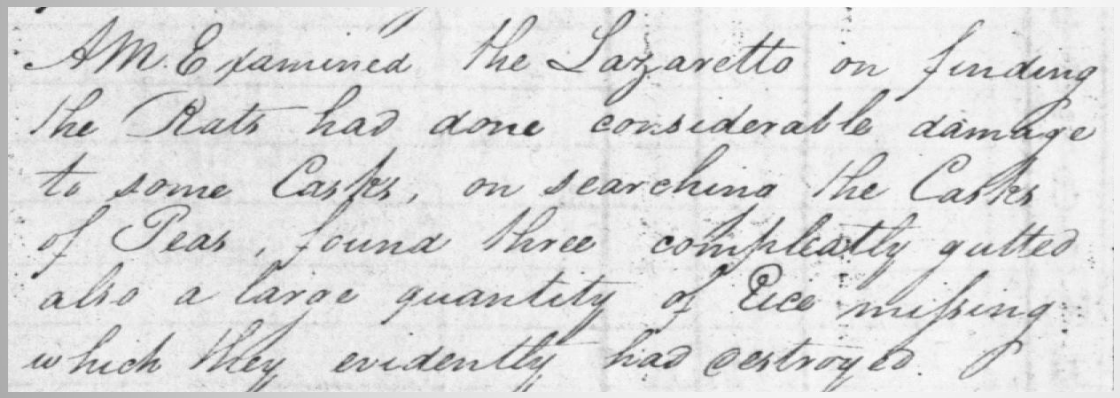

P. M. Serg.t Goodalls of H.M. 69th Reg.
female Child. Was baptized
by the Name of Catherine
Godwin.

'P.M. Sergt. Goodall of H.M. 69th Reg. female child was baptized by the Name of Catherine...'
Alfred 2, Logbook 140M – 5 July 1810

Interesting reads:

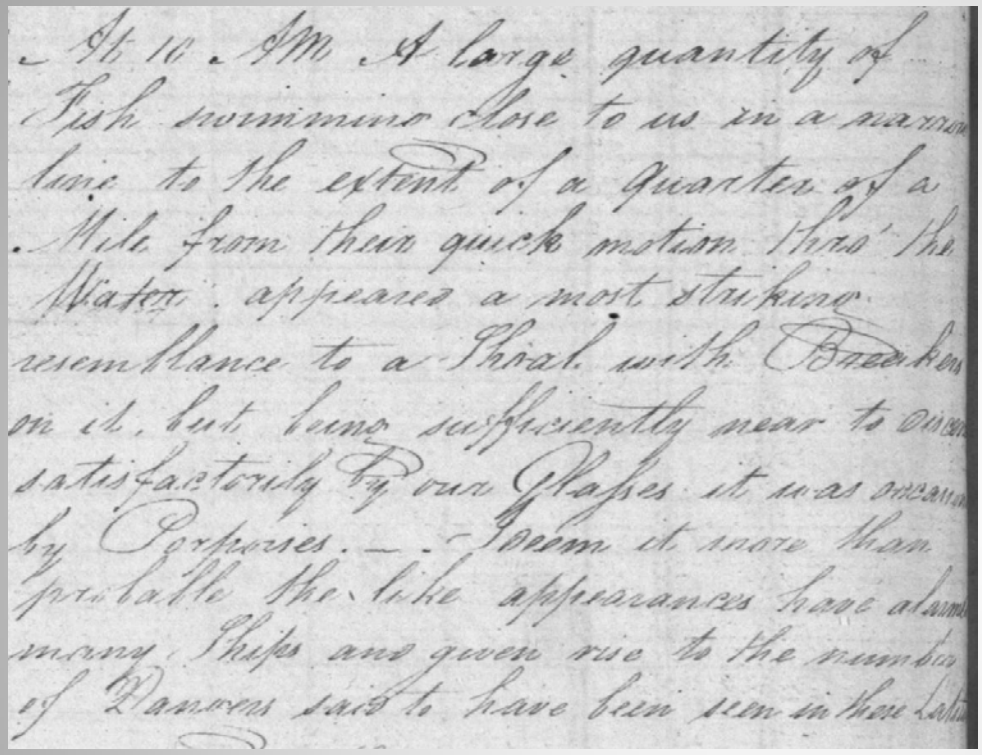

At 1 P.M. Committed the body
of the deceased to the deep with
the usual ceremony.

'At 1 P.M. Committed the body of the deceased to the deep with the usual ceremony.'
Astell, Logbook 12G – 4 March 1820


A.M. Examined the Lazaretto on finding
the Rats had done considerable damage
to some Cases, on searching the Cases
of Teas, found three completely gutted
also a large quantity of Rice missing
which they evidently had destroyed.

'A.M. Examined the Lazaretto on finding the Rats had done considerable damage to some Cases. on searching the Cases of Teas, found three completely gutted also a large quantity of Rice missing which they evidently had destroyed.'
Alfred 2, Logbook 140M – 19 July 1811

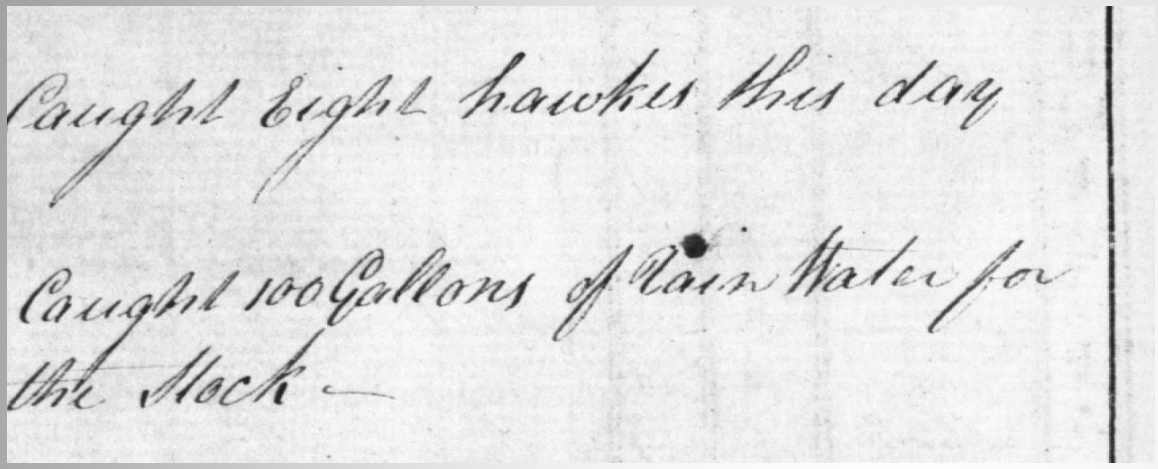
Interesting reads:


At 10 AM A large quantity of
Fish swimming close to us in a narrow
line to the extent of a Quarter of a
Mile from their quick motion thro' the
Water appeared a most striking
resemblance to a Shoal with Breakers
on it, but being sufficiently near to discern
satisfactorily by our Glasses it was occasioned
by Porpoises. — I deem it more than
probable the like appearances have alarmed
many Ships and given rise to the numbers
of Dangers said to have been seen in those Latitudes

"At 10 A.M. A large quantity of fish swimming close to us in a narrow line to the extent of a quarter of a mile From their quick motion thro' the water appeared a most striking resemblance to a Shoal with Breakers on it....."

Alfred 2, Logbook 140M – 4 June 1810

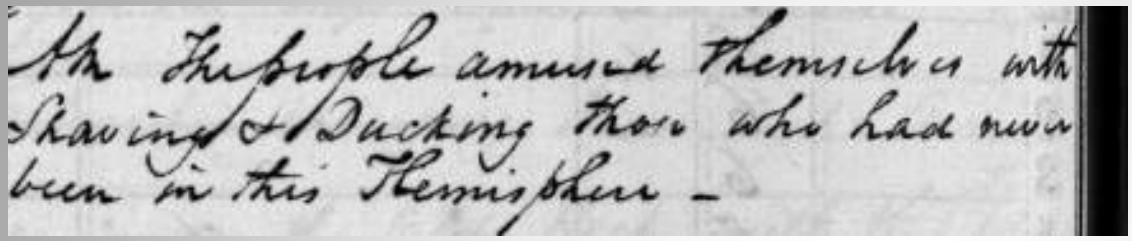
Interesting reads:


Caught Eight hawkes this day

Caught 100 Gallons of Rain Water for the Stock —

"Caught Eight hawkes this day.
Caught 100 Gallons of Rain Water for the Stock"
Britannia 4, Logbook 285CCC – 11 November 1802

Interesting reads:



"AM The People amused themselves with Shaving and Ducking those who had never been in this Hemisphere"
Thomas Grenville, Logbook 10L – 13 June 1829

Description of Shaving and Ducking from Wikipedia:

*'The practice of **shaving** new seamen **and ducking** them in the sea the first time they cross the Tropic of Cancer. The custom, common on 18th century British sailing vessels, involved tying a rope around the man and dunking him in the sea three times from the main yard. Sailors could pay a fine to escape the rite of passage, but most accepted it, many enthusiastically.*
At other times, ducking was used as a punishment.'

Thanks!

- CDMP
  - Multi-year funding to digitize the logbooks.
- RECovery of Logbooks And International Marine data (RECLAIM)
  - Significant contributions in cataloging and prioritizing EEIC logs with instrumental data and additional metadata work.
  - Additional work cataloging tabular EEIC data in published collection
  - Collection of sympiesometer observations from logbooks and published works
- Dennis Wheeler - University of Sunderland
  - Major help coordinating efforts with the British Library and getting the imaged logs to NCDC.

Thanks!

- ACRE; UK Met Office
  - Securing funds to image the logbooks; Analysis of the data and translation to the IMMA format for ICOADS
- ICOADS
  - Help with keying format and additional feedback during the course of the project
- HOV, Services
  - Preparing images and coordinating digitization
- TDEC
  - Digitizing the data