BRITISH LOGBOOKS IN UK ARCHIVES
A survey of the range, selection and suitability of British logbooks for climatic research

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Acknowledgements

Introduction

This report discusses the range, availability and suitability of ships' logbooks in British archives to yield high resolution, instrumental and non-instrumental climatic data. The temporal range of the report is from the 18th century to the Second World War. Much of the report is based on the experience and expertise developed during the course of the CLIWOC Project, funded by the European Union from 2001 to 2003. CLIWOC (Climatological Database for the World's Oceans: 1750 to 1850 - www.ucm.es/info/cliwoc) drew on British, Spanish, Dutch and French logbooks in the pre-instrumental period 1750-1850. As well as being a separate climatological database, CLIWOC is also becoming part of ICOADS (icoads.noaa.gov). During the course of the CLIWOC Project less than 5% of British logbooks were exploited and none after 1830. Part of the purpose of this report is to commit the entire experience of the UK CLIWOC team to paper. This will enable future exploitation and processing of climatic data from British logbooks to be handled effectively and efficiently. The other purpose of this report is to explore the potential of the British archives to yield data for the post-1850 instrumental period. The first part of the report will discuss the range of logbooks available within each archive. Early logbooks will then be discussed in detail, including the general availability of early instrumental data. The selection criteria for early logbooks will then be recommended as well as integration with the existing CLIWOC data, avoiding unnecessary duplication of material. The latter part of the report will concentrate on the availability and nature of logbooks for the instrumental period from 1850 to 1945.

1. Scope, Range and Organization of the Collections

In the United Kingdom, ships' logbooks can be found in three main repositories. These are the British Library (BL), the National Archives (TNA), formerly known as the Public Record Office (PRO) and the National Maritime Museum (NMM). Each of these holds a distinct group of logbooks. The National Archives hold Royal Navy logbooks compiled by individual officers, and general ships' logbooks recorded by the officer of the watch. The officers' logbooks consist of captains' logs and the logbooks of the master or navigating officer. The British Library collection is primarily made up of logbooks produced by officers of the East India Company. The National Maritime Museum holds the collection of Royal Navy logbooks written by lieutenants. Much smaller collections can be found in museums, county record

offices and institutions such as the Scott Polar Research Institute, Cambridge, the Royal Geographical Society, the UK Hydrographic Office, Taunton and the Meteorological Office, near Exeter. It is the collections in the three main repositories that form the primary focus of this report.

1.1   The National Archive (www.nationalarchives.gov.uk)
The National Archive is located at Kew in southwest London. Best access is by tube from central London via the District Line. The National Archives are the chief repository of papers and documents generated by the activities of the British state from medieval times to the present. The major part of the collection of ships' logbooks was generated by the activities of the Royal Navy and is in original manuscript form. The remaining part of the collection is made up of microfilm copies of the logbooks of the Hudson's Bay Company. The original manuscripts of these reside in Canada.

Temporal and Geographic range
The Royal Navy (RN) logbooks held in the National Archive begin in 1669 and run through to 1976. Logbooks prepared since 1976 are subject to the thirty-year exclusion rule as these remain confidential. There are an estimated 220,000 individual logbooks. The geographic range of the logbooks is global. The North Atlantic, West Indies and Mediterranean are particularly well represented. The RN was also active in the South Atlantic and Indian Oceans, including the Bay of Bengal and Arabian Gulf. Coverage of these areas is good though less dense than the North Atlantic before the 19th century particularly in times of peace. The Pacific Ocean is the least well represented. The vessels of the Hudson's Bay Company, sailing from England to the Company's factories in Canada, cover the higher northern latitudes of the Atlantic from 1751 to 1870. Many of these also traded in the Pacific. The northernmost regions are represented in the 19th century by a large number of vessels engaged in Arctic exploration.

Organization, binding and condition
The RN logbooks form a subdivision of the Admiralty records (ADM). These Admiralty documents consist of the administrative and operational records of the RN from the 17th century to the recent past. The logbooks are organized into the groups ADM 50 to ADM 55 inclusive. Hudson's Bay Company logbooks are in BH 1. There are a small number of additional logbooks to be found in ADM 7/777 to ADM

7/780. The organization and cataloguing of groups ADM 50 to ADM 52 makes it difficult to determine the exact number of individual logbooks available or to give an exact number on a decadal basis. This is because some logbooks overlap between decades and some volumes contain a very wide range of dates. The cataloguing convention of grouping logbooks under the name of the ship brings together the logbooks of different ships in different periods. Any figures given below are however a very close approximation and sufficiently accurate to give a reliable guide.

ADM 50 (Admirals' Journals)
There are 413 volumes of Admirals' journals covering the period 1702-1916 providing approximately 1,000 logbooks. Some are purely narrative as flag officers were not required to record the general navigation and management of the ship. The admiral did not command a vessel and the captain's or master's logbook should be preferred to an admiral's journal in all cases.

ADM 51 (Captains' Logbooks)
The series of captains' logbooks run from 1669 to 1853. They comprise 4,563 volumes or pieces, each containing between 4 and 10 individual logbooks. There are approximately 25,000 logbooks in total. Table 1 gives an approximate number of individual logbooks by decade.

Decade	Logbooks	Decade	Logbooks
1669-1679	130	1770-1779	1001
1680-1689	227	1780-1789	1311
1690-1699	956	1790-1799	3390
1700-1709	1105	1800-1809	7329
1710-1719	727	1810-1819	2217
1720-1729	475	1820-1829	761
1730-1739	529	1830-1839	895
1740-1749	1146	1840-1849	661
1750-1759	837	1850-1853	55
1760-1769	986	**Total**	**24738**

Table 1. ADM 51-Decadal Range (figures slightly inflated due to year range or decadal overlap in some volumes)

Each individual logbook had a standard original, marble effect paper cover enclosing the contents, which are bound into this cover. For storage each logbook has been individually enclosed in an additional canvas cover with a part number written on the outside. (These 'part numbers' are not registered on the National Archive on-line catalogue system but can be identified by calling up the volume number and counting

the number of individual logbooks listed). Several parts are gathered together and placed in chronological order in a box designated with a volume or piece number. Each volume usually contains the logs of one named vessel (not necessarily the same vessel) over a period of years. However it is not unusual for volumes to contain the logs of more than one named vessel. These other vessels have names beginning with the same letter as the first. In the example to follow, volume ADM 51/1100 contains logbooks for the vessels *Zebra* and *Zephyr*. Some of the logbooks in ADM 51 are in a hard-bound, book-style, rather than individually collected in a box.

Usually a logbook will contain entries for a twelve-month period but there is no regulation concerning this. An officer began a logbook at the commencement of a commission or appointment, and after twelve months often began a new document. Sometimes the new logbook was bound together with the first giving longer coverage. If an officer changed command, his current logbook ceased and another commenced for his next command. The first page, inside the cover of each logbook, will state the name of the vessel, the name of the captain, and the range of dates covered. If there is no cover, it is either lost or more likely the logbook is a continuation of a previous document. If in doubt, the logbook was always signed on the last written page and this signature should match a logbook title page to be found somewhere else in the set. The final date in the logbook can also be matched to a title page to be certain of its place in the series.

The example following is typical of the contents of a volume. Remarks are the author's and based on the information from the on-line catalogue and reference to ADM 8, the station lists that provide the disposition of all vessels on a monthly basis.

Name of Ship	Date Range	Author's Remarks
Zebra	1777-1778	(12 months) stationed off North America
Zebra	1780-1782	(18 months) The gap between 1778 and 1779 could indicate a missing logbook that may be found in another archive. Alternatively the Zebra may have returned to the UK to be re-commissioned in 1780.
Zebra	1782-1783	(3 months) Probably a change of commanding officer.
Zebra	1783-1784	(18 months)
Zephyr	1779-1781	(22 months) At least two voyages to West Africa 1780-1781.
Zephyr	1781-1782	(9 months) Probably de-commissioned at the end of the war

Contents of ADM 51/1100

The binding of each logbook is such that it can easily be laid flat or nearly flat for imaging (not for the hardbound sets). The binding is not close so the entire page is easily visible. The quality of paper and ink is usually excellent, making the text clear and readable. The legibility of the handwriting in captains' logbooks tends to be very good and is usually better than more junior officers. In some cases, a professional clerk or secretary wrote up the logbook, and these are generally very fine examples. If a captain died during the course of a voyage, the first lieutenant signed off the logbook and recourse would then be needed to the lieutenants' logbooks at the National Maritime Museum for coverage of the remainder of the voyage.

The above points apply to those logbooks that are separate and individually wrapped. However some logbooks in this series will be hard bound in binding that will be found to be in poor condition. Care will be needed to keep imaging equipment free from dust and in some instances the nature of the binding will make it difficult to lay the logbook pages flat. This will only apply to a small number of the logbooks.

ADM 52 (Masters' Logbooks)
The masters' logbooks run from 1672 to 1840. The master was the chief navigating officer. On smaller vessels, the commander himself performed this function. There are 2,103 volumes and about 15,000 individual logbooks. Table 2 provides an approximate number by decade.

Decade	Logbooks	Decade	Logbooks
1672-1679	4	1760-1769	968
1680-1689	125	1770-1779	1058
1690-1699	705	1780-1789	1644
1700-1709	726	1790-1799	2577
1710-1719	366	1800-1809	3469
1720-1729	335	1810-1819	1529
1730-1739	311	1820-1829	393
1740-1749	647	1830-1840	190
1750-1759	764	**Total**	**15811**

Table 2 ADM 52 – Decadal Range (figures slightly inflated due to year range or decadal overlap in some volumes)

The covers, binding, condition and organization are the same as the captains' logbooks and in most respects master's logbooks appear identical to the former. Many masters' logbooks however contain sub-daily meteorological information with the hour of the day appended. These are not regular 'hourly' observations but notes

of a change of wind direction, wind force and weather conditions with the hour in which such changes occurred. This is a refinement on captains' and lieutenants' logbooks where there is usually a chronological list of wind directions but no indication of the time of day. The CLIWOC UK research team found the abstraction of data from this type of logbook time consuming, therefore the benefit and usefulness of such refined data needs to be weighed against the additional time required to process it.

ADM 53 (Ships' Logbooks)
ADM 53 are ships' logbooks as distinct from officers' logbooks and were kept by the officer of the watch. They run from 1799 to 1976 (current public availability). There are 180,548 separate logbooks. Unlike the earlier series, the piece numbers represent an individual logbook. Any logbooks held by the National Archive for the period after 1976 are presently (2006) subject to a 30 year exclusion rule. Approximate numbers by decade for the 19th century are listed in Table 3.

Decade	Logbooks	Decade	Logbooks
1799-1809	277	1850-1859	3966
1810-1819	617	1860-1869	2973
1820-1829	396	1870-1879	1887
1830-1839	638	1880-1889	2328
1840-1849	2302	1890-1899	2830

Table 3 ADM 53 19th century Decadal Range (figures slightly inflated due to decadal overlap in some volumes)

It should be noted that the large increase in the number of logbooks towards the end of the 19th century is a reflection of a change in logbook format. Some logbooks from this period cover less than one year and sometimes less than six months causing inflation of the figures represented.

ADM 54 (Supplementary logbooks)
This series is made up of 330 volumes and in all 383 individual logbooks. They run from 1808 to 1871. They are mostly captains' logs though there are some written by other officers.

ADM 55 (Ships on exploration) - Microfilm
This series, available only on microfilm, is made up of vessels on exploration or undertaking hydrographic surveys. It does not contain all vessels on this type of mission, as many more of these can be found in ADM 51 and ADM 53. The series

also contains several merchant ships, East India Company ships and at least one whaler. The geographic range is extensive but weighed heavily towards the Arctic, Antarctic, and then the Pacific, Australia and the west coast of North America. A small number of logbooks are of vessels situated off west and southern Africa, the Cape Verde Islands and one example off the Falkland Islands. There are 164 separate volumes containing 194 individual logbooks. There is a large amount of duplication. For instance the series contains the logbooks of James Cook and all of the officers of the *Resolution.* There is similar duplication of logbooks for the *Investigator* (Flinders) and *Hecla* (Parry). When the duplicates are discounted there are about 100 logbooks remaining. Six logbooks are specifically designated as meteorological journals. Four of these have observations made in the Arctic, one the Antarctic and one the Pacific (*Resolution*). Many of the logbooks in this series will contain instrumental data. However, of those sampled many of the earliest did not have instrumental data, the Cook and Flinders logbooks, excepted. Instrumental data is here defined as temperature and barometric pressure, or at the very least, temperature alone. In this series, logbooks written after 1820 are the most likely to consistently record instrumental data. These logbooks should be considered a high priority for processing, particularly as they are already available on microfilm. It will be possible to supplement the instrumental data taken from this series by vessels on hydrographic and exploratory missions in ADM 51 and ADM 53. A list of all such vessels is in Tizard, (1900).

ADM 7 (Additional logbooks)
ADM 7 contains 35 logbooks including several unspecified Dutch vessels (ADM 7/844). Most of the logbooks are from the late 17th century; another cluster exists for the 1780s and many of these cover a period of only a few months. A notable exception is the two logbooks of the *Aurora* (ADM 7/954-5) covering a return voyage to the Far East 1899-1902.

BH 1 (Hudson's Bay Company)
BH 1 is a microfilm archive of the records of the Hudson's Bay Company. The original logbooks, in manuscript form, have been archived in Canada. (www.gov.mb.ca/chc/archives/hbca/indes.html) There are 130 volumes of logbooks held on microfilm with references BH 1/1509 to BH 1/1639 inclusive. In total there are 437 logbooks, some of which contain multiple voyages. The logbooks were

originally microfilmed in alphabetical order but each microfilm set does not always contain just one vessel or voyage. Some of the microfilms contain only part of a voyage, the remainder of the voyage can then be found on the next microfilm in the sequence. The earliest date is 1751 and the series runs through to 1870. The microfilm images of the earlier logbooks (1750s) are of poor quality and difficult to read. Many of the logbooks are for voyages from Gravesend in the Thames estuary, northwards around Orkney then west to Hudson's Bay and the factories at Moose, Churchill and York. Vessels departed in May to reach the Bay as the ice broke in spring and returned during the months of August and September. The series also contains logbooks for vessels voyaging to the Sandwich Islands (Hawaii) and the Pacific coast of Canada.

1.2 British Library (www.bl.uk)

At the British Library, located in central London, there are 50 miscellaneous logbooks scattered among the Additional Manuscripts collection. The India Office Records (www.bl.uk/collections/orientaloffice.html) keep the most significant collection. These are the logbooks and journals kept by officers for the East India Company (EIC). There are 3,822 journals, most of them catalogued under prefix L/MAR/B. An essential guide to this collection is Farrington (1999). This catalogue lists each vessel alphabetically with details of its voyage and the date of arrival at various destinations. At the time of this report (2006) there is no on-line catalogue of EIC logbooks. The EIC ceased as a trading organization after 1834, and this is reflected in the Farrington catalogue. However there are additional logbooks of East India merchant ships for the post 1834 period held in the India Office Record. These additional logbooks are also catalogued under L/MAR/B.

Temporal and Geographic range

The collection of EIC logbooks starts in the early 17th century, though there are less than 200 covering the years before 1700. Most of the logbooks cover the 18th and early 19th centuries up until 1834. Each logbook contains the outward and return leg of a voyage, traversing the North and South Atlantic Oceans and the Indian Ocean. Many cover the South China Sea and occasionally parts of the western Pacific. In many respects they mirror the tracks of the Dutch East India ships whose logbooks are held in The Netherlands but additionally include good coverage of the Bay of Bengal and parts of the Arabian Gulf.

Organization, binding and condition

The EIC logbooks are bound chronologically under the name of the ship, each volume containing three to four logs. Although in hard binding, each page is usually easy to view. Due to the layout and format of these journals, no information is lost at the binding margin. They will lie reasonably flat for imaging. The general condition of the logbooks is excellent. A small number have runs of pages where the ink has faded making it difficult and in some instances impossible to read. The number of these logbooks is small and the problem is usually confined to a section of the logbook and not to the entire volume. A very small number of these logbooks have latitude and longitude recorded in a non-standard format that renders their usefulness problematic. For instance, one logbook from the 1750s, probably as an experiment, recorded longitude by magnetic declination only. It should be stated here that many of the later EIC logbooks contained instrumental data. These data are usually for temperature (common from the 1790s onwards), but barometric readings started to appear about 1800 and became more frequent as the 19th century progressed. The availability of instrumental data, the wide geographic coverage (at least three oceans per voyage) and the consistency of the sailing routes used suggest that this series should be given very high priority for imaging. The CLIWOC UK team found these logbooks to be the most useful of the various types that they used.

1.3   National Maritime Museum (www.nmm.ac.uk)

The National Maritime Museum is located at Greenwich in southeast London. The Museum's cataloguing system also contains a section ADM for Admiralty records, and the lieutenants' logbooks are classified under this heading. The 5,205 volumes of these documents were transferred to the Museum from the Admiralty in 1938. The volumes are classified under ADM/L, and in common with the other two archives are arranged according to the name of the ship. It is estimated that there are about 62,500 individual lieutenants' logbooks. The Museum also keeps over 100 journals written by officers of the EIC. There are additional naval and merchant shipping logbooks in both manuscript form and on microfilm, some whaling logs and a few logbooks of French and Spanish warships. Most of these are in miscellaneous collections or part of a distinct collection of family or company papers.

Temporal and Geographic range

The lieutenants' logbooks run from the 1680s to about 1807, with a handful extending the range to 1809. It was about 1806 that lieutenants were no longer required to submit logbooks to the Navy Board to receive their pay. It took some months and even years for these instructions to circulate to those vessels on distant stations, meaning that the number of logbooks begins to tail off after 1806. The geographic coverage is identical to that of the RN captains' logbooks in the National Archives.

Lieutenants' Logbooks - Organization, binding and condition

As many ships carried more than one lieutenant there is a frequent duplication of logbooks in this series. This is advantageous in the sense that some officers kept better journals than others or were more fulsome in their recording, making it possible to select the best from a number of journals covering the same voyage; and also possibly allowing cross-validation of the observations between duplicate journals. There are several captains' logbooks bound up with this series. In some instances these are duplicates of those found in the National Archives. However there are instances where a captain's logbook has been bound with this series rather than with its proper collection. More importantly, lieutenants could command naval vessels such as small sloops, brigs, cutters and schooners. Therefore the logbook of the commanding officer of a small ship might be found at Greenwich rather than in the National Archives. There is no consistency in the way the Admiralty separated captains' logbooks from those of lieutenants commanding as these lieutenants' logs can be found in either archive. Furthermore, where a lieutenant had assumed command of a vessel on the death of a captain, his log may also be found in Greenwich though again there is no rule that determined in which archive it would be held.

Where more than one ship is contained in a volume they are usually vessels whose names begin with the same letter, although there are some exceptions. The individual logbooks in each volume are for the most part, arranged chronologically though there is sometimes a wide range of dates represented. Each volume contains anything from six to twenty individual logbooks

The lieutenants' logbooks have been bound into large volumes. The majority of these are in the original Admiralty leather binding, each volume being contained in an

additional canvas or paper wrapper. The volumes containing the ships whose names begin with letters A to C have been rebound. These rebound volumes present a number of difficulties for imaging. First where volumes have been rebound, the binding is sometimes tight making it difficult in some instances to view the very edge of the inside part of the page. In these circumstances it will be difficult to make the page flat for imaging and there may be problems with depth of field over the entire page. Secondly, those logbooks in their original binding present a different set of considerations. The original binding in many cases is disintegrating causing much dirt and dust when handled. Imaging equipment may need frequent cleaning to ensure a sharp image. The back of the binding is frequently broken and often the individual logbooks are loose. This does at least allow the pages to be laid flat for imaging.

A small number of logbooks are badly decayed and possibly beyond preservation. There is no way of knowing the condition until the wrapper is opened. The majority, despite the state of the binding, have pages in good condition. The ink is good and they are perfectly readable.

Other Collections at the National Maritime Museum
Organization, binding and condition
The Museum has nearly 1,500 logbooks outside of the lieutenants' collection. There is no catalogue convention that brings these together and they can appear anywhere within the collections either as a distinct series within a 'section' or as part of a group of company or family papers. Of these, the LOG series (catalogued under section 6 in the Museum) is particularly good and worthy of consideration as one of the priorities for imaging. There are 496 individual logs. The binding and condition of these is generally excellent. A description of the LOG series follows.

LOG/C
LOG/C contains 79 logbooks of merchant vessels. Many are masters or midshipman's logs for EIC vessels. In some instances there is not a corresponding logbook at the British Library (Farrington, 1999). Some are very fine examples such as the logbooks of the *Castle Huntley* in the 1820s. The CLIWOC Project used 12 logbooks from LOG/C, but nearly 70 remain unopened, covering the 18th and 19th centuries. Of those viewed, the binding and condition is excellent

LOG/F

There are eight logbooks for foreign navies mainly French and Spanish. These have not been viewed.

LOG/M

LOG/M contains a further 79 merchant ships' logbooks. The CLIWOC Project used only one logbook from this set. The binding and condition of those viewed is excellent. The series contains items of exceptional interest such as the logbook of the merchant brig *Monarch* on a voyage from Liverpool to Valparaiso and back in 1824-1825.

LOG/N

LOG/N contains 330 RN logbooks, written by the captain, but also by lieutenants and midshipmen. Many are very fine and well kept examples. The CLIWOC Project processed only 4 of these, though details of many more were prepared for abstraction. Junior officers wrote many of these logbooks but some are also captains' logs. Most will be duplicates of those in the National Archive.

MRF

MRF, meaning microfilm, is a small and varied collection of logbooks available only on microfilm.

JOD

JOD, meaning journals and diaries, contains a small number of purely narrative logbooks. These rarely contain any tabulated data but usually contain all the elements commonly found in standard logbooks. Some contain instrumental data, however the narrative format means that the abstraction of this data is time consuming.

Private and Company Papers

Only a close approximation of the number of logbooks available under this heading can be provided. This is because the series contains a small number of medical logbooks and engineer's logbooks, as well as non-standard unofficial accounts of voyages that have also been classified as logbooks. Section 4 of the NMM's manuscript collection contains 610 logbooks covering the 18th and early 19th centuries. Section 5 has 100 logbooks covering the same period. Sections 7 and 8 have 11 and 5 logs respectively and section 9 has 289 logbooks. The latter are classified as 'uncatalogued' and have non-standard Museum reference numbers prefixed 'mss'.

Many of these logbooks have at some time been part a collection of company papers or the private papers of an individual. Though many are captains' logbooks

there are also the logbooks of midshipmen, other junior officers and petty officers. As an example, the papers of Joseph Dudman (DUD) can provide logbooks for the EIC ship *Warely* from 1811-1816, and the *Inglis* from 1811-1829. Many more sets of papers have yet to be examined but look promising. Of those company and private logs viewed, all are in good condition.

Meteorological Logbooks and Journals

The collections of private and company papers contain a modest number of meteorological journals. These are not strictly ships' logbooks and are commonly some form of abstract journal. There are many fine examples such as the met logs of HMS *Enterprize* 1850-1852 (CLS/29/1-2) and the monthly met tables for HMS *Challenger* 1872-1876 (TIZ/63/2).

2.   Types of Logbook and their Notation
2.1   The Early Royal Navy Logbook – Pre 1850
     A. Format

The RN logbooks fall into two distinct types. The format of these two types is dependent on the reckoning of the day. The first format, based on the nautical day, had the logbook page divided into a series of rows and columns, each row representing a different day. The rows extended across two facing pages. The nautical day began at noon and was 12 hours ahead of the civil day. An example appears below, fig. 2.1.

Left Hand Page   **Right Hand Page**

1796 November HM sloop Rattlesnake								Remarks
Day	Date	Winds	Course	Distance	Latitude	Longitude	Bearing & Distance	
Thurs	3rd	SbE S	S54W	86	34.06S	14.58E	Table Bay N86E 52 leagues	PM Fresh Breezes and cloudy. AM moderate breezes. …………
Fri	4th	SEbS SSW	S49W	81	34.59S	13.47E	Table Bay N75E 80 leagues	Fresh breezes and cloudy. ……………

Fig. 2.1 Typical 18th century British naval logbook (nautical day)

The second format is based on the civil day, although a layout, including sub-daily entries, was also in used before the adoption of the civil day. Here the information for each day was contained either on one entire page or half page. Each daily section was divided into morning and afternoon with the noon-day information placed between the two. The example below, fig. 2.2, shows the top half and centre of a full-page entry of the civil day logbook format. Note the inclusion of hourly entries. Many logbooks of this type kept two-hourly entries.

Friday 31 Dec 1824					HMS Tweed
H	K	F	Course	Winds	Remarks
1am	5	4	SSE	ENE	AM. Moderate breezes with rain at times
2	5	3			
3	6	2	ESE	NEbE	
11		2			
12	6	3	SEbS	ENE	Noon fresh breezes and cloudy

Noon				Lat.	Long.	Bearing & Dist	Variation
Course	Distance		Departure	Acc.	Acc. 36.53W	Trinidada N24E	Azimuth
S37E	75			Obs. 22.39S	Chro. 37.23W	153 Leagues	Amplitude
				Diff.	Diff.		

H	K	F	Course	Winds	Remarks
1pm	5	3	SEbS		1pm ditto weather 3pm light breezes and clear
2	5	1			
3	3	2	SbE	EbN	

Figure 2.2 Typical early 19th century Naval Logbook (civil day)
explanations of some of the entries and notation appear in the appendix

The logbook format changed from the first to the second type over the period of a year or two after the Admiralty issued a directive, 11 October 1805, for logbooks to conform to the civil day. If there is doubt about whether a logbook is based on the nautical or the civil day the best clue is the notation of am and pm in the remarks section. In the earlier logbook, based on the nautical day pm will always precede am as the afternoon period was the first part of the new day

B. Typical ocean areas and sailing routes
Naval activity in all oceans and seas was more common in times of war and it is for such periods that the highest density of naval logbooks and meteorological data (and sometimes the lowest density of merchant logbooks) will be found. The chief periods of war were, before 1815, numerous and often extended. Those conflicts coinciding with the range of logbooks in the archives are:

1. Second Anglo-Dutch War 1664-1667 – mostly English Channel and North Sea.
2. Third Anglo-Dutch War 1672-1678 – mostly English Channel and North Sea.
3. Nine Years War 1688-1697 – Channel, Mediterranean, West Indies.
4. War of the Spanish Succession 1701-1713 – Channel, Mediterranean, West Indies.
5. Great Northern War 1710-1721 – British fleet present in the Baltic 1715-1721, and again in 1726-1727.
6. Various short disputes with Spain 1718-1739 – Mediterranean, West Indies.
7. Anglo-Spanish War 1739-1744 – Mediterranean, West Indies.
8. War of the Austrian Succession 1744-1748 – Mediterranean, West Indies, North America, India. – Near Global.

9. Seven Years War 1756-1763 – Mediterranean, West Indies, North America, India,
Pacific (Philippines) – Global.
10. War of American Independence 1776-1782 – Global.
11. French Revolutionary War 1792-1802 – Global.
12. Napoleonic War 1803-1815 – Global.
13. Crimean War 1854-1856 – Mediterranean, Baltic.

Fleets

Fleets and squadrons operated within specific self-contained areas. These areas
correspond with the monthly fleet lists in ADM 8, at the National Archives. These
lists are vital to logbook studies in order to fix a vessel's location.

1. The North Sea fleet was responsible for the North Sea, English Channel and when
required, the Baltic.
2. The Channel fleet operated in the Western Approaches, Irish Sea, Bay of Biscay
and as far south as Cape Finisterre and Lisbon.
3. The Mediterranean fleet was usually concentrated in the western Mediterranean,
and the Atlantic coast of Spain and Portugal as far north as Lisbon.
4. North America had several areas of operation. These altered after the American
colonies gained independence. Prior to this there were distinct areas designated as
Newfoundland, Nova Scotia, and the Plantations (covering New York, Virginia
and the Carolinas).
5. The West Indies fleets were divided into two distinct groups; Jamaica and the
Leeward Islands. There was often a frequent movement of smaller vessels
between the West Indies, the plantations, Nova Scotia and Newfoundland.
Group 4 and 5 therefore form a large cluster covering the eastern Caribbean and
the western Atlantic.
6. Africa – There was not an African squadron but West Africa and the Gulf of
Guinea were both designated destinations in the fleet lists. The vessels sent here
usually made their way on to Jamaica.
7. The East Indies squadron was the most extensive in geographic range but
frequently the smallest in the number of vessels. The station in terms of operations
stretched from Madagascar (and later the Cape) to China, covering all of the
Southern Ocean, Arabian Gulf, Bay of Bengal, Indonesia, the South China Sea
and the Philippines. There was no permanent presence in these waters. The East
Indies squadron until 1793 was ordered home at the conclusion of a war.

Sailing routes (also see the shipping tracks in appendix II)
Geographical coverage, as noted above, is generally good. Nevertheless, and for the
obvious reasons of needing to exploit favourable winds, ships tended to follow the
same or similar routes. These are summarised in figure 2.3, which is based on
CLIWOC data, but provides an excellent impression of coverage for logbooks of
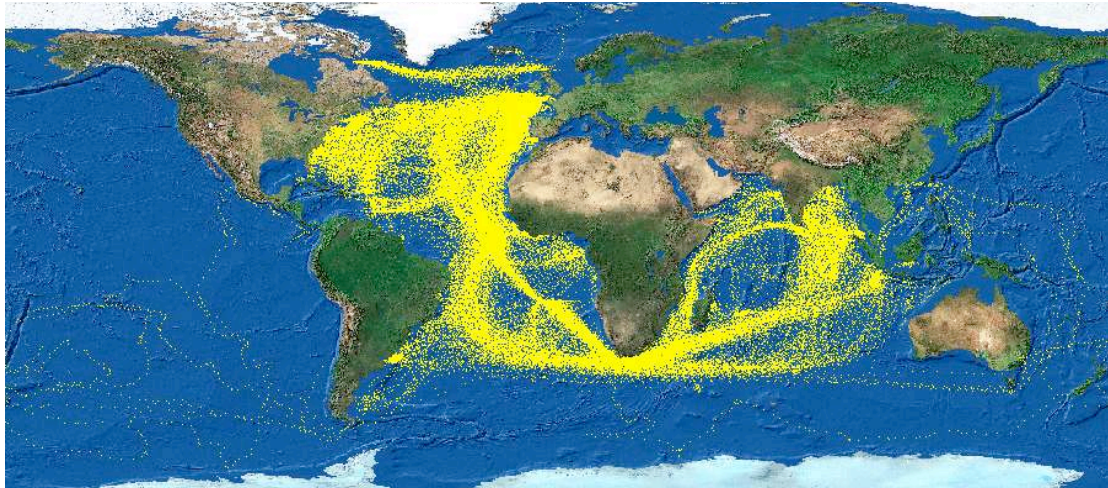British sailing ships.

Figure 2.3 Ocean Coverage of UK CLIWOC Data (ship tracks produced by Frits Koek, Royal Netherlands, Meteorological Institute - KNMI)

As a result, sailing vessels sent to designated areas could be expected, with occasional exceptions, to follow particular routes. Ships departing and returning from the northern parts of North America would maintain a fairly direct route to places such as Halifax or St. John's in Newfoundland. Vessels sailing to the southern American colonies and to the West Indies would take a route to the south of the sub-tropical anti-cyclone, taking advantage of the NE trade winds. Those vessels sailing to Jamaica, either directly from Europe or from Africa would take a similar route and always make a landfall at Barbados (fig. 2.4). Most vessels returning from the West Indies would take their departure (last sighting of land) from one of the Bahama Islands with ships homeward bound from Jamaica first rounding the western end of Cuba. Their route across the Atlantic would then pass close by Bermuda and then to the north of the Azores making a landfall off Lands End in Cornwall (fig. 2.4). The route from the Gulf of Guinea to the West Indies involved a westerly course, south of the Equator to avoid the ITCZ (Inter-Tropical Convergence Zone or doldrums) taking advantage of the SE trades, and then crossing to the north of the equator near 30ºW. Those vessels sailing between the West Indies and North America and Canada would often maintain a course close to the meridian of Barbados or one of the Leeward Islands.
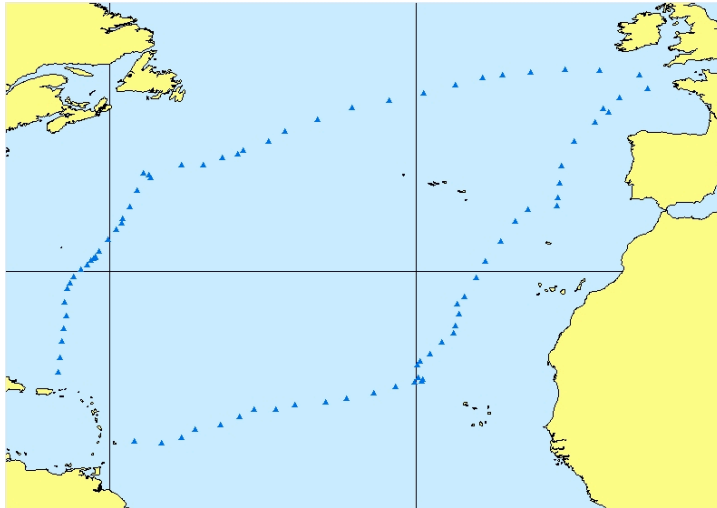
Fig. 2.4 Typical sailing route to and from the West Indies (Frits Koek-KNMI)

RN vessels sailing to the South Atlantic and Indian Oceans followed the same routes as the EIC ships. The route of EIC and RN vessels bound to the Cape or beyond, took them south past Madeira and the Canary Islands making a landfall off one of the Cape Verde Islands, commonly St. Jago or Bonavista. From here a southerly route would cross the equatorial line usually between 18ºW and 27ºW. A long southerly sweep into the South Atlantic approaching 30ºS would then bring the vessel closer to the latitude of the Cape of Good Hope and a more easterly course (fig. 2.5). Some East India and RN vessels would take this same long sweeping route to reach St. Helena, which would then be approached from the south-east.
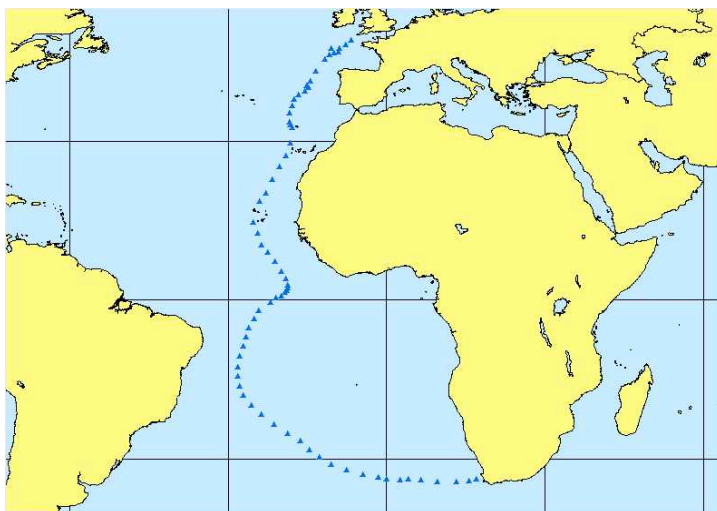

Figure 2.5 A typical sailing route towards the Cape (Frits Koek-KNMI)

C. Logbook Notation and Page Layout
Day of the Week

Very early logbooks, in particular those of the 17th and early 18th centuries adopted the standard astronomical symbols as shorthand for the days of the week. A circle with a dot at the centre, represented Sunday; a crescent moon represented Monday. Where there is uncertainty in interpretation, once these two have been identified the other days of the week can easily be determined. The day itself, before 1806 was the nautical day with the date changing at noon instead of midnight. When in port the ship would revert to the civil day. Sometimes a logbook would be endorsed, 'This log contains 12 hours' (to revert to the civil day) or 'this log contains 36 hours' to revert to the nautical day on leaving port. This is more commonly seen in EIC logbooks but applied also to the RN. It should be noted however that reverting to the civil day on board naval vessels would only occur when the vessel was anchored in a major port. Vessels offshore or blockading ports, and therefore not communicating with the shore on a regular basis, would retain the nautical day.

Date

Even the most basic of entries in early logbooks are not as simple as one might expect. The date for instance needs to be carefully accounted for. Before 1752 English dates were based on the Julian calendar. In 1752, Lord Macclesfield reformed the calendar by adopting the continental Gregorian calendar and 11 days were deleted, 2nd September 1752 being followed by the 14th. Furthermore before 1752, the year began on Lady Day, 25 March, rather than 1 January. Many logbooks before 1752 are double dated e.g. 21 February 1748/9. This convention extends back into the late 17th century but is not universal. The reader should be aware that in the absence of a double date, for instance 21 February 1733, the year may actually be 1734 by our modern reckoning. Double dating covers only the period 1 Jan to 25 March. Because some officers used 1 Jan, only checking of the logbook can confirm if, e.g., 21 Feb 1733 is 1733 or 1734.

Wind direction

The winds were listed in chronological order as they changed throughout the day. It is generally only in masters' logbooks that an hour of the day was appended to the wind direction. The last wind direction listed was that recorded at or before noon *on that day*. The first entry of a new day was after noon, usually 1pm. The wind directions were described by reference to magnetic and not true north. To fix the

ship's position by dead reckoning, a correction was made to the course 'made good' to account for the vessel's leeway. Leeway was the degree to which the vessel's course was altered by the lateral pressure of the wind on the hull and sails. The leeway was determined by wind direction and wind force and the sailing characteristics of the vessel. A further correction was made for magnetic variation, a term commonly used for magnetic declination. This correction was applied, to the computation of the course made good. Therefore, individual wind directions were not adjusted from magnetic to true until the various calculations had been performed. This was done by the navigating officer, sometime after the noon observations, and based on information recorded on a traverse board and rough log during the preceding 24 hours. A 32-point compass was generally used for recording both winds and courses. There are rare instances where very precise wind observations were made based on a 64-point compass. Many mariners however tended to favour the reporting of winds using just 16 or even 8 compass points out of the 32 (Wheeler, 2005).

Course
This was the course 'made good' between two successive noon-day positions after applying corrections for leeway and drift. Leeway has been described above. Drift was the result of the influence of surface currents and tides on the movement of the ship. The adjusted course was expressed as a degree of a circle but treated as quadrants. Thus in figure 2.1, the course S54W is 54º west of south or 234º. Although the courses steered were by magnetic compass, the course made good was plotted on a chart and therefore was with reference to true north.

Distance
This was the distance covered between successive noon-day positions. It was expressed in nautical miles, where a nautical mile is 1.15 statute miles.

Latitude
This was the distance north or south of the equator expressed in degrees and minutes. The value could either be an estimate, by account or dead reckoning, or by observation.

Longitude
A. Method
This was the distance east or west of a given meridian expressed in degrees and minutes. Until the last decades of the 18th century it can be assumed that all

longitudes are an estimate based on dead reckoning. From about the 1780s some vessels were employing more sophisticated and reliable methods of determining longitude. The following notation may appear next to the longitude recorded

Notation	Meaning
Lun or Lunar	Position calculated according to lunar observation and tables
Tk, chr or chro	Position calculated using a chronometer or timekeeper
Obs.,observed	Position calculated by solar or lunar observation
Dr, no obs., acc. or account	Position estimated by dead reckoning

In the absence of any notation the position recorded is certainly an estimate, as a dead reckoning account was always kept even when other methods were employed. It should be emphasised that with dead reckoning, many navigators built in a cushion of error to ensure the safety of the vessel. The intention was to put the reckoning ahead of the vessel's actual position so that a landfall could be anticipated. If instead the vessel was ahead of the reckoning, it then ran the risk of striking a coast at night before a proper lookout was deemed necessary. This is why some vessels may appear to be sailing over land when their courses are plotted. In these instances a correction can be applied as in figure 2.6.
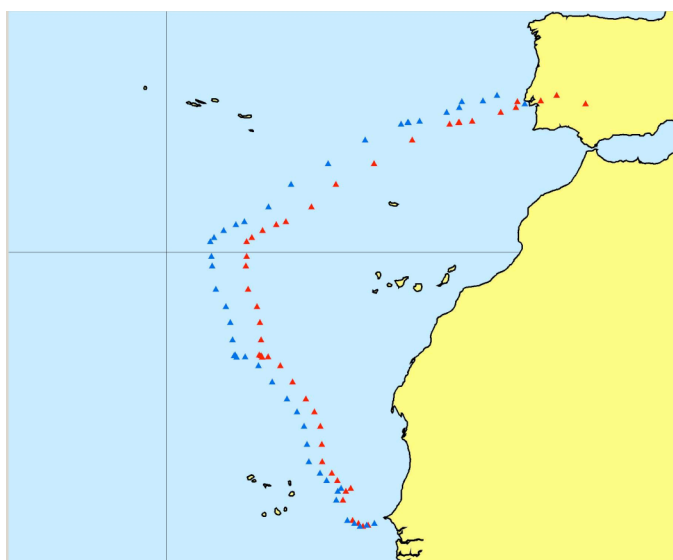
Figure 2.6 Course by Dead Reckoning (red) with Correction (blue)
(Frits Koek-KNMI)

B. Meridians
The meridian is the reference point to which a ship's longitude or position east or west is determined. The Greenwich meridian did not come into widespread use in British logbooks until the end of the 18th century and it was almost another century

before its adoption by other nations. Most of the longitude positions recorded in logbooks before 1790 were not based on the Greenwich meridian, although if the meridian 'London' was used, this was based on a line running through St. Paul's Cathedral. This line is 0º 05′ west of the Greenwich meridian. The meridians used were usually the last sighting of a clearly identifiable landmark, such as Start Point or Lizard Point when sailing out of the English Channel. Watling Island in the Bahamas was frequently used when sailing towards Europe from the West Indies. St. Helena and then Corvo in the Azores were used as zero meridians, after vessels sailing homeward from the East Indies had sighted them and fixed their position by reference to these known locations. The sighting confirmed the ship's position and allowed any accumulated error from dead reckoning to be reset.

Determining which meridian a vessel is using is essential but this information is seldom explicitly provided. The meridian used is most often, though not always, the landmark recorded in the column following 'longitude'. This is the 'bearings and distance' column as shown in figures 2.1 and 2.2. The officer would often keep a daily record in this column of the bearing and distance to some landmark whose position was well established. This was often the most recent sighting of land and this landmark would provide a zero meridian. To be absolutely certain it is sometimes necessary to go back some days or even weeks in the logbook and note the landmark bearing and distance when the longitude recorded is closest to zero. If the longitude is 0.00 and a landmark bears due north or due south then that particular location is the meridian used. But if after searching back, it is apparent that the meridian has been reset, for example jumping from 17ºW on one day to 2ºW on the next, there is likely to be a landmark in this instance, bearing NbE or NEbN (or possibly expressed as N12E or similar) and that landmark can be taken as the new meridian. The best method of keeping the correct meridian when processing a logbook is to keep a careful note of the sighting of landfalls during long ocean passages. The longitude will often be reset, the sighting having provided a new, and reliable meridian. There were, however no clear rules or conventions for fixing a meridian, and the method employed was subject to the inclination and experience of the log keeper. The CLIWOC Project identified over 450 different meridians. These can be found on the Project database under 'Geodata' which is available on the website at www.ucm.es/info/cliwoc. On the other hand, there were often occasions when no

longitude was recorded. This was common when close inshore or in sight of recognized landmarks. Reference can then be made to the next column 'bearings and distance at noon'.

Bearings and distance

This column in the logbook (fig. 2.1) gave the bearing and distance of some landmark from the vessel at noon. The landmark was not necessarily visible from the ship. If the landmark was in sight the bearing was expressed as a compass point and the bearing therefore magnetic. If the landmark was not in sight, the bearing was taken from a chart and was therefore a true bearing. In this instance the bearing would be expressed very precisely in degrees, for example N12E. As a general rule, bearings expressed as compass points are likely to be magnetic, those expressed in degrees are almost always true. The distance to a bearing was recorded in leagues (being 3 nautical miles) or, if close at hand, more precisely in leagues and miles. The bearings and distance column was seldom left blank, even in port when the location of the anchorage would be stated. The bearing and distance provides a check on the longitude of a vessel where the meridian being used is unclear. More importantly, this information was sometimes the only positional data available when latitude and longitude were omitted. This was usual when a vessel was inshore, in an enclosed sea area such as the Mediterranean, Baltic and English Channel, or when sailing amongst groups of islands such as those of Indonesia. All of these data are important for fixing the meteorological observations in space.

Remarks

The remarks column occupied the entire facing page in logbooks of the nautical day format (fig. 2.1). Unlike the tabular format of the opposite page, the remarks section was narrative. In it were described the force of the wind, general weather, precipitation, incidents of lightning and occasional mention of the sea state. Wind force was expressed, until well into the 19th century, in descriptive terms and assessed without the use of instruments. A discussion of the conversion of these terms to modern-day equivalents, as well as weather and sea-state descriptors are not within the remit of this report and the reader is directed to the literature on this subject, in particular CLIWOC (2003). The remainder of the 'remarks' section was an account of the general management of the ship including notes on discipline, health, mortality, sightings of other vessels and any other incident worthy of mention. The remarks

section was divided into distinct time periods. The notation pm and am were frequently employed, pm always preceding am when the nautical day was in use. Many logbooks divided the day into three parts. The first part corresponded to the period noon to 8pm. The second or middle part corresponded to the period 8pm to 4am. The latter part was the period from 4am to noon

Additional notation
The descriptions above apply equally to RN logbooks kept according to the civil day. The example, given in figure 2.2 of the civil day logbook format, includes some notation and sections not always found in the earlier types of logbook. The columns marked K and F referred to the vessel's speed recorded hourly. The column K was knots, or nautical miles per hour. The column F referred to fractional parts of a knot, commonly termed fathoms. There were eight fathoms to a knot. In this context the term fathom was not referring to depth of water, neither by the 17/18th century was it the more widely understood unit of 6 feet.

Originally, in the 16th century the English log line, by which a vessel's speed was measured, had knots at intervals of 42 feet. The number of knots run out by a half-minute glass gave the speed in 'knots' or miles per hour. There were seven fractional parts between the knots on the log line, each equalling six feet, hence a fathom being six feet. This was based on the notion that a mile of 5,000 feet equalled one minute of an arc of latitude. When it was determined that a minute of an arc was closer to 6,000 feet, the sea mile or nautical mile became a unit of measurement separate from the geographic mile. To compensate for this Richard Norwood in 1637 proposed that the knots on the log line be spaced at 50-foot intervals. The fractional parts of the knot, still termed fathoms, now totalled eight with a remainder of two feet (Taylor, 1971). This is why the '8 fathoms' in a knot are not six foot each. It should also be noted that knots and fathoms were not only used to record the speed of a vessel but also to record the velocity of a current.

The terms 'azimuth' and 'amplitude', either of which might appear in logbooks, referred to different methods of measuring the angle of a celestial body in order to determine the local magnetic variation. The term 'departure' is a reference to a landmark or meridian from which the longitude has been estimated. The figure inserted here is expressed either in degrees and minutes or nautical miles east or west of the point of departure.

2.2   The East India Company Logbook
A. Format

From the mid 18th century, the logbooks of the East India Company followed a consistent format with minor differences in the items recorded. The earliest EIC logbooks were often in a form similar to diaries. Later logbooks were prepared on printed pages following a common layout in use by the mid 18th century. Each logbook page was made up of two days. The day was laid out in six columns, the last being the widest and reserved for general remarks and narrative text. At the foot of each day were one, or sometimes two rows of tabular data containing all of the noon observations and navigational summaries for the day. From as early as the 1780s, printed logbook pages included spaces for air temperature and barometric readings. In common with early RN logbooks, EIC ships, and all other merchant vessels used the nautical day, each day beginning at noon, 12 hours ahead of the civil day. The nautical day was used throughout the period covered by EIC logbooks, and there was no conversion to the civil day reckoning except when in port.

B. Typical ocean areas and sailing routes

EIC vessels sailing from Britain tended to follow a seasonal pattern by departing during the winter and spring months, usually between December and May. This allowed them to enter the Indian Ocean soon after the commencement of the SW monsoon giving favourable winds to their destinations. It also meant that the Atlantic ITCZ was traversed while nearer the equatorial line and at its narrowest. Likewise, the return voyage from the east usually commenced in December or January to take advantage of the NE monsoon in the Indian Ocean. On reaching the equatorial line in the Atlantic, the ITCZ would be much further north allowing the Company's ships to take advantage of the SE trade blowing from a more southerly direction to the north of the line. Even with these environmental advantages it was not unusual to find East Indiamen sailing at less advantageous times in early or late summer.   The consequence of this largely seasonal pattern of sailing was that during the months of late October to early December, there were usually no such vessels traversing the South Atlantic.

The route of East India and RN vessels towards the Cape of Good Hope has been described above (fig. 2.5). Once past the Cape the usual route to India was through the

Mozambique Channel. By the 1780s and 1790s this track was less favoured except by those vessels bound to Bombay or requiring a stop at Madagascar. From the mid 1780s, those vessels bound to Madras and Calcutta would sail east to the meridian of Sri Lanka before adopting a northerly course to their destination. Others, usually for China, would sail even further east before turning north to make a landfall off either Christmas Island or off the coast of Sumatra. Vessels bound for China would frequently pass through the Malacca Strait, before traversing the South China Sea. The return voyage from India would sail a direct course towards the Cape of Good Hope. Those vessels sailing from China would commonly enter the Indian Ocean through the Sunda Strait, taking their departure from Java Head and sailing directly towards the Cape. From the Cape the route then led to St. Helena, then across the equator and usually to the west of the Azores before picking up the westerlies and heading towards Europe. (fig. 2.7)
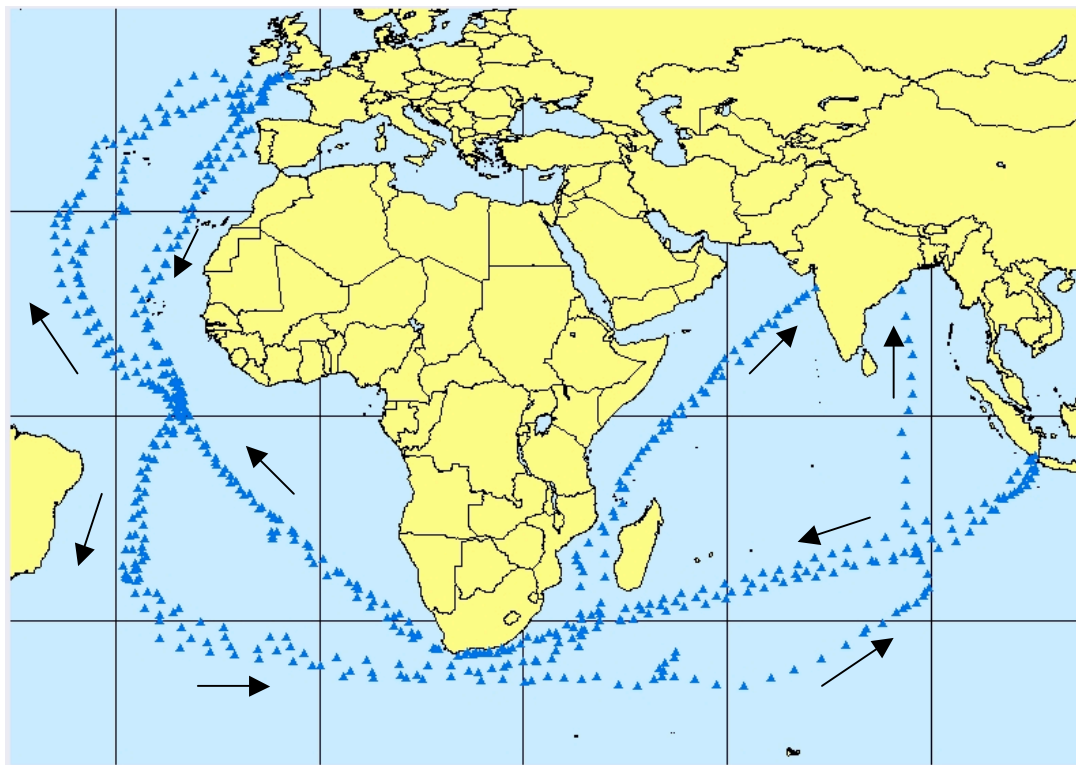

Fig. 2.7 Typical routes of East India Company vessels (Frits Koek-KNMI)

C. Notation
In the example of the *Melville Castle*, (fig. 2.8), the first column 'H' is the hour of the day, commencing with 1pm and ending with 12am or noon. The second column 'course' is the course steered by magnetic compass on an hourly basis.

Melville Castle				from England towards Bombay	
H	Course	K	F	Winds etc.	Monday 2nd April 1787
1	NEbE	6	6	S. cloudy	
2	-	7	2		
3	-	8	-		
4	NE	8	5		

9	-	9	4	SEbS squally + small	Variation by Amplitude 20.32W
10	-	9	5	rain	by Azimuth 19.56W
11	-	9	-		ship 13 miles to the southward of account
12	-	9	-	squally	
	209				Latitude observ'd 32°.12′S

Course	Distance	N	E	M + D	Lat. Acc.	Diff. Lon	Lon. in	Bearings & Dist.
N29E	209 ms	183	101	32°.59′E	31°.59′S		61°.36′E	Isle of Rodrique N9E 253 lgs.

Fig 2.8 Typical 18th century English East India Company Logbook (abridged)

Where this information is blank, the previous entry applies. Column 'K' is the vessel's speed in knots. Column 'F' records the fractional parts of a knot. Thus at 1pm the speed of the *Melville Castle* was six knots and six fathoms or 6.75 knots in the modern decimal equivalent.

The fifth column would contain a note of the wind direction, wind force and general weather. In the example the wind direction 'south', as recorded at 1pm, would hold true until another direction was recorded for example at 9am SEbS. This particular example has no wind force recorded but is an isolated example of this omission. EIC ships had a slightly different and more archaic vocabulary for describing wind force. For a full discussion of this see the CLIWOC (2003). The sixth column would record any remarks concerning the general management of the ship along with any additional navigational information. In the example the magnetic variation is recorded by two different observations. The observed latitude was also recorded here. This was common in earlier logbooks before a specific box for this information appeared on printed logbook pages.

The rows along the bottom of each entry recorded the summary of the day's navigational observations and calculations. In the example, the course made good between the noon position and that of the previous day is N29E. The distance is 209 miles. The next entry 'N' 'E' refers to northings and eastings.   In this example the vessels has made 183 miles to the north and 101 miles to the east. The navigating officer determined his course and distance made good by a method called plane sailing. This involved the resolution of a right triangle in which the northings and

eastings represented two of its sides, the hypotenuse of which gave the true distance and direction covered in the day. This was the simplest form of dead reckoning and was adequate for navigation using plane charts on which the distances between meridians remained constant regardless of latitude (see below).

The box 'M+D' refers to meridian + distance or meridian distance. This is the distance east or west of the zero meridian from which the vessel took its last departure as distinct from the vessel's longitude according to the Greenwich meridian. Meridian distance was stated in either leagues or degrees of a fixed length irrespective of latitude (20 leagues = 1 degree). This is because large-scale plane charts were being used to navigate rather than Mercator charts where the distance between meridians narrows as the latitude increases. With plane charts, the distance between meridians is constant at all latitudes (Jonkers, in press). In later logbooks meridian distance is sometimes referred to as 'Lon mde' or longitude made.

The box 'Lat Acc' refers to the latitude by account or by dead reckoning. Comparing this with the observed latitude in the remarks column indicates an error in the account of 13′ or 13 nautical miles and the remarks column records that the vessel is 13 miles to the south of account. Such errors in account were common and due to currents, drift, leeway or minor errors in calculations or in the observations themselves. 'Diff Lon' refers to the difference in longitude from the previous day's position. In the example the data are not inserted. In many logbooks 'X' is used instead of 'Diff' to denote the difference, as in 'X Lat' or 'X Lon'. 'Long in' states the longitude according to the Greenwich meridian. 'Bearings and distance at noon' is the same notation as in RN logbooks.

Other Notation
As with RN logbooks the abbreviations 'tk' or 'chr' refers to a timepiece, 'ob' is observed and 'ac', 'acc' or 'act' is account or dead reckoning. The notation 'var' refers to variation or magnetic declination. A symbol of a crescent moon indicates a lunar observation.

3. Instrumental data in early logbooks – pre 1850
3.1 Royal Navy
Instrumental data in logbooks before the 19th century is rare. The data were usually air temperature measured, as far as can be determined, in the main cabin. Barometric

pressure data are equally exceptional, and 18th century RN logbooks are almost devoid of such information. The few examples are confined to those vessels on exploratory missions or to officers with a particular scientific curiosity. Unsurprisingly, the voyages of Cook produced instrumental data. Likewise the voyages of Mathew Flinders in the *Reliance* between 1795 and 1800 recorded air temperature, several times each day. Flinders' logbooks in the *Investigator* can confidently be expected to yield similar instrumental data. Nevertheless, instrumental data can occasionally be found in early RN logbooks. The logbooks of Captain Philip Beaver of the frigate *Acasta* contained temperature and air pressure readings in 1809 and again in the *Nisus* when he commander her in the years 1810-12. Contemporary correspondence with Major James Rennell, suggests that Phillip Broke recorded air temperature while commanding the frigate *Shannon* between 1807 and 1813. Unless it is known beforehand that an officer made such readings, their presence in a logbook can only be determined by direct inspection. This is a time-consuming task not supported by any catalogue information to assist the enquirer.

Nevertheless, a sampling of RN logbooks can at least give a general indication of the likelihood of instrumental data. The examples following were selected at random and the degree of consistency suggests they are typical. An examination of several of the logbooks from the ADM 55 microfilm series indicated that not all vessels on exploration made instrumental observations. Leaving aside the logbooks of explorers such as Cook and Flinders who are known to have made such observations, it is apparent that it is not until the 1820s that instrumental data can be confidently expected. A selection of logbooks revealed that the *Seaflower* (ADM 55/126) recorded no instrumental data in 1807. The *Bathurst* (ADM 55/9) recorded both temperature and barometric pressure in 1821. A further sample, the *Samarang* (ADM 55/125) in 1843 recorded temperature, barometric pressure and sea surface temperature.

A random sample was also made of ADM 53, the ships' logbooks, on the assumption that the same pattern would also hold true for the ADM 51 captains' logbooks. The *Alert* (ADM 53/1) in 1800, contained no instrumental data. The *Arrow* (ADM 53/101) also recorded no instrumental data in the years 1826-1831. Both recorded wind direction, wind force and weather in the style of 18th century logbooks. The

Pandora (ADM 53/5501) in 1836 recorded wind direction with wind force according to the Beaufort Scale. The weather was recorded in detail according to a system of letters corresponding to a particular descriptive phrase according to the Beaufort style. There were no instrumental data.

Instrumental data were found in the logbook of the *Griffon* (ADM 53/2601) covering the years 1846 and 1847 (images supplied). There was also evidence suggesting that the recording of barometric pressure was expected and required as the logbook was endorsed 'no barometer', apparently to account for the absence of this information, although pressure was recorded by sympiesometer. This was a type of barometer where the atmospheric pressure acted upon an oil in the lower part of the instrument to compress an elastic gas in the upper part. Like the *Pandora* of 1836, wind force was recorded using the Beaufort Scale and the weather described by a series of letters. The scheme of recording was detailed on a printed notice on the inside of the logbook cover stating that observations were to be made hourly, 'with clearness and precision', in the logbooks of all Her Majesty's ships' by Admiralty instruction. The instrumental data recorded in the logbook of the *Griffon* was temperature and pressure by sympiesometer. The location of these instruments was not noted. The recording of the data was not continuous but noted either intermittently or in clusters of days. This may have been a reflection of the vessels activities and the data may only have been recorded while at sea.

Logbooks in private collections held by the National Maritime Museum, support the finding, based on the logbooks in the National Archives, that the majority of RN logbooks did not consistently record instrumental data before the 1840s. The logbooks of the *Challenger* 1828 (FRE/201), *Briton* 1831 (COD/101/3), and the *North Star* 1826-1847 (LOG N/N/20) did not record instrumental data. Again, these particular logbooks were picked at random from those operating in distant seas, and as the types of information recorded in them is so similar to those in the National Archives, they should be considered typical. It should be noted however that not all of the logbooks in these private collections were kept by commanding officers.

The above suggests that pre-1850 instrumental data can be expected in logbooks of vessels on exploration or hydrographic survey (ADM 55) after 1820. Instrumental

data are not common in RN logbooks (ADM 51, 52 and 53) until 1840 or even later. However, earlier logbooks need not be dismissed out of hand. Targeting of naval officers likely to record instrumental data prior to 1840 may be attempted and the relevant logbooks located. This would require the careful noting of the names of officers who made such observations during periods when instrumental data were not common. Those officers known to make such observations (from logbooks already processed), or to have scientific interests, or who are associated with important figures such as Beaufort, can be identified. Officers who are members of the Royal Society or other scientific organisations might also be identified. However, such targeting may not be time efficient unless this information is discovered in the normal course of work with the logbooks. In the absence of instrumental data, non-instrumental data can be interpreted and converted in the fashion of the CLIWOC Project.

3.2 East India Company
Early instrumental data is more likely to be found in the logbooks kept by the officers of the EIC. As noted before, by the late 18th century, the pre-printed logbook pages made provision for this information to be recorded though this was not always done. A close approximation of the incidence of instrumental data from this source can be made based on the sample of East India Company logbooks processed by the CLIWOC Project. Of those logbooks processed there was almost no instrumental data before 1780. Between 1780 and 1789 there were occasional temperature readings recorded. In the decade 1790-1799 between 60-70% of the vessels sampled recorded temperature. In the decade 1800-1809 between 80-90% of the vessels sampled recorded temperature with some also recording air pressure. In the decades following, such recording was common, though at times intermittent in the logbooks of more junior officers.

Where early instrumental data exist, the position of the instruments on board a ship is not mentioned in logbooks. The main cabin is one likely location. Yet according to Alexander Dalrymple, the EIC's hydrographer, the thermometer on board the EIC SHIP *Grenville* in 1775 was located in the open air on the balcony. (Dalrymple, 1778) Although sited on the open balcony, the recordings suggest that the thermometer was shaded. The balcony was a stern gallery at the very back of the vessel, and extended across the entire breadth of the ship. It was directly off the main

cabin affording the commanding officer a private area to walk. It was the logical place to hang such an instrument as the main cabin might, unless well ventilated, become very warm in the tropics. Many large and medium sized RN vessels (those larger than frigates) also had stern galleries though these became unfashionable by the 1790s, making a revival by the end of the Napoleonic Wars in 1815. Contemporary paintings suggest that East Indiamen continued to have stern galleries.

4. Related Research Aids
4.1.1 Ship Lists - ADM 8 and ADM 7

There are so many logbooks in British archives that some preliminary organization and selection is absolutely necessary before an item is chosen for data abstraction. The National Archives hold in manuscript form the original Admiralty ship lists. These begin in 1673 and continue to 1893, and are catalogued under ADM 8. There is an omission in the sequence between 1814 and 1820. However the two volumes of ADM 7/560-1 provide the required information covering the period 1811-1814 and 1815-1821, but on a ship-by-ship basis rather than by station (see below). Vessels were allocated to various stations around the globe (East Indies, Jamaica, Leeward Islands, Mediterranean, North America (Newfoundland, Nova Scotia, and until American independence, Boston, New York, Plantations [Virginia, Carolinas]), Africa and the Channel Fleet), and the ADM 8 documents list, month-by-month, to which station each ship was attached. This greatly helps to optimise the geographic coverage of abstracted data and avoid duplication. Additionally, the lists detail, under 'convoys and cruisers', the vessels stationed in British coastal waters and assigned convoy duty in European waters. Also listed, but less frequently, are those vessels on convoy to more distant parts, such as St. Helena, those under secret orders, on exploration, hydrographic survey or on fishery protection. The remainder of the list is comprised the ships in port, refitting, repairing, de-commissioned or allocated non-operational harbour duties.

For each station the lists give information on a monthly basis. Other useful, information is provided including the rate of the vessel. The rate was a division of ship types, established by the civil branch of the navy, to regulate its administration. In addition to the rate, ADM 8 records the name of the ship, number of guns and numbers of crew (both fixed by the rate), the commanding officer, names of the

lieutenants and the date the ship sailed from Britain. Once a vessel reached its destination, there is no indication from the fleet lists about its subsequent movements or its return to Britain. The only indication, without an examination of the logbook, that a vessel has left its station and returned, is the deletion of the ship's name from the station list and its appearance in the lists for one of the English ports.

4.1.2 ADM 7/560-1

ADM 7/560 and 561, like ADM 8, are a list of shipping movements but based on named vessels instead of stations. The volumes cover the period 1811-14 and 1815-21 and fill the gaps in the ADM 8 series between 1814 and 1820. The information they contain is superior to ADM 8 as they detail subsequent movements when 'on station' often with dates of arrival at different ports. Notes, of other vessels met or in company, allow further refinement and cross-referencing. It should be noted however that there are omissions and not all vessels have been recorded.

4.1.3 Limitations of ADM 8 and ADM 7

The ADM 8 series, together with the two volumes of ADM 7 can be relied upon in most instances to give accurate information on the locations of vessels and their time of sailing from Britain. The user should be aware however that the lists are subject to omissions and minor errors. They were compiled at the time by Admiralty clerks and based on the information supplied to the Admiralty by the ports. Sometimes this information was out of date or wrong, either due to a clerical error, late communication, the countermanding of orders, or because short term events did not warrant recording. Occasional oversights and clerical errors are to be expected in any form of administration. However a ship may receive a change in orders that is not notified to the clerks in time, and a vessel that in one month was reported as having sailed to the East Indies may suddenly be found in the Mediterranean instead. Likewise, a vessel making a swift passage to Lisbon or Gibraltar could easily return in a matter of weeks and the particular passage would not be recorded because it would be out-of date information when the next monthly list was compiled. Furthermore, the date of sailing as recorded in ADM 8 might be quite different to that recorded in the logbook. The port may have reported to the Admiralty that a ship had sailed on a certain date (this being recorded) only to find that the ship had returned, or put into some other port, owing to stress of weather or other accident. The revised date of

sailing may not then be recorded. The usefulness and accuracy of these ship lists should not be diminished by these minor and infrequent errors. The occasional omission of large vessels making distant voyages seems less excusable, though one must bear in mind that in wartime, some sailings were subject to a degree of secrecy and that the Admiralty clerks could only record the information that was given to them.

4.1.4 Pacific Manuscripts Bureau

A further source of RN shipping movements in the late 18th and early 19th centuries is the list compiled by the Pacific Manuscripts Bureau of Australia. A microfilm of this list can be found in the National Maritime Museum, Greenwich, reference MRF/156/1-2. The microfilm provides an alphabetical list of all vessels thought to have voyaged to the Pacific. In an attempt to be comprehensive the list includes many ships that were stationed on the Atlantic coast of South America on the assumption that they may have sailed around Cape Horn. As such the list provides an additional source of shipping references and a useful check against other sources.

4.1.5 Using the Ship Lists

Although it is not possible to know the movements of a vessel while 'on station' from these lists, (ADM 7/560-1 excepted) it is possible to identify and select those vessels most likely to be active at sea. Battleships (rated 1 to 3), which in the age of sail carried 60 to100 or more guns, were likely to be the most inactive. (see 4.1.1 above for an explanation of the rate) They would be sent to their designated station for offensive operations against French or Spanish colonies or to blockade European ports or as a response or in anticipation of an enemy sending similar heavy units to an area, such as the West Indies. These units would cruise off an enemy port or be held ready for a fleet action. With the exception of some of the smaller 60-64 gun ships, battleships did not cruise and rarely had regular convoy duties. Small two-deckers (50-44 guns), frigates and sloops (38-18 guns) would be used to cruise for enemy merchantmen, carry communications and convoy merchant ships. These are the vessels most likely to be at sea most of the time, and can easily be identified from the ship lists. Unless a large battleship is known to be making a long voyage, for example to the East Indies, it is best to select one of the smaller vessels as they will see more active service at sea.

4.2 Sailing Instructions, charts and atlases

One of the potential difficulties with early logbook data is the determination of the ship's location. The landmarks recorded may be unfamiliar and even when latitude and longitude are recorded, the longitude may be based on an unfamiliar zero meridian. It has even been known for a vessel to record (from an old chart) a bearing to an island that does not exist. Contemporary charts and sea atlases, to be found in the National Maritime Museum, Greenwich, will resolve many of these questions. By far the most useful reference works are the various sailing instructions issued for different parts of the world. For the 17th and 18th centuries one can call upon *The English Pilot* (originally by John Seller), of which there were various editions between 1675 and 1750. These were the standard pilot books used by English navigators throughout the 18th century, with separate volumes for North America, the West Indian and the Oriental navigation. Apart from the contemporary charts enclosed in the volumes, the primary advantage of these works is the detailed route descriptions and discussions of winds and currents, as well as the islands and landmarks likely to be encountered. It is here that one can find archaic terms and spellings, and the location of places whose older names have long disappeared from modern atlases. This can be most useful for locating a point of departure used as a meridian. For the 19th centuries there are works with a more modern outlook. Recommended is Horsburgh (1817). Rosser and Imray (1866) cover the latter part of the 19th century.

4.3 Operational histories

The general operational histories of the RN can be useful in a very limited way in assisting with logbook selection. They can for instance provide some information on the subsequent movements of vessels once they have been assigned to a station. It may be possible for instance to find out exactly which region of the East or West Indies a ship is operating, information that cannot be determined from the Admiralty ship lists. The most useful is Clowes (1897-1903), which should be found in larger libraries. The chief disadvantage however is that such histories naturally focus on those vessels involved in important operations or engaged in battle. The most useful and extensive meteorological data is to be gained from those vessels on long ocean passages yet it is these vessels that are least likely to be mentioned in histories, as mid-ocean encounters between opposing vessels are virtually non-existent.

5.   Priority Collections – Pre 1850

Considering the nature of the early logbook collections within each of the three main archives, priorities for data processing should be dictated by the type and quality of the data available, the geographic range, and the practical considerations for imaging. Priority should be given to the following specific collections:

5.1 British Library - East India Company Logbooks
The East India logbooks should be given the first priority.

Advantages
a. This is the only collection that, from 1800 onwards, can supply instrumental data from almost all logbooks. This data is temperature and air pressure. Instrumental data can be found as early as the mid 1780s but not in all logbooks.
b. Movements of the vessel can be ascertained before examining the logbook (Farrington)
c. The East India journals provide at least two long voyages (out and return) each of 100 to 150 days at sea.
d. Each voyage is multi-ocean and covers both the North and South Atlantic, and the Indian Ocean. Many also cover parts of the western Pacific and South China Sea.
e. The routes sailed are usually consistent.
f. The routes compliment those covered by Dutch East India vessels. The Dutch data has already been incorporated into the CLIWOC and ICOADS databases.
g. Pre-printed logbook pages (post 1780) and a standard page format will ensure consistency in the type of data recorded.
h. Sub-daily data recorded, sometimes on an hourly basis.
i. Detailed navigational information makes the position of these vessels much easier to determine.
j. General condition of the logbooks excellent
k. Only c.100 logbooks processed by the CLIWOC Project and very few post 1800.

Disadvantages
No EIC logbooks after 1833/4 although there are some post 1835 logbooks available in the British Library, India office Records, designated as East India traders.

5.2 The National Archives – Pre 1850
The logbooks held by the National Archives should be given second priority. Many captains' logbooks started to resemble the EIC format after about 1810 or 1820 and are likely to contain some instrumental data.   Within the National Archive's collections priority should be given to the following series.

ADM 55
ADM 55 is on microfilm making this series attractive. Most vessels from 1820 onwards can be expected to record instrumental data.

ADM 51, ADM 53 and ADM 52

For the 19th century, many of the logbooks of those vessels on exploration or surveying will record instrumental from about 1820. Instrumental data recorded on other RN vessels can be expected from about 1840 onwards

Advantages
a. The data will cover areas not sailed by the EIC, such as the western Atlantic, Caribbean, Mediterranean and some high northern latitudes
b. Sub-daily observations in masters' logs (ADM 52)
c. All of the logbooks sampled are in excellent condition
d. These collections were not processed by the CLIWOC Project
e. ADM 55 is available on microfilm

Disadvantages
a. Most, but not all, logbooks prior to 1820 will record non-instrumental data
b. Routes sailed are less predictable than those of the EIC.
c. Before 1840, the best data (instrumental) is more likely to be in remote areas and recorded by vessels on survey or exploration. This will mean that density of observation will be much less than on well frequented routes.
d. Voyages are shorter than those of the EIC except for those vessels sailing to the East Indies.
e. Movements of vessels can only be estimated and cannot be ascertained in detail without first examining the logbook.

5.3 National Maritime Museum

The collections in the Museum should have a lower priority but should not be dismissed. Many of the private and company collections contain excellent material. The LOG series may provide either a RN or an EIC logbook that is missing from the other national collections. The lieutenants' logbooks, which almost cease after 1806, do not contain instrumental data. The CLIWOC Project extensively processed the series for the period 1750-1806.

6. Initial selection and acquisition of logbooks for imaging
6.1 British Library

The collection of EIC logbooks are recommended as a first priority for imaging and processing for the reasons outlined above. The selection of logbooks within this collection will depend on the particular priorities set by CDMP. Assuming that the priority is for instrumental data the selection should start with logbooks from 1800 onwards as these are the most likely to have both temperature and air pressure recorded. If temperature data are considered to be as important as air pressure data, the start can be pushed back to 1790.

A further consideration should be the geographic coverage. Choosing those vessels sailing to specific destinations can further refine the selection. Coverage of the Arabian Gulf will require the selection of vessels sailing to Bombay. Those vessels sailing to Bombay are also the ones most likely to pass through the Mozambique Channel on the outward voyage. Voyages to Madras and Calcutta will cover the Bay of Bengal. Voyages to Canton or Whampoa will provide data from the South China Sea, Indonesia, and in some instances the western Pacific. It should further be considered that those vessels sailing to China, via one of the Indian ports, will give the most extensive geographic and temporal coverage. All of these voyages will of course pass through the North and South Atlantic Oceans and in addition to the considerations above, Company vessels at times touched at St. Helena on the outward passage and selection of these vessels will give more extensive data coverage for the South Atlantic.

A further factor to consider is the grouping of logbooks into volumes. Because each volume (up to 3-4 logbooks) will contain the logbooks for a particular ship for a range of years, the ship itself should form part of the initial selection rather than the year or range of years. This will save double handling, as it will be more time efficient to process all the logs in a volume at once rather than ask for the volume to be re-issued a second time.

6.2 National Archives

The initial selection of RN Logbooks requires the consideration of factors not relevant to EIC Logbooks. The former can be expected to provide data for long multi-ocean voyages totalling several hundred days. Most RN voyages were not only much shorter but sometimes did not take a route directly to a destination, for example when cruising in a designated area. Such cruising within a specific area may even be advantageous for analysing marine data. This consideration aside, and on the assumption that long runs of data are preferred, initial selection of RN logbooks should follow the procedure adopted by the CLIWOC Project. This was to select vessels on the basis of their intended destination in order to approximate as far as possible the long runs of data abstracted from the EIC logbooks. Priority was given to the following regions or intended destinations. (These regions correspond to the main

regions in the logbook directory and database presently being compiled.   This is so that particular types of voyage can be easily identified.) Regional maps with typical sailing routes are in the appendix to this report.

- First priority was always given to those vessels sailing to the East Indies, and when vessels were sailing in company, to the frigates and sloops rather than the larger vessels. This was done because the larger vessels would normally remain at their destination for some considerable time whereas the smaller vessels would be directed to some other duty such as to cruise or to carry communications. This meant that the logbook of the smaller vessel was much more likely to contain more sea time and therefore more data. Furthermore within any group of vessels sailing to the East Indies, the CLIWOC team looked for those vessels stopping at St. Helena on the outward leg of the voyage. Stopping at St. Helena meant a partial circuit of the South Atlantic and more time at sea on the outward voyage. (region 1)

- The second priority should be given to those vessels making voyages into the South Atlantic, either to St. Helena or the Falkland Islands. Again time at sea is the main consideration. (region 1)

- The third priority should be vessels sailing to the West Indies a voyage of about six weeks or up to twelve weeks if sailing as escort to a convoy. Within this set, the CLIWOC team always searched out those few vessels sailing to Jamaica via West Africa and the Gulf of Guinea. Once again sea time was the main consideration. All of the first three priorities cover or pass through the areas of the ocean dominated by the tropics and trade wind belts. (region 2)

- The fourth priority was given to vessels sailing to North America. These tended to be the shortest routes, a voyage from St. John's in Newfoundland to the Plymouth for instance could take as little as three weeks. The route was also through the more variable and stormy belt of the westerlies. Voyages to the more southern parts of the United States used a more southerly route near the northern edge of the NE trades. Although the trans-Atlantic routes offer voyages with less sea time they have the advantage of being very numerous

and, added to the longer voyages to the East, provide a dense coverage of data for the North Atlantic. (region 2)

• The CLIWOC project gave the lowest priority to vessels in the Eastern Atlantic or with destinations in the Mediterranean or other European waters. (region 3)

A further point to consider is the physical handling of the logbooks. The logbooks contained in ADM 51 and 52 are grouped together under the name of the vessel. When a piece number (the term used by the National Archives for a volume) is ordered, it will be on the basis that one of the logbooks contained within it has been short listed for inspection, or processing. Each piece number can contain from four to ten separate logbooks. The system followed by the CLIWOC Project was to always allocate a short period of time to inspect the additional logbooks. In most cases it was found that these other logbooks also contained data that were needed. This mode of working had several advantages. First it saved double or even triple handling as the same piece number might otherwise have been called for again if one of the other logbooks was required. Secondly this mode of working provided a short cut for the initial selection of logbooks. These secondary logbooks were selected on the basis that they were there and contained good data therefore shortening the time needed for the initial search. This provided the CLIWOC Project with efficiency gains. In some instances logbooks were discovered that might otherwise have been overlooked.

Although this mode of working can save time, it does require the keeping of careful records. Note must be made of what areas of the oceans and what dates have been adequately covered, with a running account of what data is still required. Such records should be kept in any event, but it is very important to check the content of these additional logbooks against existing or anticipated data requirements. It provides an efficient use of time and effort.

6.3 National Maritime Museum

As already noted, the lieutenants' logbooks as a collection were fully exploited by the CLIWOC Project for the period 1750-1806. It should be noted however that for the period 1750-1770 only part voyages were abstracted whereas after 1770, whole

voyages were processed. Furthermore the entire collection of pre-1750 lieutenants' logbooks have not been viewed or processed. The logbooks in the National Archives can provide most of the pre-1750 data anyway. Any logbooks selected from the company and private collections should, as in the other archives, be based on long runs of data from vessels sailing to the most distant destinations.

7. Further Selection Criteria –Pre 1850
7.1 Suitability for imaging
The observations in this section apply primarily to the logbooks of the 18th and early 19th centuries. Before a logbook is finally selected for imaging and processing a number of factors must be taken into account. First, as noted above, the vessel must be sailing in or to a region and at a period where data is required. Assuming a corresponding logbook has been located, it must then be in a physical condition that will allow it to be easily imaged. Almost all of the logbooks in the National Archives and the British Library will be suitable for imaging. Their storage format is such that most can be laid flat for imaging. The paper quality and quality of the ink on the page is generally excellent. There will however be very rare instances where ink has faded on a few pages making it difficult to record. In all instances, a very quick examination of the page and ink quality is to be recommended before the logbook is processed in order to eliminate those very few that will not provide a clear sharp image.

This recommendation applies equally to any logbooks processed in the National Maritime Museum. In addition to this however, there are logbooks within the NMM's collections that will be difficult to image effectively or will prove unsuitable. Some volumes of logbooks have very decayed leather binding. Although the paper pages within the volumes are very good, the page surface will need to be kept clean and free from dust and other particles that will accumulate due to the handling of the binding. A few logbooks will also be decayed, the pages being in an advanced stage of disintegration, making them impossible to process. Other logbooks have large non-standard pages. These have had their pages folded to fit into the covers of a standard volume. The edges of these examples are usually heavily discoloured and the pages can be difficult to unfold and lay flat for imaging. Logbooks in this condition are few and confined, as far as can be ascertained, to the ADM/L series of lieutenants'

logbooks. They should be discarded in all instances. Many are in canvas wrappers, therefore their condition cannot be determined in advance.

Additionally, several hundred volumes of the lieutenants' logbooks, those under ships whose names commence with letter A-C, have been rebound in a new hard binding. This eliminates the difficulties of the original leather binding. However many of these logs have been tightly bound and any wording at the very inside edges of the pages can be difficult to read, and will be difficult to image. The pages within these volumes will not lay perfectly flat and the inside edges will be angled away. This will mean a less sharp image at this point unless the imaging equipment has sufficient depth of field.

7.2 Duplication
There will be only minimal duplication of data providing that the logbooks being processed are from either the National Archives or the British Library (but see note on ADM 55 above). The lieutenants' logbooks at the National Maritime Museum offer a large degree of duplication because several lieutenants would have served on the same vessel. If logbooks are selected from the other two archives the amount of duplication of data within a particular series will be very small. There will of course be duplication between series such as the captains' and masters' logbooks. Duplication will also occur when vessels sail in company. This can be advantageous when a check is needed on data quality and consistency. Paired or multiple ship voyages can be identified from the ship lists at the very start of the selection process and selected or avoided on that basis. It should be noted however that when vessels sail in company they do not necessarily stay in company and a preliminary examination of the logbook might be necessary in order to determine the amount of duplicate data to be expected.

7.3 Data quality
Putting aside for the moment, the subject of instrumental data and non-instrumental descriptive data, there are other issues to do with data quality that must be taken into consideration when selecting a logbook for processing. First there is the matter of the legibility of the script. This is rarely a problem with captains' logbooks but can be a difficulty with a few logbooks written by more junior officers, especially lieutenants. Midshipmen, or aspiring officers usually have very well kept logbooks as these formed part of their selection for promotion. Apart from legibility, the chief quality

problem to be encountered will be the precision in recording by the logbook keeper. Some used lazy shorthand to complete their logbooks, with the frequent use of the word ditto or some variant of this to describe aspects of the weather. The occasional ditto recorded is acceptable providing that it is consistent with those latitudes where the same conditions can be expected from one day to the next, for instance the trade wind belts. Some logbooks however have the term ditto used over many days and sometimes a week or more. Data, even when it is recorded properly is not to be trusted and these logbooks are to be avoided. Again incidents of this type of recording are infrequent and generally confined to the lieutenants' logbooks.

Another area of data quality concerns the omission of essential information. This has been observed in some of the EIC logbooks. Some may not record longitude. Without this information the ship's position cannot be precisely determined. There may be a bearing and distance to a landmark by which the ship's position can be estimated but this may not be satisfactory. A vessel may also use a non-standard format for recording longitude such as magnetic declination. This was encountered once in the CLIWOC Project and is not common. A logbook should only be rejected if longitude is consistently omitted as it was usual for officers not to record this information when close inshore. Occasionally a logbook will omit wind force data. Again if this is consistent throughout the logbook then it should be discarded. Instances of this are rare but the omission can easily be overlooked at the final stage of selection.

8. Integration of CLIWOC Data - Duplication

The CLIWOC team exploited only 5% of the available archive of UK logbooks with emphasis placed heavily on the collections in the National Maritime Museum and, to a lesser extent, the EIC logbooks in the British Library. The years covered by the entire project were 1750 to 1850. The UK team however did not go beyond 1829 and the period after 1810 was sparsely covered. Parts of the 1750s were also insufficiently covered. The densest coverage was for the period 1793 to about 1807 when there was little data available from Dutch and Spanish sources due to an extended period of successful maritime warfare on the part of the British RN. It was necessary for the UK team to assist the other project teams to make up for this shortfall in data.

The UK CLIWOC records were carefully preserved against future logbook projects and it will be possible to check for duplication before any new logbooks are processed. There will be no risk of duplication of logbooks processed for the period after 1810 and it will not become an important consideration unless it is intended to process additional logbooks for the period 1750-1805.

9. Royal Navy Logbooks – 1850-1899

Most of the RN logbooks for the post 1850 period will be found in the National Archives. Additional navy and merchant logbooks can also be found amongst the company and private papers held by the National Maritime Museum. RN logbooks in the latter half of the 19th century are of a very different format to those found earlier in the century. Almost all contained detailed, sometimes hourly, instrumental data. The instrumental observations were of temperature and air pressure. There are also some measurements of sea temperature. Furthermore from the 1890s onwards, the nature of the instrumentation and its location was stated. Observations of the weather were enforced by regulation.

9.1 ADM 53 (1850-1899)

The logbooks are to be found in at the National Archives in ADM 53. These are ships' logbooks kept by the officer of the watch. The collection as already noted runs from 1799 to 1976 and consists of 180,548 separate logbooks. An approximate number of logbooks by decade from 1850 to 1899 are provided in Table 4.

Decade	Logbooks
1850-1859	3966
1860-1869	2973
1870-1879	1887
1880-1889	2328
1890-1899	2830

Table 4. ADM 53 Decadal Range 1850-1899
(some figures may be slightly inflated due to overlap between years and decades)

The logbooks for the second half of the 19th century are bound into an individual volume. This was common up until the first decades of the 20th century. An image of a logbook cover from the 1850s is provided. This was the standard binding and common to all of the logbooks sampled prior to 1920. After about 1920, the logbooks (covering one month) were bound into a paper cover. The binding, paper and print on all of the logbooks sampled was excellent throughout. In the section following the

images of the relevant logbooks have been supplied. Like the pre-1850 logbooks sampled, those for the post 1850 period were selected at random. Although small differences are apparent between logbooks from different decades, these differences are supported by evidence of evolving regulations and instructions. There is sufficient consistency in the general recording and format of the logbooks over the several decades to safely assume that these are typical

Amphion –1856 and Boxer 1860
The logbook of the steam vessels *Amphion* (ADM 53/5501) and *Boxer* (ADM 53/7101), instrumental data were recorded on a standard pre-printed page when the vessel was at sea. The data recorded was set out by Admiralty regulation and consisted of air temperature and pressure. Note was also made of the magnetic variation 'allowed' as courses steered and wind directions were still with reference to magnetic north. Wind force was recorded using the Beaufort Scale. The current was also noted and recorded. Weather was noted according to a scheme of letters in the format of the Beaufort code. Many features of the earlier logbooks are evident. The course made good over the previous 24 hours was recorded in degrees but treated in quadrants, in this instance N51E. Position was noted by both observation and dead reckoning. The bearings and distances at noon were however a true bearing, whereas in the earlier 18th century logbooks the bearing could be either magnetic or true.

Growler –1871
The logbook of the *Growler* (ADM 53/10101), the navigational data is no different to that of the previous decades. There is however a marked increase in the frequency and quality of the weather observations. Meteorological observations were made whether the vessel was at sea or in port. Furthermore there were regulations now stating that 'the height of the barometer and thermometer and the temperature of the sea is to be recorded at the hours of 4, 8 and 12 am and pm except in stormy weather when the barometer and thermometer are to be noted every hour'.

Tenedos-1885
The logbook of the *Tenedos* (ADM 53/15999) shows the same format as the *Growler* in the 1870s. As the regulations previously cited indicate, the logbook of the *Tenedos* recorded hourly data in stormy weather. The only notable difference was the more precise measurement of the wind force (8.9, 5.8 etc.). How this precision was

achieved is not clear and it is not a feature of the logbook sampled for the 1890s or later decades and was probably not typical.

Tourmaline-1895
The *Tourmaline* logbook (ADM 53/16302) covers 18 months and is the first logbook sampled to give the type, maker and position of the barometer and of the thermometers for air and sea temperature. It is also the first logbook sampled to indicate the sea state.

9.2 Additional Logbooks 1850-1899 – National Maritime Museum
The National Maritime Museum holds several collections of naval and merchant shipping logbooks of the late 19th and early 20th centuries. These form part of the papers originally belonging to companies and private individuals.   The most significant of these sets of ships' logbooks are those connected with the Canadian Pacific Railroad (catalogued under CPR).   There are 191 individual logbooks covering the years 1903-1915. These are kept at a Museum out-station and need to be ordered several weeks in advance. As yet the author has not viewed them. Further collections of logbooks are those of the Royal Mail Steam Packet Company. There are 15 logbooks (RMS/37/1-15) covering the 1840s and 1850s. These have not yet been viewed and the geographic coverage and the nature of the logbook entries cannot be commented on at present.

A collection worthy of consideration for processing is the 11 logbooks within the Joseph Osborn collection (OSB/1-11).   These are logbooks of merchant vessels sailing from Liverpool to India, China and Australia between 1853 and 1875. The earliest of these record four hourly observations of wind direction, barometric pressure and temperature as well as descriptions of the wind force and weather. The later logbooks, 1860s onwards, have observations using a sympiesometer, as well as the earlier instrumentation, and a description of the sea state. All observations in these logbooks were made at four hourly intervals.

9.3 Locating vessels and logbooks 1850-1899
The location and short-listing of logbooks in the post 1850 to 1898 will be by the same method as the earlier pre-1850 logbooks. The RN ship lists in ADM 8, found in the National Archives, extend to 1898, after which, recourse must be made to the official published *Navy List*. This was printed monthly and copies can be consulted in

both the National Archives' reference room and the library of the National Maritime Museum. The *Navy List* provided information on the ship, its commanding officer and station. Unlike ADM 8, it does not give the date of sailing from Britain. Furthermore, during the 20th century world wars, the *Navy List* was understandably reticent concerning the locations of vessels.

9.4 Summary of data in logbooks of the period 1850-1899
- Temperature and pressure data will be found in all logbooks after 1850.
- Wind force was recorded according to the Beaufort Scale
- Weather was recorded according to a lettered scheme
- Wind directions were magnetic until c. 1920
- By the 1870s, observations were made at 4, 8 and 12, am and pm by regulation and more frequently in stormy weather
- Type, maker and position of instruments was cited in logbooks from the 1890s
- Sea state was consistently recorded from 1890s

10. 20th CENTURY ROYAL NAVY LOGBOOKS
10.1 Logbooks 1900-1938

The number of logbooks available for the 20th century is considerable. It should be clearly noted however that these numbers are not directly comparable to those of the 18th and early 19th centuries. The earlier logbooks would cover at least one year and sometimes much longer periods. By the 1920s most logbooks were of one month's duration. This has implications for the ordering and handling and processing of logbooks for imaging, and will require more precise targeting of date ranges. The number of logbooks for 20th century surface vessels available prior to the World War II period is outlined in Table 5. These logbooks varied in length from yearly to quarterly, bi-monthly or monthly.

Date Range	Total Number of Logbooks	Notes
1902-1913	15,843	Figures include 3,450 torpedo boats generally used in coastal waters
1914-1919	37,280	Figures include 2,553 torpedo boats and 1,267 motor launches generally used in coastal waters.
1920-1938	37,502	

Table 5 ADM 53 Logbooks for surface ships 1902-1938

The examples following are typical of early 20th century naval logbooks.

Pyramus-1909

The *Pyramus* logbook (ADM 53/25053) covering an 18-month period, provided further refinements in recording on 19th century practice. The type, maker and position of the instruments were again noted. According to the directions for making observations, the sea state was to be recorded by a number rather than by a description. Observations were made at four hourly intervals in good weather. The main refinement was in the recording of temperature. Four separate observations were now recorded, air, wet bulb and sea temperature. There was also an observation taken from a thermometer attached to the barometer.

Constance-1921.

The logbook of the *Constance* (ADM 53/74049) covered one year and is in most respects the same as the *Pyramus*. The important differences are that the courses steered were true rather than magnetic and the notation for recording the course made good was in degrees but no longer treated as a quadrant. As the steering compass was clearly corrected for magnetic declination it is likely that the wind directions recorded are also true rather than magnetic. A further refinement was the recording, in the top right corner of the page, of the ships position at 0800 and at 2000 hours as well as at noon. This provided three certain positions each day for the corresponding meteorological observations, and thus avoids the need to interpolate the ship's position. The vessel's position at the time of additional observations can be interpolated as before. Another addition to the information recorded was the 'time zone kept at noon' found at the centre left hand edge of the page. The directions at this time gave a scale of fog intensity and a 'sea disturbance' scale as opposed to a 'sea state' scale.

Carlisle-1930

The logbook of the *Carlisle* (ADM 53/72695) was the first sampled that only covered one month (June). This short one-month format was also common to many vessels during the 1920s and usual for the 1930s and 1940s. The logbook format and data recorded appeared no different to that of the *Constance* in 1921. In the image of the logbook page supplied, barometric pressure was recorded hourly though this may have been due to stormy weather, the wind force being Beaufort 8 and 9.

Summary of data characteristics in early 20th century logbooks
- Air, wet bulb and sea temperatures were consistently recorded from 1900s
- All bearings were given as true rather than magnetic from 1920s

- Ships position was recorded at 0800, noon and 2000 hours from 1920s
- Scale of fog intensity used from 1920s
- Time zone recorded from 1920s

10.2 Submarine Logbooks

A notable innovation in 20th century naval warfare was the development of the modern submarine. Such vessels had been used with various degrees of success since the late 18th century and most notably during the American Civil War. It was not until the 20th century that the RN maintained a substantial number of these vessels. The logbooks of submarine are kept in the National Archive at Kew catalogued under ADM 173. Submarines kept regular meteorological observations and spent most of their time on the surface, submerging only to avoid detection. Their number and availability prior to WWII is outlined in Table 6.

Date Range	No. of Logbooks
c. 1915-1934	13,341
1935-1938	2,294

Table 6. ADM 173 Submarine Logbooks c. 1915-1938

10.3 Royal Navy Logbooks 1939-1946
10.3.1 Availability of World War II Logbooks
The numbers of RN logbooks available for the WWII period and the immediate post-war period are laid out in Tables 7-8.

Year	No. of Logbooks	Year	No. of Logbooks
1939	4,045	1945	1,760
1940	2,207	1946	1,122
1941	1,723	1947	787
1942	1,564	1948	897
1943	1,941	1949	2,070
1944	2,025	1950	2,027

Table 7. ADM 53 Logbooks of surface vessels 1939-1950

Year	No. of Logbooks	Year	No. of Logbooks
1939	621	1945	906
1940	445	1946	509
1941	477	1847	434
1942	558	1948	410
1943	721	1949	397
1944	1,004	1950	376

Table 8. ADM 173 Logbooks of submarines 1939-1950

For the WWII period, the availability of logbooks after the first few months of 1940 is limited according to the type of vessel. This accounts for the substantial reduction in the number of logbooks available after 1939. Whereas, up to about February 1940, most logbooks for all types of naval vessels can be found in the National Archive, after this date only the logbooks of major surface vessels and submarines have been retained. As a rule the logbooks of destroyers, corvettes, frigates, minesweepers, minelayers, escort vessels and other smaller vessels were not kept by the Navy and subsequently not archived. Nevertheless, a very few logbooks, for destroyers and torpedo boats can be found for the period after 1940 and it is always worth checking the catalogue.

Despite the more limited selection of logbooks for most of the war years, the variety of vessels for which logbooks exist is wide. General availability by type of vessel is presented in the Table 9. All of the ADM 53 surface vessel logbooks for the war period cover one month only. The format of the logbook and the data recorded are the same as that outlined above for the *Constance* (1921) and *Carlisle* (1930). The submarine logbooks, in ADM 173, also cover one month only. The logbook is a smaller format and the layout on the page differs from surface vessels. The meteorological data is recorded in the same manner as for surface vessels.

Logbooks retained after Feb. 1940	Logbooks not retained after Feb. 1940
Aircraft Carriers	Destroyers*
Assault Carriers	Frigates
Escort Carriers	Corvettes
Light Fleet Carriers	Escort Vessels
Battleships	Minelayers
Cruisers	Minesweepers
Armed Merchant Cruisers	Patrol vessels
Submarines	Torpedo Boats*
Anti-Aircraft ships	River Patrol Vessels
Air Transport Vessels	Whalers (in RN service)
Survey Ships	Trawlers (in RN service)
Depot Ships	
Accommodation Ships	* A few were retained.

Table 9. General Availability of Logbooks for the WWII period

10.3.2 Organization of WWII Logbooks

The WWII logbooks in the National Archive are arranged and catalogued differently to the logbooks of earlier periods. This is because each logbook contains only one month allowing runs of consecutive manuscript numbers under any one ship's name. Thus in any given year, if a particular ship has twelve monthly logbooks those twelve are numbered consecutively. The catalogue then goes to the next ship in the alphabetical sequence for that year. This arrangement means that within any given year, all of the logbooks for any particular ship are grouped together, thus making the ordering and processing of the logbooks more efficient. This applies to the logbooks in both ADM53 and ADM 173 for this period. It will be noted however that some of these sets of logbooks apparently commence and cease for no apparent reason even though the vessel remained in existence. This is because vessels were transferred from one national navy to another. Late on in the war, several escort carriers built or fitted out at Tacoma or Seattle on the American Pacific coast were transferred to the British RN and returned again at the conclusion of hostilities. Likewise several RN cruisers were transferred to the navies of Australia and New Zealand. In the latter case, the logbooks of these ships can be found in the state archives of those countries.

National Archives of Australia – (www.naa.gov.au)

See in particular the online document 'Series notes for series SP551/1'

Archives of New Zealand – (archway.archives.govt.nz)

10.3.3 Locating WWII Warships

The *Navy List*, published monthly, contains much material on the RN. However, there is no information on shipping movements within these lists. Even the official Admiralty (secret copies) held in the National Archive provide no useful information. Details of the location and movements of all British and Commonwealth naval vessels can be found in the Admiralty Pink Lists. (ADM 187 in the National Archive, Kew) These 'top secret' documents were produced every few days throughout the war for ships and shore establishments. They list the operating area or location of each vessel with occasional notes on dates of sailing. It was also noted if a vessel was refitting or repairing with the location of the refit. It is apparent however that some shipping movements, including many submarines (which are certainly not all listed) were either not available or deemed too secret to be printed in the Pink Lists and ships may suddenly turn up in a particular area. Despite this, these lists are immensely detailed and useful.

A further, and probably best, resource for locating ships and plotting their movements during WWII can be found at the National Maritime Museum at Greenwich. These are the 'Ship Movement Books'. They are presently (2006) not catalogued and do not appear on-line or in any of the printed finding aids. They are large and bulky volumes, housed in a basement, and need to be requested in advance. They appear to be a compilation of the 'Pink Lists' but on a ship-by-ship basis. Both surface ships and submarines are represented and each vessel has a separate page or pages listing various places and locations with the dates of arrival and departure, and the authority for movement. A remarks column provides details of operations and refits, repairs etc. The documents appear to be an official government issue. Those held by the Museum are photocopies.

The Museum also holds copies of 20th century warship service histories. These are photocopies of histories produced by the Ministry of Defence, Naval Historical Branch and include service records of both surface ships and submarines. The collection is however incomplete and the histories for many vessels have either not been written of have not been passed to the Museum. The original collection held by the Naval Historical Branch may have additional histories.

11. Whaling Logbooks

To date (2006) less than 200 whaling logbooks have so far been located in British archives for the post-1800 period. The majority of these whaling ships were operating in the Davis Straits and the seas off Greenland. Twenty-seven logbooks have been located for other areas. Most of these were operating in the Pacific Ocean, but some have also been found in the area of the South Shetland Islands, the Kergulen Islands and the Antarctic. The author has not yet viewed any of these logbooks; therefore it is not possible at this present time to report on their quality, format or the type of data recorded.

Whaling logbooks have not been collected into one archive. All of the collections are relatively small and usually centred on the locations from which the whaling ships sailed. The most significant numbers of whaling logbooks can be found at the Dundee Library and Museum, the Town Docks Museum, Kingston-upon-Hull, the Hull Local Studies Library, the National Maritime Museum, and the Scott Polar Research Institute. Holdings, in single figures only, can also be found in the

collections of the Royal Geographical Society, the British Museum of Natural History, Peterhead Public Library, the Gloucestershire County Records Office, and the universities of Aberdeen, Exeter and Glasgow. It is likely that others exist, probably not catalogued, in various UK county archive offices, universities, private collections and small museums. Useful reference books for whaling logs are Downey and Adams (1986) and Holland, (1982.)

12 Merchant Shipping Logbooks (excluding East India Company)
Unlike their American counterparts, British merchant shipping logbooks, in particular those written during the 20th century, are few in number. The most extensive collection is that of the EIC, discussed in detail earlier in this report (section 1.2). Some merchant shipping logbooks exist in the National Maritime Museum, either in the section LOG/M or scattered amongst the Museum's holdings of company and private papers. Most of these date from the 18th and 19th centuries and have also been discussed earlier in this report (section 1.3). A further cluster of merchant shipping logbooks exists in the India Office Records at the British Library. Like the EIC logbooks they are catalogued under L/MAR/B. However these are logbooks of vessels trading to India after the commercial activities of the Company ceased in 1834. Therefore they are not included in Farrington's catalogue. The number and range of these additional logbooks is as yet (2006) to be determined but it is thought that in format, quality and type of data recorded, they will be similar to the EIC logbooks.

Merchant shipping logbooks from the 20th century have not been collected into one archive. It has not yet been determined if the many thousands of logbooks that were kept have even survived. Companies such as P&O and Cunard hold a very small number. It is possible that collections of logbooks associated with various shipping companies still exist. These companies have either stopped trading or were absorbed by other shipping lines. Logbooks may have been disposed of or may still be stored somewhere unrecorded and unnoticed. If substantial numbers of logbooks for various shipping lines exist in storage, it is certain that no details of these have been posted on-line. It is hoped therefore that some may have survived but at the present time (2006) this is pure speculation and must await further enquiries. However according to a report of 1994, the Met Office holds 3,795 meteorological logbooks kept by

merchant ships during the period 1936-48 as well as over 10,000 met forms. (Rhodes, 1994) Presently, this is also the subject of further enquiries.

13 Metadata
13.1 Sources of Metadata
13.1.1 Logbooks
The sources for metadata and other ancillary information needed to process historical marine data are many and varied. Depending on the period under study, the logbook itself will provide some of the required information. The logbook cover will usually state the name of the ship, the range of dates covered by the logbook, the name of the commanding officer and usually the name of the logbook keeper, if the keeper is not the commanding officer.   The latter point does not apply to those logbooks kept by successive officers of the watch (ADM 53 and ADM 173). Most late 19th and early 20th century RN logbooks will also provide details of meteorological instruments. This information includes the type and maker of the barometer, the height above sea level and the error. Information on thermometers includes the maker, position and whether screened. The logbooks of the WWII period do not provide this information in each of the monthly logbooks. Instrument metadata for this period is presently (2006) a matter of further enquiry.

Further information on meteorological instruments can be found in the National Archive at Kew. BJ 10/6 is a register of Admiralty thermometers 1855-1908, and BJ 10/2 is a register of Admiralty barometers 1854-1911.

13.1.2 Reference works
Metadata on ships and officers can be found in a number of standard reference books. For the sailing ship era the most comprehensive work for RN vessels is David Lyon's, *Sailing Navy List*. This gives all the details of RN ships built purchased or captured from 1688 to 1860. For the period after 1860 there is *Conway's all the World's Fighting Ships*. There are three volumes covering the periods 1860-1905, 1906-1921, and 1922-1946. These three volumes not only cover all major navies such as Britain, the United States, Germany, Japan, France and Italy, but also the smaller navies such as those of the British Commonwealth, and the South American republics. Farrington (1999) provides details of the size (tonnage) and the commanding officer of most of the EIC vessels.

If the name of a commanding officer or logbook keeper is required, the most unambiguous source is the logbook itself. This information is not stated on later logbooks, especially the WWII period. Another source for these names is the printed *Navy List*, produced monthly form the late 18th century onwards. Copies of the *Navy List* are readily available in both the National Archive and the National Maritime Museum. A further source for the early period is the *Commissioned Sea Officers List 1688-1815*. The National Archive holds a manuscript copy of this list that has been annotated with the names and of the ships the officers served on or commanded, with approximate dates (Jones, 1950). Whenever possible however, the logbook itself should be the primary source of this information.

13.2 Types of Metadata
13.2.1 Ship Name
It is usual to find the name of a vessel on all logbooks. With early logbooks there can be alternative spellings of ship names, which one should be alert to (eg. Enterprise and Enterprize, or Cameleon and Camelion [for Chameleon]). Search engines within archives may modernize a name or omit alternative spellings and it should not be assumed that a logbook does not exist when a search produces a negative result. This can be a particular problem when early British warships (originally captured from an enemy) retain a form of their foreign name.

Over a period of time, there will be a duplication of names and it should not be assumed that ships with the same name are the same vessel. If dealing with an extended time period, it is usual to append the date of launch to the vessel's name, for example, *Victory* (1765). This method is unambiguous and absolutely necessary during war periods when vessels may be lost and a new ship, then building, is assigned the name of the lost vessel. Duplication of names of vessels co-existing will not usually occur with the RN although there are very infrequent exceptions. A very old ship might have been assigned harbour duties, such as a storehouse or barracks, and retained its original name while a vessel of the same name is commissioned and active. Additionally, a captured vessel may be commissioned abroad and inadvertently given a name already in use. Furthermore it is not unknown for a vessel to have its name changed. Such circumstances can easily be checked against standard reference works, and Lyon's *Sailing Navy List* is best for this

Duplication of names will occur between vessels of the RN and the EIC and it is therefore important to distinguish the owner or operator of the vessel. Furthermore many East Indiamen were chartered and there are co-existing EIC ships with the same name. Farrington (1999) provides a number to differentiate between ships of the same name (ie. York 3, York 4).

2. Tonnage

Tonnage will give the relative size of the vessel. With sailing ships however, tonnage was based on builder's measurements and did not refer to displacement. Tonnage by builder's measurement was determined by a standard formula using the length of keel, extreme breadth and the depth of the hold. Essentially it was a measurement of carrying capacity but in the sailing ship era was applied to both warships and merchant vessels. The measurements used to work out the tonnage were the same for different nations, however each used a slightly different formula. For instance in the early 19th century, if a British and American ship were registered as the same tonnage, the American vessel would have slightly larger dimensions.

3. Dimensions

The dimensions, available for most sailing vessels, are length of keel, extreme breadth, and depth of hold. These were the dimensions used to calculate the tonnage. For later vessels, in particular the steam era, extreme length and breadth, length between perpendiculars and depth (below waterline) were usual.

4. Ownership of Vessel

It is important to distinguish between naval and merchant vessels especially as there is likely to be a duplication of ship names.

5. Builder/Launch

The building details of vessels are usually, the name of the builder and the location of the dock or slipway, the date the ship was begun and the date of launch. The year of launch is often useful to distinguish between ships of the same name. For later vessels, especially 20th century, the date of completion (following the launch) is also available.

6. Fate/Disposal

The details concerning the fate of a vessel can often explain the absence of a logbook and prevent an unnecessary search

7. Type of Vessel

Knowing the type of vessel is useful in determining the sorts of duties it would have performed. This can then be used to judge the amount of activity and sea time one can expect to find recorded in the logbook. Table 10 lists the types of vessels in the age of sail.

Type of vessel	Number of guns	Typical duties
Ship of the Line	100-50	Blockade, fleet battle
Frigate	50-24	Cruising, commerce raiding
Sloop	24-18	Cruising, commerce raiding, exploration
Brig	18-12	Cruising, carrying despatches
Cutter	12-6	Revenue protection, carrying despatches
Schooner	8-4	Revenue protection, carrying despatches
Bomb vessel	1or 2 mortars	Bombardment
Storeship		Supplying stores to fleets, ships and colonies
Troopship		Moving troops
Guardship	100-50	Commissioned warship kept in an advanced state of readiness
Hulk Lazarette Prison ship Powder hulk Receiving ship Sheer hulk		Harbour duties only.

Table 10. Types of Early Warship

In the age of steam the categories are battleship, battle cruiser, aircraft carrier, cruiser, armed merchant cruiser, destroyer, frigate, corvette, minesweeper/layer, motor torpedo boat, etc.. The availability of UK naval logbooks of the Second World War are largely confined to battleships, carriers and cruisers, and armed merchant cruisers, though a few logbooks from smaller vessels have been retained.

8. Number of Guns

The number of guns carried on board a vessel in the age of sail gives a good indication of the type and size of the vessel. The designated number of guns assigned to RN vessels was not necessarily the total carried on board. The designated number of guns fixed the vessel within a specific 'rate' or administrative category so that the proper number of officers, men, provisions, stores and rates of pay could be allocated. A 'rated' vessel was commanded by a full, or 'post captain'. A thirty-eight gun

frigate for instance could carry up to 46 guns, the additional eight being made up of carronades, which were special short range ordnance. The official 'rate', based on the number of standard guns carried, was well understood and it was usual to distinguish between types of vessels merely on the number of ordnance carried as per the table following

Ship Types 1700-1815				
Type	**Rate**	**Gun Decks***	**No of guns**	**Approximate Period**
Ship of the Line	1	3	100 +	1700-1815
Ship of the Line	2	3	98	1700-1815
Ship of the Line	2	3	90	1700-1815
Ship of the Line	3	3	80	1700-1750
Ship of the Line	3	2	80	1770-1815
Ship of the Line	3	2	74	1750-1815
Ship of the Line	3	2	70	1700-1770
Ship of the Line	3	2	64	1760-1810
Ship of the Line	3	2	60	1700-1770
50 gun ship	4	2	50	1700-1800
Frigate	4	1	50	1812-
44 gun ship	4	2	44	1700-1790
Frigate	4	1	44	1790-1815
Frigate	5	1	40	1790-1815
Frigate	5	1	38	1770-1815
Frigate	5	1	36	1750-1815
Frigate	5	1	32	1700-1815
Frigate	6	1	28	1700-1800
Sloop	6	1	24	1700-1815
Sloop	6	1	20	1700-1815
Brig/Sloop	unrated	0	18	1700-1815
Cutter	unrated	0	8-14	1700-1815
Schooner	unrated	0	4-8	1700-1815
Bomb vessel	unrated	0	mortar	1700-1815
Troopship	unrated			1700-1815
Storeship	unrated			1700-1815

Table 11 Rates and Guns carried by Warships 1700-1815
*Gun deck refers to a full deck covered or partially covered. The smallest vessels carried their armament on the spar deck (top deck exposed to the weather). A 100 gun vessel such as HMS *Victory* would be referred to as a 'three-decker' or a 'first rate'.

As can be seen from the above table the rates and types of vessel remained fairly standard for over a century. After 1815, but before the steam era, there were changes in the number of guns carried by frigates. Frigates of 52, 46, 42, 28, 26 and 22 guns were common   Most ships of the line carried either 120, 100, 90, 84, 76, or 74 guns The only notable change was the general increase in the size of vessels. For the steam

era, the number and type of guns carried becomes more complicated. Although the data is readily available it is not so useful in identifying the type of vessel.

9. Propulsion
The data available for ships of the steam era are number and type of engine, horsepower, number of shafts and maximum speed.

14. Catalogue Design
The aim of the catalogue is to bring together a comprehensive listing of all UK vessels according to their date of sailing and destination. Appended to this listing will be the relevant archive reference of the vessel's logbooks, an indication of its destination and all other information useful to making a selection of a logbook for research. It will be designed in such a way that the user can interrogate the listing for a specific named vessel, a range of dates, a geographic area, or where known specific types of recorded information. In its database form it will be possible to link vessels and logbooks in a variety of ways depending on the needs of the enquirer. The format and the design of the first versions of the catalogue and database will be subject to change and revision as new data and new fields are added.

14.1 Geographic and Temporal Grouping
The catalogue design, format and content will need to be discussed and agreed. It was sufficient for the CLIWOC Project to have a list of vessels, arranged chronologically in the order that they sailed from Britain, along with their destination. To this was appended a geographic station list at irregular intervals in order to keep track of those vessels that had left their station. Where possible the date of arrival back at a British port was also included. The most important information however was the destination of the vessel and, as outlined above, this formed the primary focus for short-listing vessels prior to a search for the logbook. The logbook catalogue number, when found was appended to the list of vessels.

This project will have many more logbooks, and the catalogue design needs to be tuned to the requirements of the CDMP. Rather than a chronological list of vessel, it is suggested that the catalogue be focussed on the vessel's destination in order to target those vessels with the longest runs of data. This will also allow emphasis to be placed on particular geographic regions if required. These regions should be self-contained meaning that anticipated sailing routes should be within a region, with

minimal transfer of vessels from one region to another. Furthermore, sea areas common to most vessels, such as the North Atlantic and the English Channel should not be considered as regions.

Suggested regions are:

Mediterranean and European waters
To include the Mediterranean, the Bay of Biscay, and the Atlantic coasts of Spain and Portugal. (The English Channel and Western Approaches will be common to virtually all sailings)

North America, West Indies and West Africa
As well as a North Atlantic crossing, the grouping of these three sea areas takes account of the frequent movement of vessels between the West Indies, Nova Scotia and Newfoundland, and at earlier periods, the American colonies. It also takes account of the regular though infrequent sailing of vessels to Jamaica via West Africa and the Gulf of Guinea, and those occasional sailings from Newfoundland to Lisbon. The North Atlantic will be common to all sailings

East Indies and South Atlantic
As well as a North Atlantic crossing, this region will take account of those RN vessels sailing to areas south of the Equator and will include St. Helena, South America, India, China, Australia and the Pacific. This region will also include all sailings of EIC vessels. Within each of these three regions, vessels should be listed chronologically in the order in which they sailed from British ports. Thereby it will be possible to target or avoid those vessels sailing in company, or to target a particular month of the year or some other specific time frame.

14.2 Data to be included in Catalogue or Directory
The metadata for each vessel need not be included in the catalogue and can be gathered and recorded at a later stage. Some of the metadata requires a direct inspection of the logbook. The essential information required for the targeting and short-listing of vessels will be:

Unique ID number
This will be used to identify a particular voyage rather than a vessel.

Archive reference number of logbook
This should occupy a column for the National Maritime Museum, another for the British Library and six columns for the National Archives, one for each of the five

divisions within the collections of RN logbooks and another for the Hudson's Bay Company. An additional column will be needed for the Scott Polar Research Institute, and another for miscellaneous minor archives.

Part Number

This will refer to the individual logbook within the group of logbooks filed under one reference number. This information is not in the catalogues but can be determined easily. Recording this will ease selection and allow for multiple logbooks to be identified under one reference number.

Date Range

The date range within each logbook

Name of vessel

Number of guns

Important for the RN vessels, as the smaller frigates and sloops are the most likely to give longer and more frequent runs of data. During the sailing ship period, the number of guns carried is an excellent proxy for determining the relative size and type of vessel.

Company

Ownership or general type of vessel such as RN, EIC, Hudson Bay Company, merchant, whaler etc.

Region (regional maps are provided in the appendix)

Numbered regions allow for quick sorting of voyages for specific destinations and parts of the globe. The regions are for the most part self-contained as explained above.

1-South Atlantic, Indian and Pacific Oceans
2-Western Atlantic, Tropical Atlantic, Caribbean
3- Eastern Atlantic, Mediterranean and all European waters
4-Arctic regions
5-Antarctic regions

Primary Destination

The precise destination should be obtained where possible, other wise a general area such as the East Indies should suffice.

Secondary Destinations

Where possible any onward voyage or intermediate ports of call should be noted. This will allow further refinement of logbook selection.

Date sailed from UK

Essential information to fix the voyage within a time frame

Date returned to UK

Not essential but useful to target the dates of a return voyage if that voyage is not in the same logbook as the outward journey.

Station or destination reference

This will be a reference to the source from which the vessel's location or destination and any data on movements was obtained. The sources used to date are as follows. Further details of these sources are in the bibliography.

ADM 8 series	Royal Navy Fleet and Station Lists (National Archive-Kew)
ADM 7/560-561	Royal Navy Ship and Movement List 1811-1821 (Kew)
CLIWOC	CLIWOC Project databases and handwritten project notes
Farrington	*Catalogue of East India Company Ships' Journals and Logs 1600-1834.*
Holland	*Manuscripts in the Scott Polar Research Institute*
NC	*Naval Chronicle*
NMM catalogue	National Maritime Museum Catalogue (Greenwich)
PMB	Pacific Manuscripts Bureau (microfilm, NMM Greenwich)
Tizard	*Chronological List...* (Hydrographic Office, Taunton)
TNA catalogue	National Archive catalogue (Kew)
WLJ	*Whaling Logbooks and Journals 1613-1927*

Examined

Some indication should be given if the contents and condition of the logbook have been inspected.

Voyage Details

Wherever possible details of each leg of a voyage, ports of call, cruising areas, with dates will be given. The present version of the database contains this information where it has been recorded in the sources listed above. Additional information must be added to the database whenever a new logbook is examined.

Instrumental data

In order to target more precisely, those logbooks containing or likely to contain instrumental data there could be a ranking system such as:

1. Instrumental data present (confirmed)

2. Instrumental data likely to be present

3. Instrumental data unlikely to be present

4. No instrumental data (confirmed)

Confirmation of instrumental data may need direct inspection of the logbook. However it will be possible to keep a tally of the names of those officers who are known to record instrumental data from the evidence of previous logbooks. For example, any additional logbooks that were kept by those officers, but have not been inspected, could then be ranked as category 2.

Type of Instrumental Data
Where the presence of instrumental data is known, further refinement in selection can be made. There should be three columns headed AT for air temperature, BP for barometric pressure and SST for sea surface temperature. The recording of '1' or '0' can indicate whether this information is present.

Weather Note/Met Log
This field can be used to indicate if the logbook records any unusual weather phenomena, descriptions of or references to storms or any other reference, either directly or indirectly, to severe weather. This field will also record whether a meteorological log is available. This will be a separate document to the regular ship's or officer's logbook.

CLIWOC Reference
This field contains all references to the EU CLIWOC project. It will indicate if the logbook was examined or processed either whole of in part by the project, giving dates and other relevant information.

Remarks
A section for any notes, comments or information that do not fall within the other categories

14.3 Format and development of Catalogue or Directory
The catalogue is presently being compiled as an Excel spreadsheet or series of spreadsheets, one for each of the three main regions, a fourth for the Arctic/Antarctic, a fifth detailing only the EIC vessels and a sixth listing RN packet ships whose movements have not yet been determined. The last is presently a convenience in the development of the catalogue and can be merged with the other spreadsheets later. Excel spreadsheets have the advantage of being fully searchable and can be converted to an Access database or other format of database as required.

A catalogue from the CLIWOC Project already exists covering the years 1750-1799. Not all of the vessels in this early catalogue were processed, nor is the catalogue in the same format as suggested above. The new catalogue starts from the year 1800 (when some instrumental data can be expected from EIC ships) and will through to 1947. The two catalogues can be merged at some point to give a continuous run of vessels and logbook references from 1750 to 1947.

14.4 Security of Data
The catalogue will be copied and backed up daily as it is developed. It is suggested however that at least one other person be supplied with a copy on a regular basis (monthly or bi-monthly) to minimize the impact of any loss of data by some accident.

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APPENDIX I
Table of abbreviations and notation in early logbooks

|	
Ac., Acc. or Acct.	Account or estimate. Refers to the latitude or longitude having been determined by dead reckoning or account.
am	Period from midnight to noon. In logbooks kept according to the nautical day, the am formed the latter part of the day.
Amp.	Amplitude. An observation of a celestial body usually performed to determine the magnetic variation of the compass
Azm.	Azimuth. An observation of a celestial body usually performed to determine the magnetic variation of the compass
Chron., Chro.	Marine chronometer. Used to indicate that the longitude has been determined by reference to a timekeeper.

Dep.	Departure. The last sighting of a recognized landmark, usually used as a zero meridian
Diff. Lon.	Difference in longitude from the previous day
DR.	Dead Reckoning. An estimate of the vessel's position based on course and speed, with corrections for leeway, drift and magnetic variation.
E	Eastings. The distance a vessel has made in an easterly direction as determined from a traverse table. A traverse table was a running account of courses and speed.
F	Fathom. Refers to the vessel's speed at one-eighth part of a knot or nautical mile. In the later 19th century, the term referred to one-tenth part of a knot. The term is also used in the same sense when measuring the velocity of a current.
First part	First part of the day. In logbooks kept according to the nautical day, the first part was the period from noon to 8pm.
H	Hour. Found at the head of the column where the hour of the day is noted
K	Knot. Refers to the vessel's speed in nautical miles per hour
Lat. Acc.	Latitude by account. An estimate of the ship's latitude by dead reckoning.
Latter part	Latter part of the day. In logbooks kept according to the nautical day, the latter part was the period from 4am to noon.
Lon. in	Longitude by the Greenwich meridian
Lon. mde	Longitude made. Distance in degrees and minutes from the zero meridian
Lun.	Lunar. Refers to the vessel's longitude being determined by a lunar observation.
M+D	Meridian + Distance. Longitude made. Distance in degrees and minutes from the zero meridian expressed as leagues or degrees of a fixed length irrespective of latitude. (indicating the use of plane charts as opposed to mercator charts)
Middle part	Middle part of the day. In logbooks kept according to the nautical day, the middle part was the period from 8pm to 4am.
N	Northings. The distance a vessel has made in a northerly direction as determined from a traverse table. A traverse table was a running account of courses and speed.
No obs.	No observation. Indicates that, no celestial observation was possible due to the state of the sky. The ship's position is often absent though there may be a dead reckoning estimate.
Ob.	Observed. Indicates that the vessel's position has been determined by an observation, solar or lunar, as opposed to an estimate by dead reckoning
pm	Period from noon to midnight. In logbooks kept according to the nautical day, am will form the first part of the day.
S	Southings. The distance a vessel has made in a southerly direction as determined from a traverse table. A traverse table was a running account of courses and speed.
Second part	Middle part of the day. In logbooks kept according to the nautical day, the second or middle part was the period from 8pm to 4am.

TK	Marine timekeeper or chronometer. Used to indicate that the longitude has been determined by reference to a timekeeper.
Var.	Variation. A term used for the magnetic declination of the ship's compass
W	Westings. The distance a vessel has made in a westerly direction as determined from a traverse table. A traverse table was a running account of courses and speed.
X Lat.	Difference in latitude from the previous day
X Lon.	Difference in longitude from the previous day

APPENDIX II Regional Maps with Typical Sailing Routes (sailing ship era)
All ship plots produced by Frits Koek, Royal Netherlands Meteorological Institute
(KNMI)

Data is taken from the CLIWOC database. The points on each plot are the noon
positions of the vessel.

REGION 1
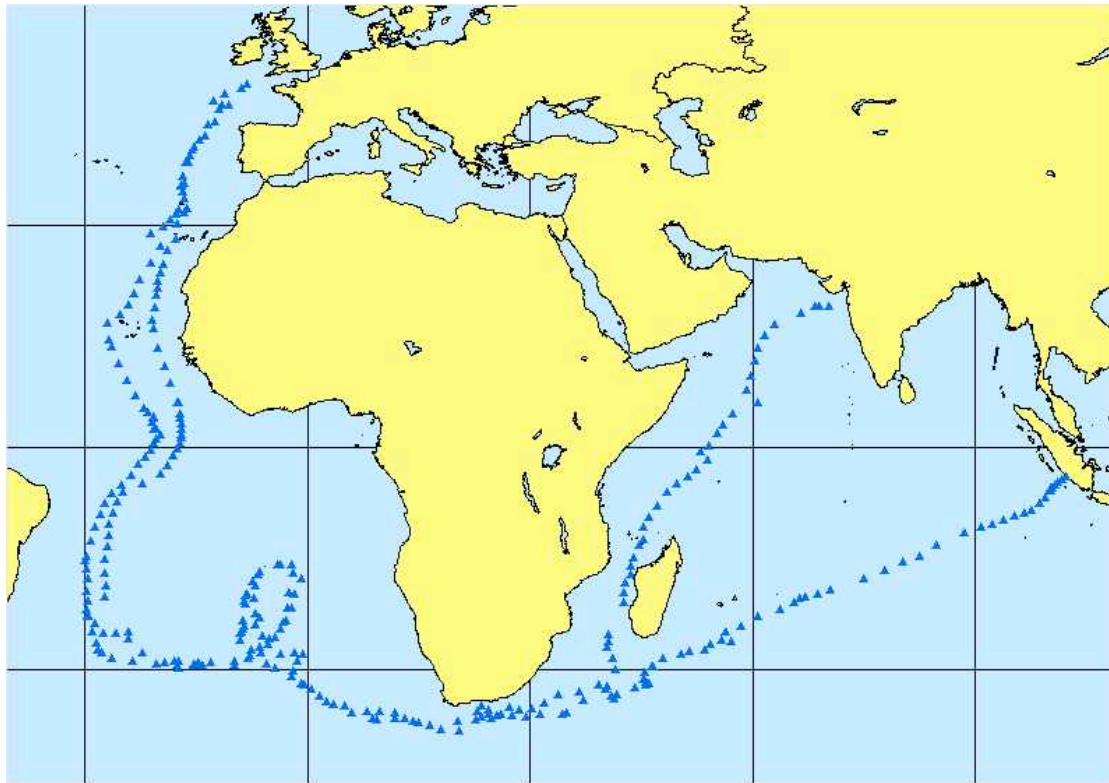
Region 1, Map 1 Route to the Cape and Bombay - EIC Ship *Raymond*
1. Portsmouth to Bombay via St. Helena and the Mozambique Channel, Mar-Sep 1783
2. Portsmouth to Cape of Good Hope via St. Helena, Dec 1784-May 1785
3. Benkulen, Sumatra to the Cape of Good Hope, Mar-May 1786

Region 1, Map 2 Route to Madras - EIC Ship *Britannia*
Downs to Madras May-Sep 1802

Region 1, Map 3 Route to Bengal and onward to China– EIC Ship *George IV*
1. Downs to Saugor Roads, Feb-Jun 1828
2. Saugor Roads towards China via the Malacca Straits, Aug-Sep 1828
3. Java Head to Downs via St. Helena, Feb-May 1829
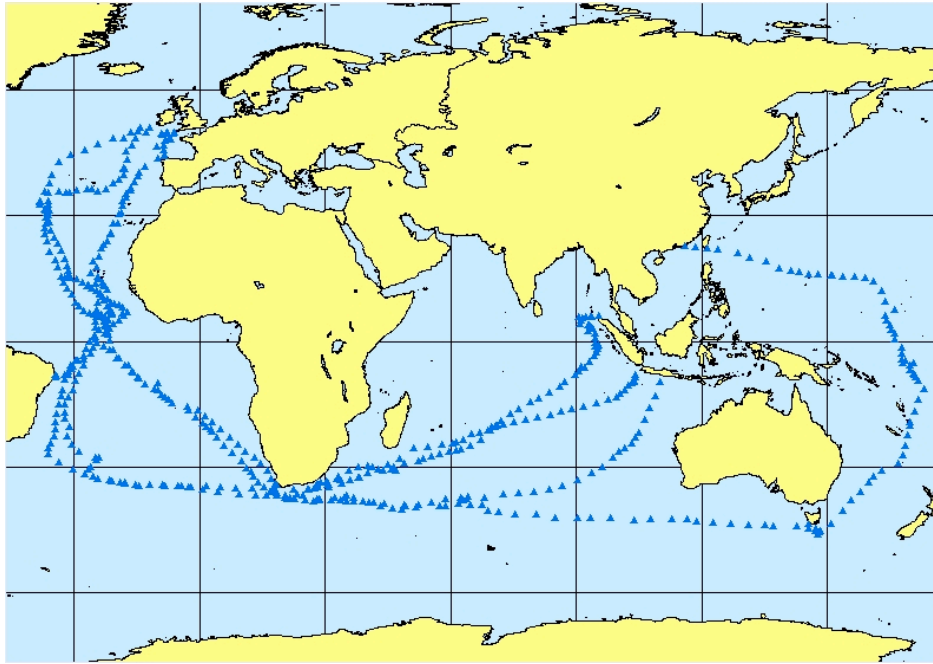
Region 1, Map 4 Route to China via Pacific – EIC Ship *Walpole*
1. Portsmouth to China via Pacific by sailing south of Australia, Jun-Dec 1794
Other tracks shown
2. Portsmouth to Anjer Road, Java, May-Aug 1792
3. Java Head to Portsmouth via St. Helena, Jan-Jun 1793
4. Acheen Head, Sumatra to Motherbank via St. Helena, May-Nov 1795

Region 1, Map 5 Route to and from the Pacific Ocean via Cape Horn – HMS *Conway*
1. Montevideo to Valpariso, Nov-Dec 1821
2. Galapagos to Panama and Acapulco and St. Blas, Jan-Mar 1822
3. St. Blas to Rio de Janeiro, Jun-Sep 1822
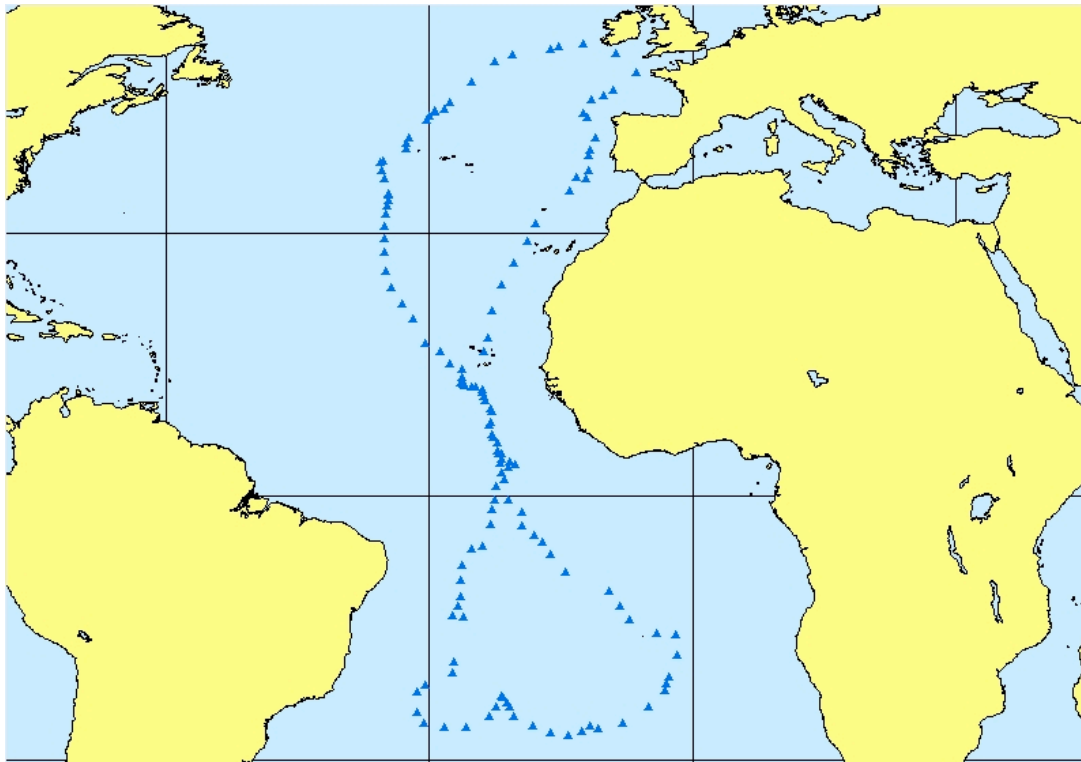
Region 1, Map 6 route to St. Helena and Return – HMS *Argo*
Spithead to St. Helena and return to Downs, Mar-Sep 1794
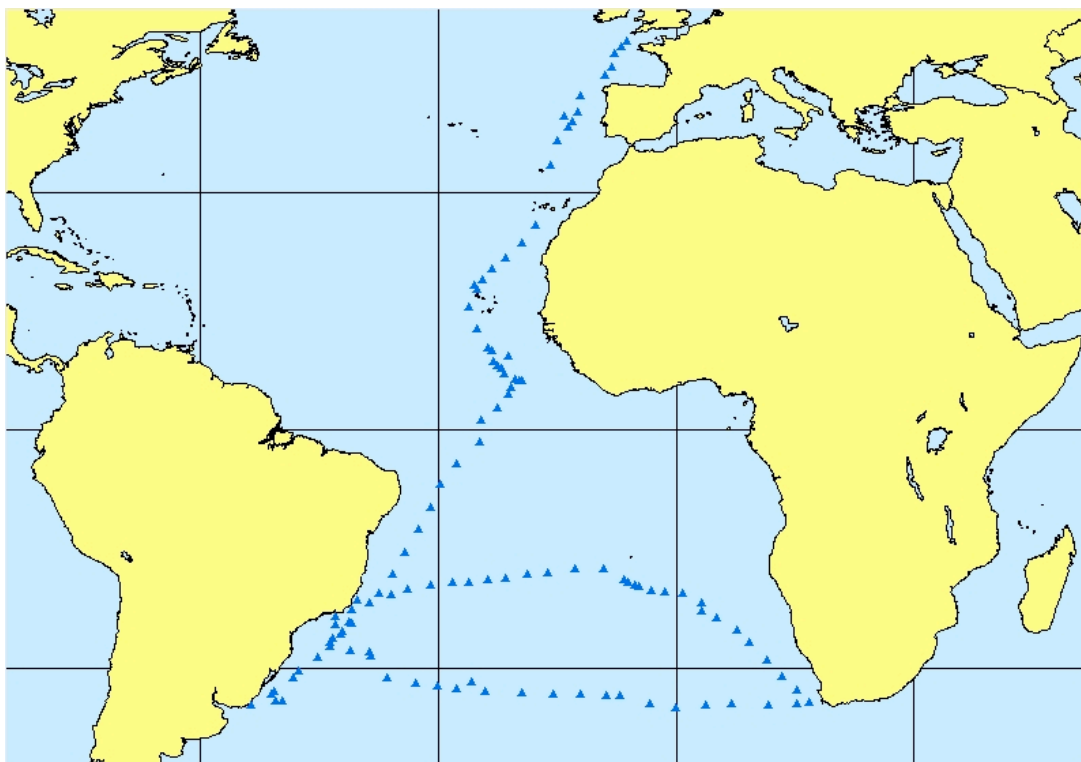
Region 1, Map 7 Route to South America and then Cape of Good Hope–HMS *Spartiate*
1. Plymouth to Rio de Janeiro, Sep-Nov 1823
2. Rio to the Cape of Good Hope, returning to Rio, then Montevideo, Jun-Sep 1824

Region 1, Map 8 Route to and from the Falkland Islands – HMS *Florida* (storeship)
Passages to and from the Falkland Islands 1764-1770

REGION 2
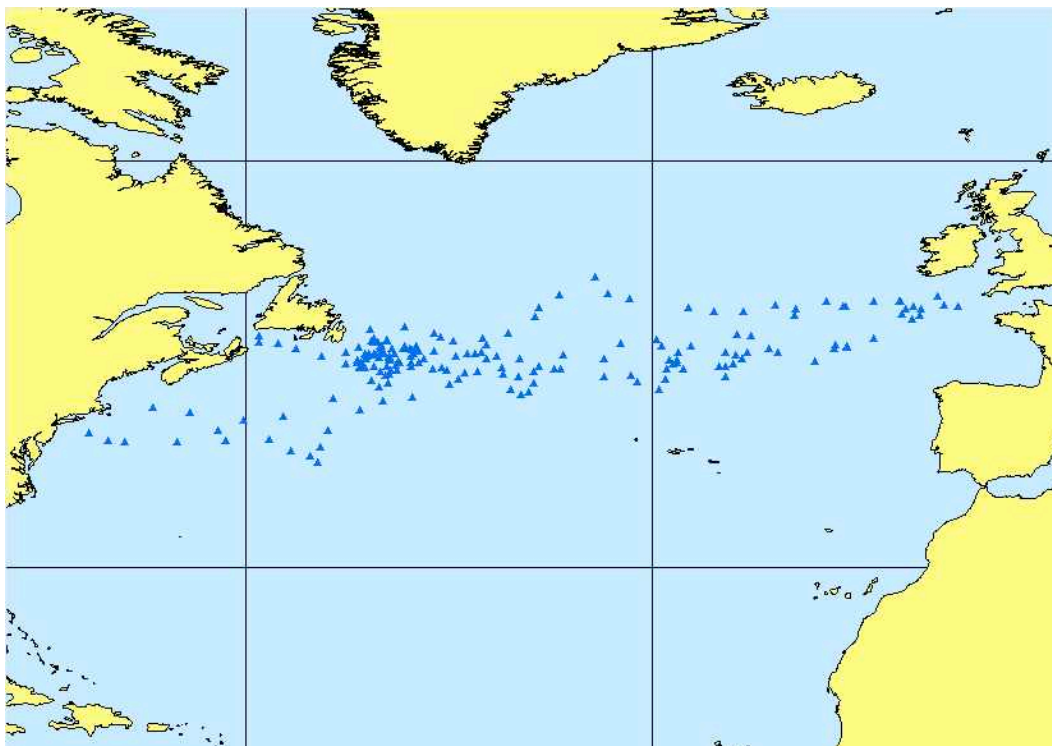
Region 2, Map 1 Northern Routes to North America – HMS *Active*
1. New York to Plymouth Nov-Dec 1776
2. Channel Islands to Nova Scotia Apr-May 1777
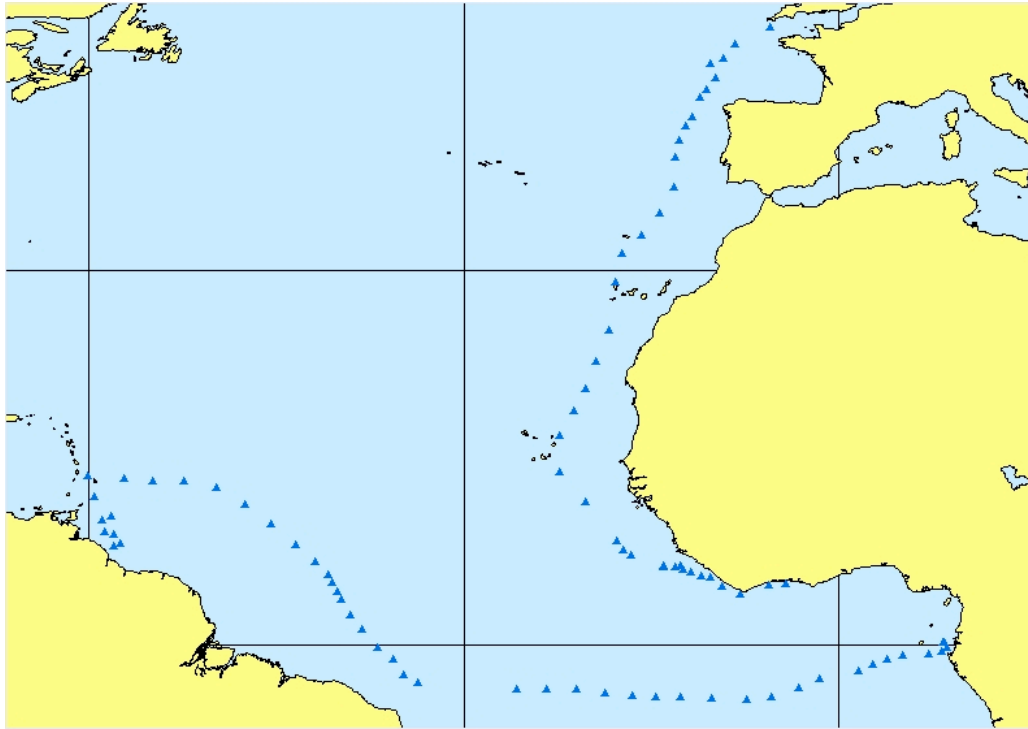3. St. Johns Newfoundland to Spithead Sep-Oct 1777
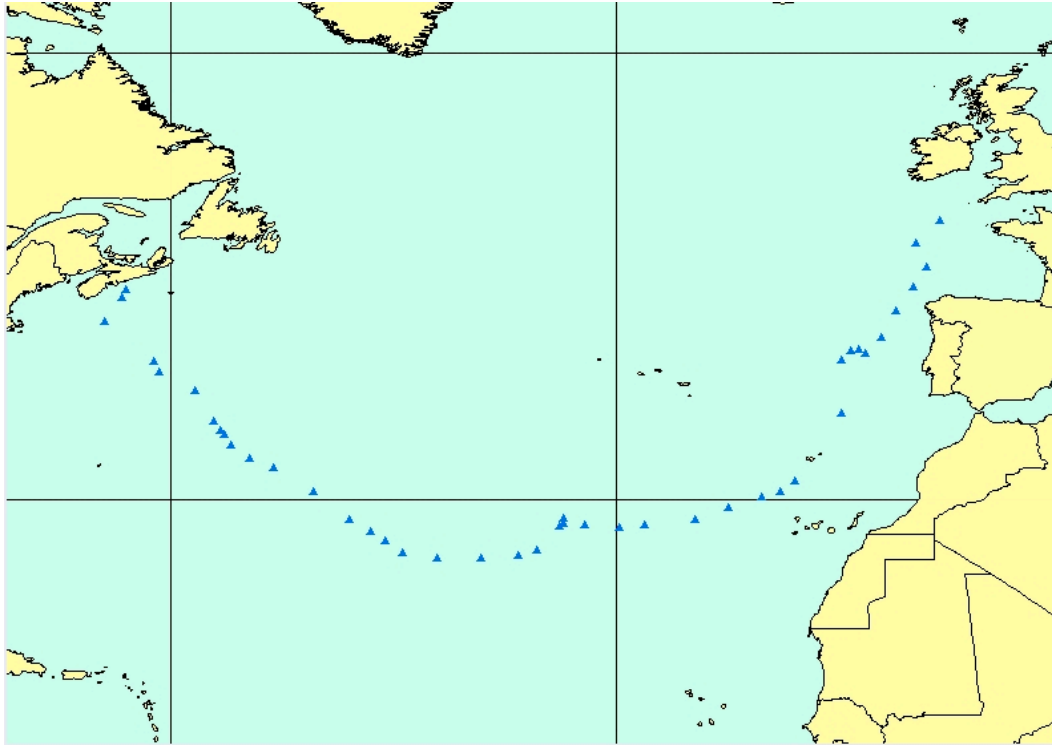
Region 2, Map 2 Southern Route to North America – HMS *Thisbe*
Spithead to Halifax, Nova Scotia via Funchal, Madeira Mar-May 1790
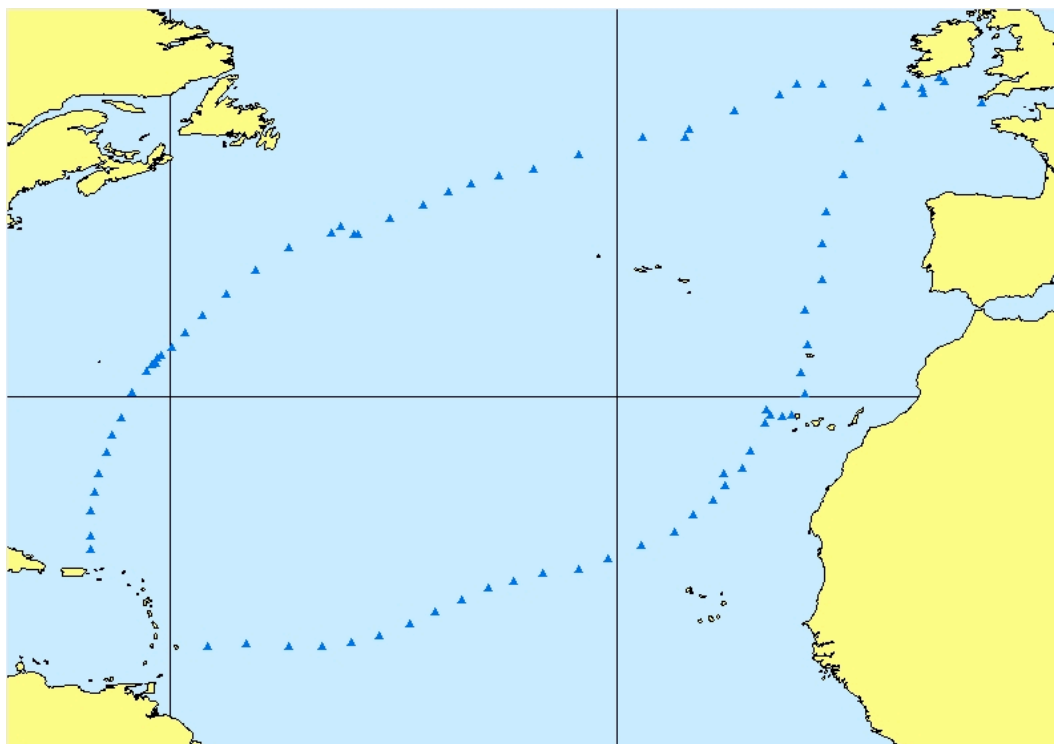
Region 2, Map 3 Route to and from the West Indies – HMS *Acasta*
1. Cork to Barbados Feb-Apr 1807
2. Road Town, Tortola to Downs Jul-Aug 1809

Region 2, Map 4 Route to the West Indies via West Africa and the Gulf of Guinea HMS *Amphion*
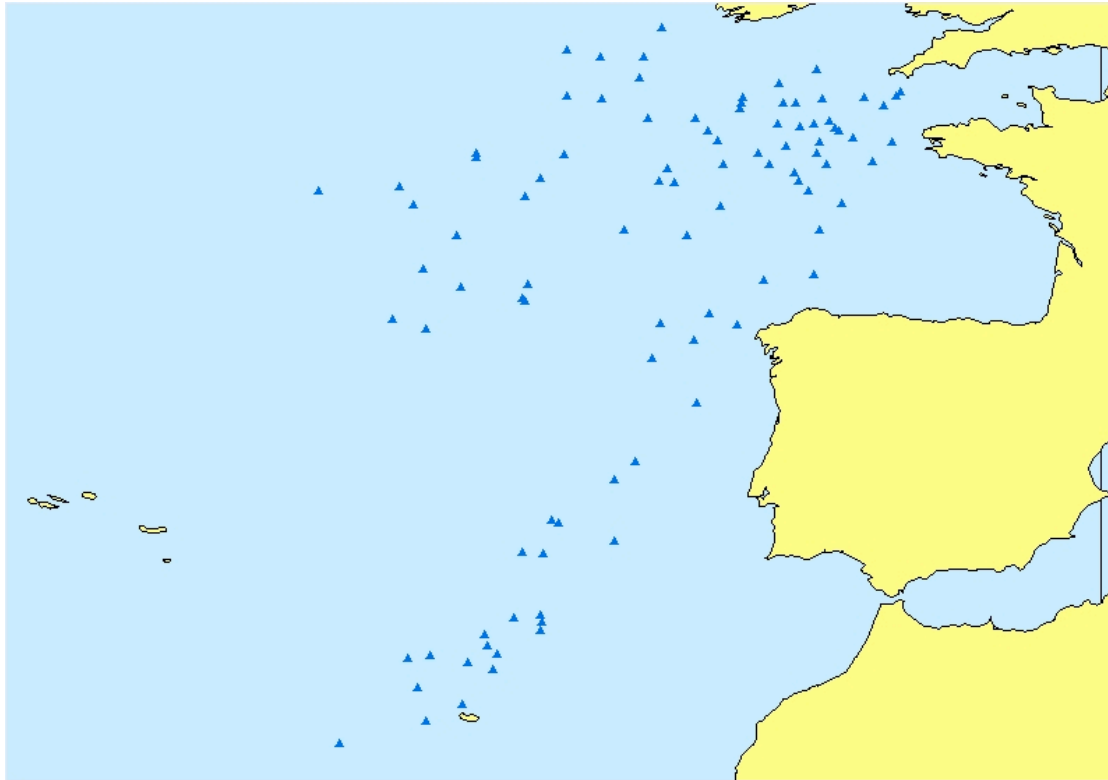Spithead to St. Lucia via Madeira, St. Jago (Cape Verde Islands), Cape Coast, and Princes Island, Gulf of Guinea Dec 1798-Jun 1799
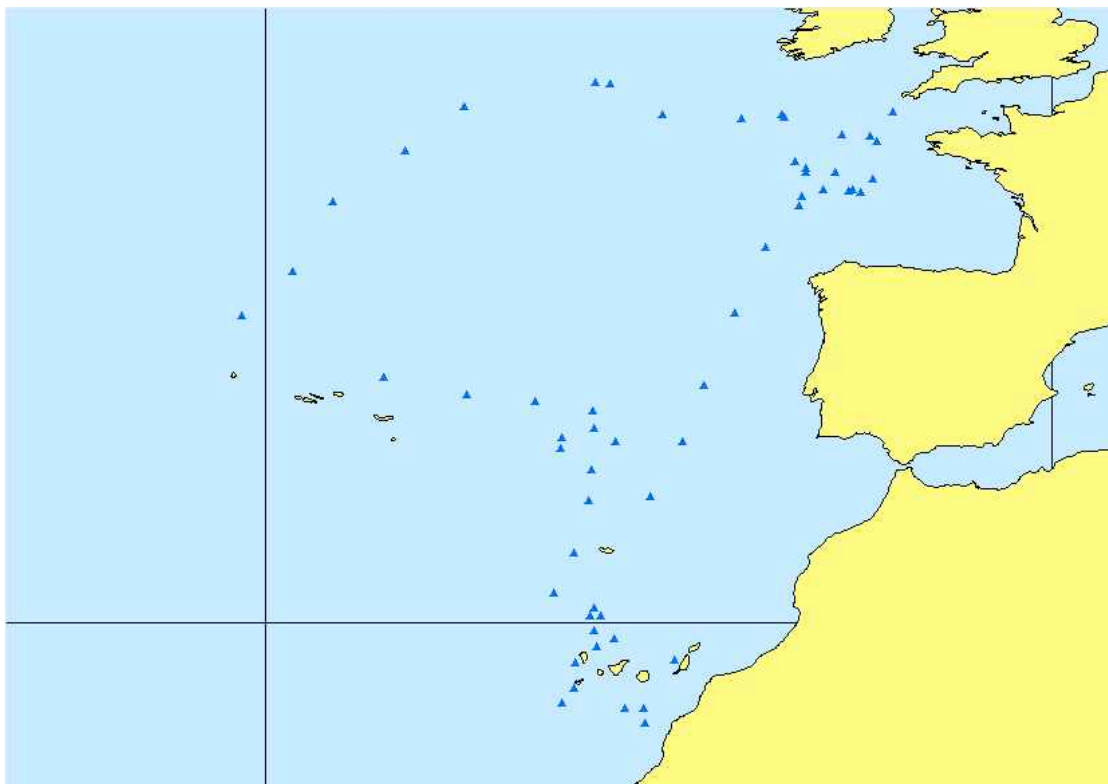
REGION 3

Region 3, Map 1 Route from Spain and Portugal to Britain – HMS *Aeolus*
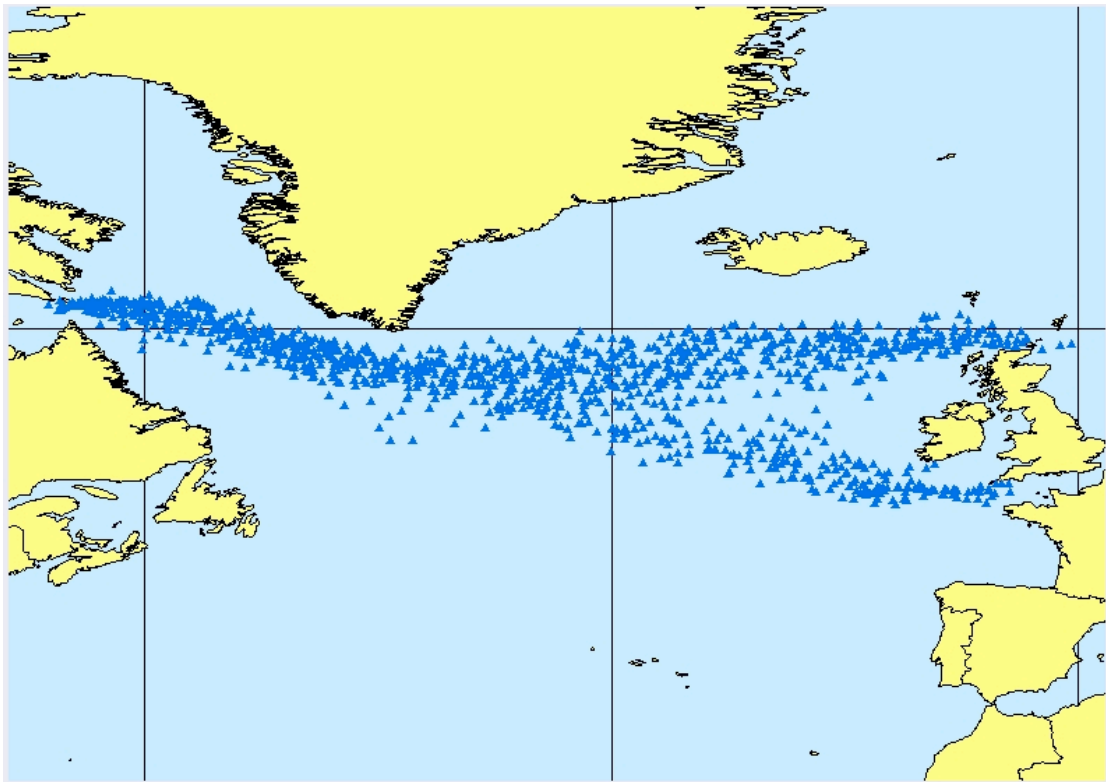Lisbon to Spithead Aug 1780

Region 3, Map 2 Typical Cruising Area for Western Approaches–HMS *Glasgow*
Cruising Western Approaches, Cape Finisterre and Madeira 1814-1815

Region 3, Map 3 Typical Cruising Area for Western Isles– HMS *Active*
Cruising Azores, Madeira and Canary Islands Jul-Sep 1800

REGION 4

Region 4, Tracks of Return Voyages to Hudson's Bay – HBC Ship *Prince Rupert*
Gravesend to Hudson's Bay and return (outward voyage via Orkney Islands) 1760-1763