



¹ Universidad Complutense de Madrid, ² University of East Anglia UK, ³ KNMI, ⁴ Unidad de Historia Ambiental, Mendoza, Argentina ⁵ University of Sunderland UK

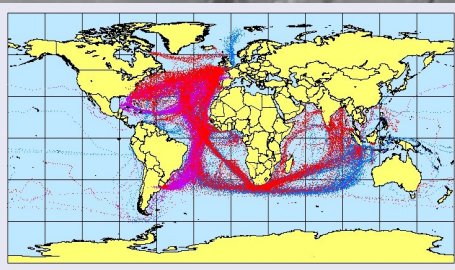


"...from about 1670 there are in various archives many daily reports in the logs of ships in many diverse ports and on the high seas. For climatic research this is a vast treasure trove waiting to be used." (Hubert Lamb, *Climate, History and the Modern World*, p.79).

PROJECT OBJECTIVES

In 1982 Hubert Lamb made the above observation in respect of the scientific value of ship logbook information. Now over 20 years later, some, but by no means all, of that potential has been realised. In no small measure these advances are a result of the activities of the CLIWOC team. The project, funded under the EU Framework V programme, began in 2001 and concluded in 2004. Its principal objectives were:

- to establish a database of marine observations from the pre-instrumental period (before 1850)
- to validate the logbook data and observations
- to establish methods with which to prepare and analyse logbook data from the pre-instrumental period
- to identify logbook sources in the archives of participating national parties
- to provide a means of articulating the CLIWOC database with instrumental databases such as ICOADS
- to provide a sound basis upon which future logbook studies can proceed



CLIWOC data coverage. Red = English data; blue = Dutch data; purple = Spanish data

WHAT IS A LOGBOOK?

Officers in the service of most national navies were obliged to keep a logbook in which the daily record of the ships' activities were duly noted. In the age of sail it was inevitable that wind and weather conditions were carefully noted. With the exception of ships of the English East India Company, few vessels carried meteorological instruments before 1850 and most recorded weather under three headings, those of:

1. Wind direction (measured on a 32-point compass)
2. Wind force (using a pre-Beaufort scale)
3. A general description of the day's weather, mentioning rain, fog, thunder etc.

Much other information on the day-to-day operation of the ships was also recorded in the logbook but not used in the project although useful to other disciplines such as history, navigation, health studies and sociology. They were the primary ships' document and as such carefully written and preserved on return to the home port.

THE ADVANTAGES OF LOGBOOK DATA

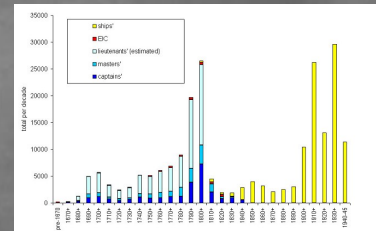
Despite the data being non-instrumental in character, the CLIWOC team were able to identify a number of significant advantages to the climatologist in their use:

- their geographical coverage is extensive but, more importantly, embraces the oceans and seas of the planet; areas for which such data are impossible to come by from any other source
- the information is not proxy-based but consists of direct written accounts of the conditions at the time
- each data point can be fixed in space (latitude and longitude) and time (calendar date and time of day)
- the boundary layer effects on wind flow are minimised over the oceans rendering the observations more reliable (quasi-geostrophic) than those for land sites
- the information enjoys a degree of homogeneity in vocabulary and methods of observation that is exceptional in documentary sources

THE DATA SOURCE: remarkable spatio-temporal coverage

It had been apparent to the members of the CLIWOC team that logbooks were a source of information the abundance of which was matched by a notable geographical coverage. By far the largest collection of logbooks resides in UK archives, and for the period in question (1750 to 1850) there are over 100,000 such documents representing approximately 22,000,000 days of marine data spread without a break over the century-long study period. Most of these are logbooks of ships of the Royal Navy. It should, however, be noted that RN logbooks go back nearly one century earlier and continue to be deposited in the UK National Archives to the present day, representing thereby an extraordinary continuum of data and information. Other nations, however, possess smaller logbook collections from the same period, and CLIWOC also used those from France, the Netherlands and Spain.

The geographical coverage (see map left) is impressive and reflects the geographic extent of the various European empires. The Indian and North and South Atlantic Oceans are well-represented and only the Pacific - never a commonly frequented seaway - yields little information.



Decadal count of UK logbooks, 1670 to present

CLIWOC logbook data: a cautionary note

Whilst logbook data are abundant, care needs to be taken in their interpretation.

Dates: English dates from before September 1752 are on the Julian Calendar and 11 days behind the Gregorian date

Day: the nautical day begins at midday and 12 hours ahead of the civil day

Longitude: Greenwich became the Universal Prime Meridian only in the late C19. Over most of the study period the adopted zero meridians were the port of departure or some similar landmark (the CLIWOC team identified 600 such meridians - all listed in the website).

Wind force terms: the Beaufort Scale came into widespread use only after 1850. The CLIWOC team were faced with the task of re-expressing the earlier scales in English, French, Dutch and Spanish in modern-day Beaufort Scale terms. The project dictionary of such re-expressions (see below) is freely available.

Wind direction: was recorded with regard to magnetic bearings and need to be converted to directions with regard to true north before they can be used.

Such findings are important and provide an important methodological basis for future studies.

FREE DATA AND DOWNLOADS!

The CLIWOC team processed and verified over 285,000 marine observations. These are all available from the project website. To download the data, visit:

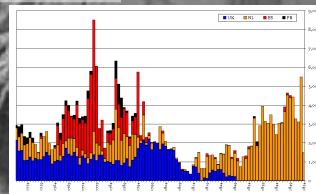
www.ucm.es/info/cliwoc

From the same site you can download the pdf version of the multi-lingual dictionary of wind force terms and other documents.

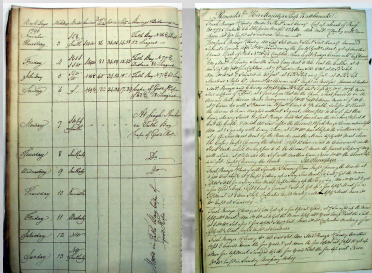
DATA AND METADATA

The CLIWOC database consists of verified and corrected daily observations of wind force and wind direction. The weather descriptions are also keyed by reference to specific phenomena such as rain, fog, thunder etc. It also provides important metadata, which includes corrected dates and locations for each observation, together with notes on the documents from which the data were abstracted, the type of vessel and, where known, the recording officer. The database is available in MS Access and IAMA formats.

The graph (left) shows the distribution through time of data points in the CLIWOC database. Although variable, it is important to note that the vast reserves of untouched logbooks offer the possibility of substantially improving this uneven temporal picture.



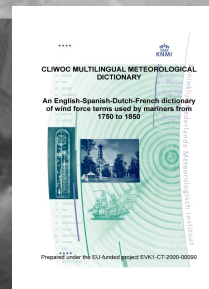
Temporal distribution of data (by national sources) in the CLIWOC database



Typical pages from a Royal Navy (top), Dutch (above left) and Spanish (top right) logbooks

LOGBOOKS: an international document

Logbooks were kept by all officers, irrespective of their nation. The layout was different, but the content remarkably similar. CLIWOC used logbooks from the UK, the Netherlands, France and Spain: the first such international effort.



Cover of the CLIWOC multi-lingual dictionary