

# Report on the Quality of Marine Surface Observations

Report Number 43

January to June 2010

# REPORT ON THE QUALITY OF MARINE SURFACE OBSERVATIONS:

JANUARY TO JUNE 2010

## Distribution list :

### i) External

Technical Co-ordinator DBCP, [Mr E. Charpentier](#)  
Chief, Ocean Affairs Division, WMO ([oca@wmo.int](mailto:oca@wmo.int))  
Diretoria de Hidrografia e Navegação (attn. [janice.trotte@terra.com.br](mailto:janice.trotte@terra.com.br))  
National Oceanography Centre, Southampton (attn. [Dr. Peter K. Taylor](#))  
National Oceanic and Atmospheric Administration (attn. [Mr. John Warrelmann](#))  
PMO, Hong Kong Observatory ([hkopmo@hko.gov.hk](mailto:hkopmo@hko.gov.hk))  
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Japan Meteorological Agency (attn. [Dr. Kazuhiko Hayashi](#))  
Japan Meteorological Agency ([mcss@climar.kishou.go.jp](mailto:mcss@climar.kishou.go.jp))  
Office of Marine Prediction, Japan Meteorological Agency ([wave@climar.kishou.go.jp](mailto:wave@climar.kishou.go.jp))  
Office of International Affairs, Japan Meteorological Agency (attn. [Dr S. Nakagawa](#))

### ii) Internal

Manager of Global Assimilation, [Mr. F. Rawlins](#)  
Observation Monitoring Scientist, [Mr. C. A. Parrett](#)  
Offshore Adviser, [Mr. Iain Hendry](#)

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**For further information, please contact:**

Manager of Global Data Assimilation  
Discovery 2  
The Met Office  
Fitzroy Road  
Exeter  
Devon  
EX1 3PB  
United Kingdom.

E-mail: [rick.rawlins@metoffice.gov.uk](mailto:rick.rawlins@metoffice.gov.uk)

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# REPORT ON THE QUALITY OF MARINE SURFACE OBSERVATIONS:

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## 1. INTRODUCTION

In 1985, the Commission for Basic Systems (CBS) agreed that there was a need for GDPS / Global NWP centres to monitor the quality of observations available on the GTS and to exchange monthly lists of stations providing seemingly erroneous data. In 1988 three lead centres were nominated which would have a co-ordinating role of producing, at six-monthly intervals, consolidated lists of suspect stations for given data types together with information on the nature of the error. NCEP was given responsibility for aircraft and satellite data and ECMWF, that for upper-air data. The Met Office was allocated the role as lead centre for marine surface observations which encompass observations from ships, drifting buoys, moored buoys and other fixed marine platforms. This is the forty-third report and covers the period January to June 2010. For each observing platform identified as suspect, values are supplied for the number of observations received at the Met Office, the number of these observations with gross errors, the observations' mean differences from the background values used by the numerical data assimilation system and the standard deviations of these differences.

Following the CBS recommendations, by the end of the 1980s there were four centres active in the monthly exchange of monitoring information; The Met Office, ECMWF, RSMC Tokyo and NCEP. Since then, a number of other centres have also begun to exchange this information and these reports have included data provided by Météo-France as of report number 23. Initially, the only monitoring information exchanged on marine surface observations related to pressure, and the first two WMO reports addressed that parameter alone. Since then, these reports have contained monitoring statistics for wind observations, now being exchanged between centres on a consistent monthly basis. In addition, the report contains monitoring results for sea-surface temperature (SST). Due to changes in the observation processing system and database structure, there was no monitoring of SST data at the Met Office from May 1998 to September 2000. The SST information presented in reports 20 to 23 was therefore compiled, with permission, from the monthly NCEP monitoring data and so is not directly comparable with that presented in other reports. SST monitoring was reinstated at the Met Office from October 2000.

## 2. MONITORING METHODS

Errors in observations may arise from a number of sources: the instrument may be malfunctioning, figures may be mistaken while being transferred manually, or there may be corruption of data during transmission. Errors can also arise in the pressure report if the adjustment to sea level is made incorrectly or not at all, and a poorly sighted anemometer can result in errors in the observations of wind. For SST observations, the depth at which the observation is made can be crucial. 'Surface' observations from buoys are usually made at a depth of around 0.5m, whereas ships may take a measurement between a depth of 10m and the surface, depending on the method used. At present, there is no indication given within the report of the observation's depth, so it is not possible to determine the significance of this factor. (By contrast, satellites measure the temperature of the ocean's 'skin' which is generally slightly cooler than the temperature immediately beneath, by several tenths of a °C, as a result of evaporative cooling and other surface processes.)

Some errors can be detected by applying checks on the code format and the internal consistency of the report (for example: are the position and pressure consistent with a report 6 hours earlier?). Checks on spatial consistency are possible where there are other nearby observations. However, such quality checks are unable to identify errors on all occasions and it is recognised that the numerical data assimilation systems in use today can provide global reference values applicable in observation monitoring. The short-term forecast from the previous numerical analysis, commonly known as the first-guess or background field, provides perhaps the most useful information on observation quality, as it represents an accurate and spatially consistent estimate of the observed value which is independent of the observation itself. Observation-minus-background (hereafter referred to as O-B) differences are at the core of all monitoring work by GDPS centres. Due to the thermal-inertia of the oceans and the slowly varying nature of SST, the background SST is in fact the previous analysis (daily analyses are produced at the Met Office from an assimilation of both surface and satellite observations).

Taking all marine surface observations together, the values of O-B have distinct characteristics. The vast majority of the observations show quite small departures from background and the distribution of O-B is nearly Gaussian, with little or no bias. These O-B differences are generally made up from random errors in the background fields and/or the observations, which are statistically of similar magnitude. However, there is a smaller group of observations that depart much more from the background, for which observation error is the only reasonable explanation for the large values of O-B. Studies of the distribution and variation of O-B at different points around the globe enable reasonably accurate estimation of background error, and this provides the basis for the monitoring methods described here. Those marine observing platforms for which, in a sufficiently large sample, the observed values differ from the background by an amount significantly in excess of the estimate of background error, may be labelled as 'suspect' with a high degree of confidence. The limits used here to identify suspect observing platforms have been set appropriately to preclude much likelihood of the background, rather than the observations, being in error.

Each monitoring centre produces a monthly list of the identifiers of marine observing platforms considered suspect according to their departures from the model background values. All observations are used, both synoptic and asynoptic, and the background fields are interpolated to the observation time.

Given that the number of observations made during the month is at least 20, then the condition used by all centres for obtaining platforms for the suspect lists is that at least one of the following criteria are satisfied:

#### Pressure

1. | mean of O-B |  $\geq 4.0$  hPa
2. standard deviation of O-B  $\geq 6.0$  hPa
3. percentage of gross errors  $\geq 25$

#### Wind

1. | mean of O-B |  $\geq 5.0\text{ms}^{-1}$  (Speed)  
 $\geq 30^\circ$  (Direction)
2. standard deviation of O-B  $\geq 80^\circ$  (Direction)
3. percentage of gross errors  $\geq 25$

#### Criteria used for monthly monitoring

Gross errors are defined as observations that depart from the background by more than 15hPa (Pressure) or  $25\text{ms}^{-1}$  (Vector Wind). The mean and standard deviation of the samples are evaluated excluding gross errors, so that occasional extreme values resulting from, for example, corruption during transmission, do not influence the sample characteristics. Direction statistics are also calculated excluding values in light winds, where either the observed or background speeds are less than  $5\text{ms}^{-1}$ .

The monthly results for pressure from all five monitoring centres show considerable agreement, both on the observing platforms listed as suspect and the values of the mean and rms difference from each centre's background. Differences between the monthly suspect lists are usually due to the different numbers of observations available at each centre, due to different cut-off times. There are also some unexplained variations in the data receipt between the centres, which may be due to problems on the GTS or in the local procedures for handling the data. Monitoring results for wind speed also show reasonable agreement on the mean and standard deviation from each centre's background.

This report draws together all the monthly monitoring results exchanged on marine surface data and identifies a list of observing platforms that have provided observations of poor quality over the 6-month period. In drawing up this list, there have been a number of guiding principles:

1. As with the monthly lists, accuracy is assessed relative to background values.
2. Observing platforms are listed only where there is a reasonable degree of confidence that the observations rather than the background values are in error.
3. At least 40 reports are required over the period in which the observations are considered suspect.
4. The perceived accuracy over the last part of the six-month period is of greatest importance; observing platforms are not listed if there has been recent improvement and their reports are at present without major error.
5. Given that the number of observations made during the period is greater than or equal to 40, then the condition for listing a platform as suspect in this report is that at least one of the following criteria are satisfied:



### Pressure

1. | mean of O-B |  $\geq 3.5$  hPa
2. standard deviation of O-B  $\geq 5.0$  hPa
3. percentage of gross errors  $\geq 25$

### Wind

1. | mean of O-B |  $\geq 5.0\text{ms}^{-1}$  (Speed)  
 $\geq 30^\circ$  (Direction)
2. standard deviation of O-B  $\geq 6.0\text{ms}^{-1}$  (Speed)  
 $\geq 60^\circ$  (Direction)
3. percentage of gross errors  $\geq 25$

### SST

1. | mean of O-B |  $\geq 3.0$  °C
2. standard deviation of O-B  $\geq 5.0$  °C
3. percentage of gross errors  $\geq 25$

### Criteria used for biannual monitoring

All observations having gross errors are excluded from the calculation of the mean and standard deviation of O-B. The same gross error limits apply in these reports as in the monthly lists. The Met Office now sets a limit of 10°C for SST but this was previously 5°C and NCEP use 15°C. Also, criteria used in early reports were based on O-A statistics. Consequently, data presented here is not directly comparable with that in older reports.

The limits on the bias and standard deviation of O-B are more stringent than those for the monthly lists because the sample sizes are larger. If there has been a recent change in quality, they are only applied at the end of the period. Identifiers can be listed in this report without appearing on any of the monthly lists. This is due to a representative sample only being obtained over several months or deterioration occurring at the end of the period for platforms reporting very frequently. The 6-month list is longer than most of the monthly lists because many ships cease reporting for variable periods of time, in many cases while they are in port or out of service. Only over a relatively long period, probably more than 6 months, is a representative sample obtained from all those ships providing observations.

### 3. MONITORING RESULTS

The monitoring results presented in this report relate only to data exchanged over the GTS. Observations from marine platforms are transmitted in one of two formats: the SHIP code, used for most observations from ships, moored buoys and other fixed platforms, and the BUOY code, used mostly for observations from drifting buoys. In this report, the term "ship observations" refers to those received in the SHIP code and the "drifting buoy observations" to those received in BUOY code. The SHIP code indicates whether the observation was made manually or by an automatic system and accordingly the sub-divisions "manual ship" and "automatic ship" will be defined.

#### 3.1 *Pressure*

In the six-month period, January to June 2010, 4374027 observations of pressure were monitored at Exeter from 2486 manual ships, 915 drifting buoys, and 507 automatic ships. The number of reports received from individual ships varies greatly as Table 1 demonstrates: apparently a large percentage of ships continue to report only once, which may be due to erroneous call signs, caused by errors in the part of the message giving the ship identifier. A comparison with the corresponding table in report number 42 shows little change. Since most marine observations are located in the northern hemisphere, there is inevitably some seasonal variation in the number of vessels reporting, especially in the case of buoys, since new or replacement buoys are generally deployed in better weather conditions. Considering the general trends over previous reports, the decline in the number of manual ships reporting pressure seems to be continuing, with a small decrease, while the recent decrease in automatic ships seems to have stopped, and there was an increase in the number of drifting buoys reporting.

Table 2 and Figure 1 show the number of observations of pressure that have been received over the GTS at the Met Office and processed, over past 6-month periods. It can be seen that the total number of observations remained fairly steady with only minor fluctuations until report number 11 (January-June 1994). Since that time however, there has been a steady increase in the total up to 2008, with the number of observations of pressure nearly doubling between reports 11 and 16 (1994-1996) and doubling again between reports 33 and 38 (2005-2007). The first increase was largely due to the increase in number of drifting buoy reports, due to the larger number of reports from each drifting buoy. The second increase was due to increased numbers of both drifting buoys and automatic ships, with the number of reports from manual ships remaining fairly constant over recent years, despite the slow reduction in the number of manual ships reporting pressure. The number of reports from drifting buoys seems to have peaked in the second half of 2008 and has remained fairly constant since then. Reports from drifting buoys now account for 60% of the total, while those from manual ships make up just 10% of the total, and those from automatic ships account for the remaining 30%. The sudden increase seen in the number of automatic ships in report number 19 (January-June 1998) was due to observation processing changes at the Met Office, whereby all reports from 'automatic ships' began to be processed, rather than only one report per 6-hour assimilation period, as previously. Since then there has been a fairly steady increase in the total number of pressure reports, which has only recently levelled-off.

A histogram of O-B differences for all ship pressure reports in the period January to June 2010 is shown in Figure 2a, together with the Gaussian distribution with the same mean and standard deviation. Although almost all values fall within the range +5 to -5 hPa, a small number of much larger values, presumably resulting from erroneous observations, contribute to the large standard deviation of the population. The distribution for all those observations which fail the automatic quality-control checks is broad (Figure 2b). The remaining 94% of observations that pass the quality checks show a distribution of O-B which is very close to Gaussian (Figure 2c) with mean -0.1 hPa and standard deviation 1.1 hPa. The principal contribution to the standard deviation is assumed to be from background errors.

A global estimate of the background error, such as that provided above, can conceal large spatial variations. Background values will be more accurate in data-rich areas (e.g.: in the North Sea or Mediterranean) or where the meteorological variability is low (e.g.: the tropics). Figures 3 and 4 show the geographical distributions of the mean and standard deviation of the values of O-B from ship observations that passed the quality control checks, calculated for 10-degree latitude-longitude boxes. In most areas, the magnitude of the mean is less than 0.5 hPa, the exceptions being generally where the sample size is small. The standard deviation is generally in the range 1.0 to 1.5 hPa, but is less than 1.0 hPa in some areas of the north Atlantic, the north-west Pacific and the tropics. The number of ship pressure reports that passed the quality control checks are shown in Figure 5.

Table 3 contains a list of those ships and drifting buoys considered to have produced suspect observations of pressure in the period January to June 2010. Values over the six-month period are given for the number of observations of pressure available for Met Office global model runs, the number of observations differing from the model background value by more than 15 hPa (gross errors), and the mean and standard deviation of the model O-B. The number of times the identifier has appeared on the monthly suspect lists from the five monitoring centres is also given. In order to give a detailed picture of the frequency of reporting and any changes in the observation accuracy, 6-month time-series of O-B differences are given at the end of the report for each of the identifiers listed (although the data for March is unfortunately missing due to a problem with database corruption).

An interesting characteristic of the errors identified here, which soon becomes obvious on inspection of the time-series charts at the end of this report, is that most can be attributed to a bias in the observed pressure. In many cases, the bias is constant over much of the monitoring period; although some values depart greatly from the sample mean, presumably due to some gross error in the observation, these are generally isolated instances. In only a few cases are there regular large random departures from background. Those observing platforms listed in Table 3 which appeared in report number 42 (July to December 2009) have been indicated with an asterisk. A comparison of the statistics given here with those in report number 41 (January to June 2009), clearly indicates that the bias in the pressure observations from a few ships has hardly changed for more than a year.

Statistics for those marine observing platforms listed in report number 42 and which do not appear in Table 3b, are given in Table 4 along with comments on the quality of their pressure observations. Time-series of the pressure observations from these platforms are not given. Less than 40 reports were received in the 6-month period for many of these platforms, but 63% of platforms on the list do show some improvement in the quality of their observations.

## 3.2 Wind

Monitoring observations of wind is more problematical than pressure. On most observing platforms, wind is measured using anemometers; the reported speed depends upon the averaging period and instrument height above sea level, which varies a great deal between platforms. Since large structures distort wind flow, the anemometer position relative to the wind bearing and platform structure does affect the measurement. (These factors do not apply to those ship observations where wind speed is based on visual estimates of the sea state e.g. the UK VOS fleet.)

In these monitoring results, the background winds are valid at a height of 10 metres above mean sea level; rather lower than the average height of ship anemometers. Where anemometer height is much different from 10 metres, a significant O-B speed bias may be evident. Examples of this are (i) observations from oil rigs or tankers with anemometer heights of 50m or more, although the speeds reported by most rigs are now adjusted on board to be nominal 10m values, and (ii) buoys, where the anemometer can be as low as 2m.

In the period January to June 2010, 1512764 wind observations were available for monitoring at Exeter, from 2514 manual ships, 25 drifting buoys, and 535 automatic ships. (More detail is given in Table 1.) The number of reported manual ship identifiers shows the same trends as for pressure, but with slightly more identifiers reporting wind. As stated for pressure observations, the large increase in the number of monitored wind observations, seen in report number nineteen, was largely due to the inclusion of all 'automatic ship' data, rather than just one report in each six hour period.

Histograms of O-B differences for ship observations of wind speed are presented in Figures 2d, 2e and 2f and of wind direction in Figures 2g, 2h and 2i. As with observations of pressure, those wind observations that fail the quality-control checks differ most from background, some by as much as 50  $\text{ms}^{-1}$ , and they make a large contribution to the variance of O-B. The distributions of O-B wind speed and direction for the remaining 93% of the observations that passed the quality control checks are nearly Gaussian; these observations had a speed bias of  $+1.0\text{ms}^{-1}$  relative to background and a direction bias of  $-1.1^\circ$ .

Figures 6 and 7 show the geographical distributions over the six-month period of the mean and standard deviation of O-B for ship observations of wind speed that pass the quality-control checks. The numbers of wind reports used to generate these statistics are presented in Figure 8. The standard deviation of O-B wind speed is typically 2-3  $\text{ms}^{-1}$  in middle latitudes and around 2  $\text{ms}^{-1}$  in the tropics. The wind speed bias is generally around  $+1 \text{ms}^{-1}$ , but exceeds  $+2 \text{ms}^{-1}$  in a few places and is slightly negative in areas off north-west Europe and North America and in some tropical areas. Similar distributions of the mean and standard deviation of O-B wind direction are shown in Figures 9 and 10. Only reports where both the observed and background wind speeds are greater than 5  $\text{ms}^{-1}$  were used to obtain these values. The magnitude of the bias is less than 5 degrees in most places, but exceeds 15 degrees in a few places in the tropics. The standard deviation is generally between 15 and 30 degrees globally, but in some data-sparse areas and near some coasts it is as large as 40-50 degrees. The numbers of reports of wind direction used to generate these statistics are presented in Figure 11.

Figures 6-11 provide reference values against which to compare the O-B characteristics for different marine observing platforms. Table 5 contains a list of those ships and drifting buoys considered to have produced suspect observations of wind speed in the period January to June 2010, and in Table 7 a similar list is provided for wind direction. Values are given for the number of observations of wind received at the Met Office, the number of observations having a vector difference from background of more than  $25 \text{ ms}^{-1}$  (gross errors), and the mean and standard deviation of O-B. Time-series of O-B are given at the end of the report for each listed identifier. In nearly all of the suspect speed observations, a constant bias is clearly evident. Errors in observations of direction are more random in nature. Tables 6 and 8 contain statistics for platforms reporting in ship code that are not included in Tables 5 and 7 but were listed in the previous report, for wind speed and direction respectively. Time-series for these identifiers are not included in this report.

### 3.3 *Sea-surface temperature*

In the 6-month period January to June 2010, a total of 7880828 observations of SST were monitored at the Met Office, from 2286 manual ships, 2009 drifting buoys and 362 automatic ships. Of the total, 469452 were from manual ships, 6163024 from drifting buoys and 1248352 from automatic ships. (More detail is given in Table 1.) For the same reasons as stated for pressure observations, it appears that many identifiers report only once during the 6-month period. There has been little change in the numbers of ships and drifters reporting SST over the last 4 years, although the number of buoys has increased by 13% in the last year. There are similar numbers of manual ships reporting SST as there are drifting buoys and automatic ships combined, but manual ships account for only 6% of the total number of observations. This is due to the greater frequency of automatic ship and buoy observations, hourly in many cases, with manual ships tending to report only at the main synoptic hours.

Histograms of O-B differences for all ship SST reports are shown in Figures 2j, 2k and 2l. As with observations of pressure and wind, those SST observations that fail the quality-control checks differ most from background and make a large contribution to the variance of O-B. The distribution of O-B SST for the remaining 87% of observations that pass the quality control checks is nearly Gaussian and they have a bias of  $+0.1^\circ\text{C}$  relative to the background and a standard deviation of  $1.2^\circ\text{C}$ .

Figures 12 and 13 show the geographical distributions over the 6-month period of the mean and standard deviation of O-B for ship observations that passed the quality control checks. The numbers of reports used to generate these statistics are presented in Figure 14. The bias is generally less than  $0.5^\circ\text{C}$  and the standard deviation is around  $1^\circ\text{C}$ .

Table 9 contains a list of the ships and drifting buoys considered to have produced suspect observations over the 6-month period. The comments given in each case provide an indication of the main reason for the station to be listed as suspect; time-series charts have also been plotted for SST and are included at the end of the report. The majority of the identifiers appearing on the list do so because of bias. Table 10 gives details of the performance over the latest 6-month period of ships which were considered suspect in the previous period but which do not appear in Table 9.

#### 4. SUMMARY

There are 52 marine observing platforms listed as producing suspect observations of pressure over the period January to June 2010, 85 as producing suspect wind observations and 59 as producing suspect SST observations. The first report issued by RSMC Bracknell, for the period January to June 1989, listed 150 marine platforms producing suspect observations of pressure. With the selection criteria remaining unchanged, an initial reduction in the number of platforms listed as suspect was followed by a series of reports listing similar numbers of suspects, around 80. There was an increase in suspect numbers during 1999 and 2000 and since then the numbers have fluctuated, mostly between 100 and 160, although over the past two or three years there has been a downward trend, with a decrease of 61% over the previous two years (compared with report 39). Considering the fluctuations in numbers of platforms reporting and observations monitored, there seems to have been little overall trend in observation quality until recently, although there are signs of a possible improvement in quality over the past two years.

For wind observations, over the years up to 2002 there was a tendency for a small increase in the number of wind observing platforms listed as suspect, but since then the numbers have fluctuated, mostly between 100 and 150, except for the last three report periods which have been well below 100. The number of SST observing platforms listed as being suspect has been fairly constant recently, following a decrease in numbers from a high value of 225 in 2005.

The most common characteristic in the case of identifiers listed as producing suspect pressure observations is bias in the reported pressure, sometimes remaining constant for many months. In the case of wind suspects, the most common reason for listing a platform is either a bias in the reported wind speed or a large standard deviation in wind direction, with fewer having a bias in wind direction. For sea-surface temperature observations, bias is again the most common cause of error.

The selection criteria have been set appropriately to ensure that the platforms listed are only those for which there is a high degree of confidence in their reports having errors. There are many others, not listed here, for which there must be considerable doubt over the quality of the observations. A wider range of monitoring results is available from the Met Office on request.

**TABLE 1: FREQUENCY DISTRIBUTION OF THE NUMBER OF REPORTS OF PRESSURE, WIND AND SEA SURFACE TEMPERATURE FROM INDIVIDUAL IDENTIFIERS AVAILABLE FOR MONITORING AT EXETER, JANUARY TO JUNE 2010.**

Number of reports	Number of manual ships reporting			Number of drifting buoys reporting			Number of automatic ships reporting		
	Press.	Wind	SST	Press.	Wind	SST	Press.	Wind	SST*
<b>1</b>	214	229	185	4	0	6	11	10	2
<b>2-10</b>	271	282	296	4	0	13	7	11	4
<b>11-20</b>	158	159	156	1	0	7	13	11	2
<b>21-40</b>	302	297	269	13	2	14	11	12	1
<b>41-100</b>	646	651	511	1	1	22	18	17	2
<b>101-200</b>	522	522	442	20	1	36	22	20	7
<b>201-500</b>	266	265	256	40	3	109	25	29	12
<b>501-1000</b>	45	48	59	74	7	181	48	57	32
<b>1001-1500</b>	21	21	32	105	1	172	44	50	17
<b>1500+</b>	41	40	80	653	10	1449	308	318	283
<b>Total</b>	2486	2514	2286	915	25	2009	507	535	362
(Report 42)	(2577)	(2598)	(2230)	(859)	(40)	(1893)	(495)	(538)	(351)

\* numbers are for automatic (fixed) buoys only

Table 2: Number of observations of pressure received at the Met Office over the GTS for each of the 6-month periods covered by these monitoring reports.

Period	WMO report number	Number of Observations			
		Manual ships	Drifting buoys	Automatic ships	Total
Jan - Jun 1989	1	424087	174971	40082	639140
Jul - Dec 1989	2	421315	151972	58016	631303
Jan - Jun 1990	3	424335	177927	63847	666109
Jul - Dec 1990	4	412430	205488	71146	689064
Jan - Jun 1991	5	364760	177069	64401	606230
Jul - Dec 1991	6	348710	148604	68456	565770
Jan - Jun 1992	7	332443	216872	73893	623208
Jul - Dec 1992	8	336958	247873	80862	665693
Jan - Jun 1993	9	340293	288208	77317	705818
Jul - Dec 1993	10	348082	316261	88650	752993
Jan - Jun 1994	11	334134	279963	111928	726025
Jul - Dec 1994	12	383760	305618	142468	831846
Jan - Jun 1995	13	369781	407111	124537	901429
Jul - Dec 1995	14	394016	528938	138653	1061607
Jan - Jun 1996	15	430162	566035	122909	1119106
Jul - Dec 1996	16	477928	621869	133221	1233018
Jan - Jun 1997	17	446530	623835	122178	1192543
Jul - Dec 1997	18	453399	684292	140227	1277918
Jan - Jun 1998	19	426622	700743	423217	1550582
Jul - Dec 1998	20	443548	700239	497313	1641100
Jan - Jun 1999	21	432506	697983	466311	1596800
Jul - Dec 1999	22	448996	771624	500070	1720690
Jan - Jun 2000	23	443023	772510	455799	1671332
Jul - Dec 2000	24	477828	829588	512338	1819754
Jan - Jun 2001	25	458345	784686	465887	1708918
Jul - Dec 2001	26	473887	914744	554002	1942633
Jan - Jun 2002	27	443876	1111699	517200	2072775
Jul - Dec 2002	28	544433	952313	595959	2092705
Jan - Jun 2003	29	432672	994877	506185	1933734
Jul - Dec 2003	30	473591	1128039	605241	2206871
Jan - Jun 2004	31	435824	1092461	596495	2124780
Jul - Dec 2004	32	434160	1113527	724014	2271701
Jan - Jun 2005	33	471113	1221528	717207	2409848
Jul - Dec 2005	34	472565	1523938	837397	2833900
Jan - Jun 2006	35	456847	1758276	792765	3007888
Jul - Dec 2006	36	447474	1833376	975555	3256405
Jan - Jun 2007	37	410076	1947986	998474	3356536
Jul - Dec 2007	38	454512	2265115	1116750	3836377
Jan - Jun 2008	39	444253	2397246	1156968	3998467
Jul - Dec 2008	40	481513	2605728	1315696	4402937
Jan - Jun 2009	41	466628	2551270	1201762	4219660
Jul - Dec 2009	42	452548	2473739	1381174	4307461
Jan - Jun 2010	43	442069	2606292	1325666	4374027



**TABLE 3: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT PRESSURE OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2010.**

- Column 1 Call sign or identifier.  
 Column 2 Number of pressure observations available for monitoring over the 6-month period, excluding duplicates, but including any observations with gross errors.  
 Column 3 Number of pressure observations differing by more than 15 hPa from background (gross error).  
 Column 4 Standard deviation of observation-minus-background differences excluding cases of gross error.  
 Column 5 Mean of observation-minus-background differences (bias) excluding cases of gross error.  
 Columns 6-10 Number of times observing platform has appeared on suspect lists. B=Exeter, E=ECMWF, F=MétéoFrance, T=Tokyo, W=Washington.  
 Column 11 Comments on quality of pressure observations.
- Notes:*
1. Units are hPa.
  2. Observing platforms marked with an asterisk were listed in the previous report (January to June 2010)

**Table 3a: Platforms reporting in BUOY code**

*i): Platforms non-operational at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
14908	504	0	3.0	-3.6	0	0	2	0	0	Bias
16523	119	33	0.4	0.3	1	1	1	1	1	GE
16525	465	61	5.2	-3.6	0	1	0	0	0	Bias & SD
16527	1874	7	3.1	0.5	0	0	0	0	0	SD
17671	2057	10	3.5	5.9	5	5	4	5	5	Bias
17679	2640	10	3.5	3.1	3	3	2	3	3	Bias
17907	2369	33	3.1	3.5	2	1	0	2	1	Bias
21984	764	224	0.4	0.0	2	2	2	1	2	GE
23706	2567	904	1.1	1.0	2	2	2	2	2	GE
23997	1621	0	0.6	4.2	2	0	2	2	1	Bias
33689	244	0	1.1	-3.7	0	1	0	1	0	Bias
33903	583	0	0.9	-3.7	0	1	0	1	0	Bias
33946	597	0	0.8	-3.7	0	0	0	1	0	Bias
33949	169	0	0.9	-5.2	1	1	1	1	1	Bias
46636	136	126	0.9	0.3	1	1	0	1	1	GE
48596	266	221	5.5	-8.8	1	1	2	0	1	Bias & SD
56517	143	143	---	---	2	2	2	0	1	GE
56901	1126	601	0.4	0.0	1	1	1	1	1	GE
71705	1090	1	2.7	3.6	1	2	0	1	1	Bias

ii): Platforms operational at the end of the reporting period

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
33947	198	0	1.0	-3.4	0	0	0	1	1	Bias

Table 3b: Platforms reporting in SHIP code

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
A8JX8	59	1	3.7	4.0	2	3	3	0	3	Bias
AUFI	57	0	1.3	4.6	2	2	0	0	2	Bias
C6UK7	49	0	5.6	-3.1	1	1	0	0	2	SD
C6XB2	116	0	2.9	-3.4	0	0	0	0	0	Bias
CG2350	70	17	1.2	-9.0	1	1	1	0	1	Bias
CG2522	732	440	10.0	-6.2	2	2	0	0	2	Bias & GE
CG2960 *	1241	239	5.1	1.3	4	4	6	0	5	Bias & SD
CG2992 *	925	647	4.9	6.2	2	2	2	0	2	Bias & GE
CGDS *	2890	1789	10.1	-2.5	6	5	6	0	6	Bias & SD
KS000	274	0	6.3	0.4	1	1	1	0	1	Biases
NWS0010	2117	489	9.0	-0.8	5	1	3	0	4	SD
NWS0016	499	18	1.4	-14.1	2	1	1	0	1	Bias
OUII2	124	0	1.8	3.9	2	2	2	0	2	Bias
S6NK5	60	0	1.8	4.3	1	1	1	0	1	Bias
TBWUK36	232	0	3.3	1.9	0	0	0	0	1	Reduced bias
UAHF	45	0	1.8	4.3	1	1	1	0	1	Bias
UBHE9 *	43	0	3.5	5.5	1	1	0	0	1	Bias
UCJP	59	0	5.1	-1.9	0	0	0	0	1	SD
UCTS	197	6	5.6	-1.5	2	2	3	0	2	SD
UIFU	109	0	2.6	-3.5	1	2	2	0	2	Bias
V2AC6	56	0	1.4	-3.5	0	1	0	0	0	Bias
V7DG6	78	0	2.4	-3.5	0	0	0	0	0	Bias
VC6750 *	214	112	1.0	-13.1	1	0	1	0	1	Bias
VCJM	322	202	1.0	-9.4	2	2	2	0	3	Bias
VGWM	117	4	5.5	-0.7	0	1	0	0	0	SD
VOPM *	134	55	0.6	-0.8	1	1	1	0	1	GE
VWNY	44	0	3.9	-4.5	1	1	0	0	1	Bias
WDC8307	80	1	5.3	2.1	2	0	1	0	2	SD
WDE2652	54	1	10.0	-2.9	1	0	0	0	0	SD
WDE3569	67	10	4.7	-3.8	1	0	2	0	2	Bias
YJUF5	95	0	1.0	5.7	2	0	1	0	2	Bias
ZCDL9 *	90	0	4.7	6.0	2	0	3	0	2	Bias

**TABLE 4: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 3 BUT LISTED AS SUSPECT OVER THE PERIOD JANUARY TO JUNE 2010.**

Column	1	Call sign or identifier.
Column	2	Number of pressure observations available for monitoring over the 6-month period, excluding duplicates, but including any observations with gross errors.
Column	3	Number of pressure observations differing by more than 15 hPa from background (gross error).
Column	4	Standard deviation of observation-minus-background differences excluding cases of gross error.
Column	5	Mean of observation-minus-background differences (bias) excluding cases of gross error.
Column	6	Comments on quality of pressure observations.
<i>Notes:</i>	1.	Units are hPa

Identifier	N Obs.	NGE	SD	Bias	Comments
8PPK	73	1	2.4	0.6	Reduced bias
9HRJ9	2200	0	1.8	0.7	Reduced SD
9MBW7	18	3	2.2	-2.3	Less than 40 reports
A8ET7	61	0	2.0	-1.2	Reduced bias
A8GI7	125	23	6.7	1.2	Reduced bias
A8JJ8	64	0	1.8	-0.3	Reduced bias
A8NA3	24	0	1.8	3.0	Less than 40 reports
AUBE	17	3	4.9	5.2	Less than 40 reports
AUBL	6	1	0.6	11.5	Less than 40 reports
C6PZ3	86	0	2.6	1.2	Reduced bias
C6SE8	73	0	1.1	0.5	Reduced bias
DQVG	78	0	2.9	-4.0	Bias
HPHV	45	0	3.6	2.1	Reduced bias
IBCF	533	1	2.6	-0.2	Reduced bias
MRWF2	145	0	2.6	-1.0	Less biases
ONAI	3	0	0.4	-3.7	Less than 40 reports
ONCA	102	13	3.0	2.3	Reduced bias
ONEQ	1	0	0.0	-4.1	Less than 40 reports
OUJS2	73	0	3.3	3.1	Reduced bias
OZBY2	103	0	2.1	2.1	Reduced bias
UCAB	60	0	2.3	1.0	Reduced bias
UCJE	30	0	1.1	3.2	Less than 40 reports
UCKA	96	6	2.7	1.4	Reduced SD
UCUF	138	0	3.4	-0.3	Reduced SD
UITP	50	1	3.2	3.3	Reduced bias
UITR	58	0	4.0	-3.1	Reduced bias
VRCQ2	33	0	2.2	2.9	Less than 40 reports
VRWE7	65	3	3.8	2.7	Reduced bias
VRZK8	147	0	4.0	0.8	Reduced bias
WCZ6534	2	0	0.3	-0.8	Less than 40 reports
WDE8265	38	0	3.5	-0.1	Less than 40 reports
WED2281	167	0	1.9	-0.7	Reduced bias
WL3108	2	0	0.5	-1.8	Less than 40 reports
WQZ7791	62	10	4.1	-0.8	Reduced bias
WQZ9670	258	9	1.8	0.1	Reduced bias

**TABLE 5: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT WIND SPEED OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2010.**

Column 1	Call sign or identifier.
Column 2	Number of wind speed observations available for monitoring over the 6-month period, excluding duplicates, but including any observations with gross errors.
Column 3	Number of wind observations with vector difference from background of more than 25ms <sup>-1</sup> (gross error).
Column 4	Standard deviation of observation-minus-background differences excluding cases of gross error.
Column 5	Mean of observation-minus-background differences (bias) excluding cases of gross error.
Column 6-10	Number of times observing platform has appeared on suspect lists. B=Exeter, E=ECMWF, F=MétéoFrance, T=Tokyo, W=Washington.
Column 11	Comments on quality of wind speed observations.

*Notes:*

- Units are ms<sup>-1</sup>
- Observing platforms marked with an asterisk were listed in the previous report (January to June 2010)

**Table 5a: Platforms reporting in BUOY code**

*i): Platforms non-operational at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
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*ii): Platforms operational at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
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**Table 5b: Platforms reporting in SHIP code**

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
A8ET7	61	0	4.3	4.8	1	1	0	0	1	Bias
A8JR5	81	0	3.9	5.0	1	0	0	0	0	Bias
A8RH4	94	0	4.2	5.0	2	2	2	0	2	Bias
A8SW4	85	0	3.7	4.9	1	0	0	0	0	Bias
BATFR20	55	26	10.3	7.7	1	0	2	0	1	Bias & SD
DHDH	47	0	2.9	5.9	2	1	2	0	2	Bias
HP6038	284	1	4.0	6.1	3	0	0	0	2	Bias
KS000 *	274	14	5.7	7.9	3	3	3	0	2	Bias
UCUE	105	0	1.6	-5.3	1	1	2	0	1	Bias
VEP717 *	991	3	4.4	6.3	6	4	3	0	3	Bias

**TABLE 6: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 5 BUT LISTED AS SUSPECT OVER THE PERIOD JANUARY TO JUNE 2010.**

- Column 1 Call sign or identifier.  
 Column 2 Number of wind speed observations available for monitoring over the 6-month period, excluding duplicates, but including any observations with gross errors.  
 Column 3 Number of wind observations with vector difference from background of more than  $25\text{ms}^{-1}$  (gross error).  
 Column 4 Standard deviation of observation-minus-background differences excluding cases of gross error.  
 Column 5 Mean of observation-minus-background differences (bias) excluding cases of gross error.  
 Column 6 Comments on quality of wind speed observations.

Notes: 1. Units are  $\text{ms}^{-1}$

Identifier	N Obs.	NGE	SD	Bias	Comments
3EKU3	78	0	5.2	4.7	Reduced bias
A8CP8	41	0	4.9	3.4	Reduced bias
A8KO3	125	4	4.2	4.2	Reduced bias
ELTG9	2	0	2.4	10.9	Less than 40 reports
KS078	8	0	3.9	9.2	Less than 40 reports
PCHM	2302	1	3.4	3.3	Reduced bias
ZCDF8	350	0	3.1	4.2	Reduced bias
ZCDP2	13	0	3.0	2.5	Less than 40 reports

**TABLE 7: LIST OF MARINE OBSERVING PLATFORMS PRODUCING SUSPECT WIND DIRECTION OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2010 .**

Column 1	Call sign or identifier.
Column 2	Number of wind direction observations available for monitoring over the 6-month period, excluding duplicates, but including any observations with gross errors.
Column 3	Number of wind observations with vector difference from background of more than $25\text{ms}^{-1}$ (gross error).
Column 4	Standard deviation of observation-minus-background differences excluding cases of gross error.
Column 5	Mean of observation-minus-background differences (bias) excluding cases of gross error.
Column 6-10	Number of times observing platform has appeared on suspect lists. B=Exeter, E=ECMWF, F=MétéoFrance, T=Tokyo, W=Washington.
Column 11	Comments on quality of wind direction observations.

*Notes:*

1. Units are degrees ( $^{\circ}$ ).
2. Observing platforms marked § had a significant speed bias at some time within the period and the statistics and their plots refer to direction reports associated with background wind speeds greater than  $5\text{ms}^{-1}$ . If no significant speed bias was present, the statistics and plots refer to direction reports with an observed speed greater than  $5\text{ms}^{-1}$ .
3. Observing platforms marked with an asterisk were listed in the previous report (January to June 2010)

**Table 7a: Platforms reporting in BUOY code**

*i): Platforms **non-operational** at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
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*ii): Platforms **operational** at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
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**Table 7b: Platforms reporting in SHIP code**

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments	
31260	641	0	78.5	37.1	1	3	5	2	5	Bias & SD	
3EBL5	*	326	0	63.0	9.4	0	0	2	0	0	SD
3EJM9		66	0	49.3	-41.3	0	0	0	0	0	Bias
42364	*	5287	0	29.8	1.9	0	0	0	0	0	SD
45144		334	1	106.0	100.1	1	1	1	1	1	Bias & SD
45145		459	0	50.7	-94.5	1	1	1	1	1	Bias
46022	*	1128	0	47.1	29.8	0	0	0	0	0	Bias
46081	*	3230	0	37.5	-29.8	0	0	3	1	6	Bias
46146		3410	0	46.2	-37.7	0	0	0	0	3	Bias
61010	*	1043	0	58.1	81.5	6	6	6	6	0	Bias
62128	*	3352	0	49.4	31.0	0	0	0	0	1	Bias
9HJH9		53	0	45.0	-38.3	0	0	0	0	0	Bias
9HOB8		389	0	64.2	-1.9	0	0	0	0	2	SD
9HOM8	*	304	0	55.9	-8.2	0	0	0	0	1	SD
9VAY4	*	139	0	73.7	-8.4	0	0	0	0	3	SD
A3CW4		73	0	64.2	-8.8	0	0	0	0	0	SD
A8CJ9	*	139	0	59.8	-1.1	1	1	2	0	1	SD
A8IH6		97	0	65.9	14.6	0	0	0	0	1	SD
A8IN9		200	5	60.2	-13.9	0	0	0	0	3	SD
A8IP3		109	1	74.9	1.9	0	0	1	0	3	SD
A8JH7		87	1	64.3	-28.7	1	1	0	0	0	SD & bias
A8PQ8	*	54	0	59.9	15.0	0	0	0	0	0	SD
A8RQ6		102	0	61.7	2.4	0	0	0	0	1	SD
BATFR2	§	55	24	55.0	-37.2	1	0	2	0	1	Bias
BATFR3	§	141	0	84.2	-1.3	1	0	1	0	1	SD
C6KD4	§	255	0	65.3	-0.8	0	0	0	0	2	SD
C6ME8		117	1	66.4	4.2	0	0	0	0	1	SD
C6OM7		96	0	41.7	-40.1	0	1	0	0	2	Bias
C6UG4		81	7	94.1	-1.7	2	1	1	0	2	SD
DAQZ	*	83	1	51.9	-30.2	0	0	0	0	1	Bias
DFRZ		116	0	68.5	-4.4	0	0	0	0	0	SD
DPCK		121	7	67.1	-0.4	0	0	0	0	2	SD
ELZY4		95	0	67.1	-45.6	0	0	0	0	1	Bias & SD
GLNE		114	1	67.8	-13.5	1	1	1	0	1	SD
H3VR		171	0	54.9	-38.1	0	0	0	0	0	Bias
H3VS		138	0	60.1	-17.8	0	0	0	0	1	SD
H9UY	§	209	5	81.7	-2.7	2	4	2	0	3	SD
HZDD		127	0	61.8	-2.7	0	0	0	0	2	SD
HZZB		54	0	61.6	7.7	0	0	0	0	1	SD
IBLQ		65	0	62.5	4.1	0	0	0	0	0	SD

Continued >



Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
J8AZ3 *	125	0	55.4	-52.4	0	0	0	0	1	Bias
J8NW *	128	0	65.7	-23.4	0	0	0	0	2	SD
JNCJ *	71	1	69.1	1.0	0	0	0	0	0	SD
KF001 *	65	0	55.3	-45.7	0	0	0	0	0	Bias
KS034 *	159	0	65.9	-55.7	0	0	0	0	2	SD
KS049	430	0	100.1	4.2	4	4	4	1	4	SD
KVMU	96	0	65.4	-23.9	0	0	0	0	0	SD
MNDC9	121	1	69.0	-0.8	1	2	2	0	2	SD
MZFP7	153	0	64.2	-7.3	0	0	0	0	1	SD
OVYB2	92	1	76.4	-16.4	0	0	1	0	1	SD
PBGH	120	1	61.2	9.3	0	1	0	0	0	SD
PDVN	59	0	62.2	25.5	1	1	0	0	2	SD
S6HU3	56	1	70.0	-4.1	0	0	0	0	0	SD
S6TB *	79	0	70.5	3.4	0	0	0	0	1	SD
SXSQ	59	6	93.6	-2.2	0	0	0	0	0	SD
SYVI	67	2	69.7	17.9	0	0	0	0	0	SD
UASP *	52	1	55.5	65.7	0	0	0	0	2	Bias
UCUF *	138	0	50.8	6.2	0	0	0	0	0	SD
UDYN	151	0	51.4	46.2	0	0	0	0	2	Bias
V2AC6 *	56	0	63.8	6.6	0	0	0	0	1	SD
V2AM5	73	0	66.0	-0.2	0	0	0	0	0	SD
V2CJ8	56	0	67.3	-9.3	0	0	0	0	1	SD
V7DW6	69	0	60.3	5.1	0	0	0	0	0	SD
V7EE5	59	1	70.2	-18.0	0	0	0	0	0	SD
V7OX3	90	0	72.2	-0.4	0	0	0	0	0	SD
VCJM	317	16	143.4	-22.7	2	0	2	0	3	SD
VQBW2	99	0	68.2	2.8	0	0	0	0	2	SD
VRBK6	88	1	70.2	1.3	0	0	0	0	2	SD
VRDR8	68	0	71.7	-5.1	0	0	0	0	0	SD
VREQ5	132	0	71.6	4.0	0	0	0	0	1	SD
VREX7	64	3	77.1	-20.1	1	1	0	0	1	SD
VRGA6	64	1	68.4	-5.8	0	0	0	0	0	SD
WBP321 *	3180	21	64.0	2.5	1	3	2	0	5	SD
WCX74' *	2714	39	79.3	-10.4	3	4	4	0	5	SD
YJZC5	104	0	61.9	-10.5	0	0	0	0	1	SD
ZCDL9	87	1	73.1	0.4	0	0	0	0	1	SD

**TABLE 8: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 7 BUT LISTED AS SUSPECT OVER THE PERIOD JANUARY TO JUNE 2010.**

Column	1	Call sign or identifier.
Column	2	Number of wind direction observations available for monitoring over the 6-month period, excluding duplicates, but including any observations with gross errors.
Column	3	Number of wind observations with vector difference from background of more than $25\text{ms}^{-1}$ (gross error).
Column	4	Standard deviation of observation-minus-background differences excluding cases of gross error.
Column	5	Mean of observation-minus-background differences (bias) excluding cases of gross error.
Column	6	Comments on quality of wind direction observations.
<i>Notes:</i>	1.	Units are degrees ( $^{\circ}$ )

Identifier	N Obs.	NGE	SD	Bias	Comments
21210	3107	312	123.3	-4.7	Bias removed in April
3FCA9	40	0	54.5	-4.2	Reduced SD
3FPQ9	109	0	43.1	0.8	Reduced SD
3FPS9	88	0	42.2	-10.0	Reduced SD
46094	5068	0	43.1	12.7	Reduced bias
62081	1358	0	29.2	3.8	Reduced bias
9VVD6	93	0	46.3	-26.6	Reduced SD
A8FS8	16	0	76.8	-49.2	Less than 40 reports
A8FW3	42	1	34.3	-9.0	Reduced SD
A8GX4	65	0	55.7	15.8	Reduced bias
A8IH2	134	0	41.2	-8.6	Reduced SD
A8JM3	82	0	37.4	3.6	Reduced SD
A8ME4	97	0	38.4	-10.5	Reduced SD
A8PQ4	1294	4	41.4	4.9	Reduced SD
ATMG	27	0	81.8	35.3	Less than 40 reports
ATVX	142	0	40.7	-2.2	Reduced SD
C6JT	185	1	43.9	-3.8	Reduced SD
C6KD5	165	0	51.5	-22.1	Reduced SD
C6XE5	35	0	81.6	11.0	Less than 40 reports
DCPC2	82	0	51.8	-27.0	Reduced SD
DDVK2	214	3	68.2	-2.3	Reduced SD & bias
DGOS	143	0	50.5	-3.4	Reduced SD
DICB	36	0	49.2	-9.5	Less than 40 reports
IBCE	98	0	55.8	9.7	Reduced SD
MGSM5	36	0	57.0	-0.8	Less than 40 reports
MHNO6	30	0	37.5	-5.6	Less than 40 reports
PEBP	143	0	42.4	-7.1	Reduced SD
TBWUK18	14	0	60.9	-2.3	Less than 40 reports
UCAD	136	1	57.0	0.3	Reduced SD
UCJE	30	0	40.0	-15.1	Less than 40 reports
UCKA	110	1	52.0	-14.0	Reduced SD
UCUO	239	0	60.3	-11.4	Reduced SD
V2BM5	64	0	49.4	-7.0	Reduced SD
V2NA1	21	0	65.1	-36.8	Less than 40 reports
VRCQ2	33	0	65.4	-12.8	Less than 40 reports
VRDT7	66	1	54.1	5.8	Reduced SD
VRFS2	131	0	45.8	21.2	Reduced SD
VRXK4	102	0	49.0	-1.2	Reduced SD
WBS5272	57	0	37.4	1.2	Reduced SD
WCF3990	20	0	41.5	5.5	Less than 40 reports
WCX4608	26	0	77.0	-17.8	Less than 40 reports
WDD9281	357	0	51.1	-2.3	Reduced SD
WWU8	252	0	50.9	-1.5	Reduced SD
ZCBP6	30	0	41.5	-22.6	Less than 40 reports

**TABLE 9: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT SEA SURFACE TEMPERATURE OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2010.**

Column	1	Call sign or identifier.
Column	2	Number of sea-surface temperature observations available for monitoring over the six-month period, excluding duplicates, but including any observations with gross errors.
Column	3	Number of sea surface temperature observations differing by more than 10 °C from background (gross error).
Column	4	Standard deviation of observation-minus-background differences excluding cases of gross error.
Column	5	Mean of observation-minus-background differences excluding cases of gross error.
Columns	6-10	Number of times observing platform has appeared on suspect lists. B=Exeter, E=ECMWF, F=MétéoFrance, T=Tokyo, W=Washington.
Column	11	Comments on quality of sea surface temperature observations.
<i>Notes:</i>	1.	Units are °C
	2.	Observing platforms marked with an asterisk were listed in the previous report (January to June 2010)

Table 9a: Platforms reporting in BUOY code

*i): Platforms non-operational at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
15613	176	0	1.5	5.8	2	-	0	-	2	Bias
21984	744	218	0.4	-0.4	2	-	0	-	2	GE
21987	234	1	2.1	3.3	1	-	1	-	0	Bias
23706	3239	871	0.4	0.2	1	-	0	-	1	GE
31733	835	704	5.7	2.3	3	-	2	-	3	SD
32719	125	125	---	---	1	-	1	-	1	GE
44641	1468	514	0.7	8.6	3	-	4	-	3	Bias
44914	210	210	---	---	2	-	0	-	2	GE & bias
46568	711	20	1.1	8.5	1	-	1	-	1	Bias
51621	625	0	2.2	3.7	1	-	0	-	1	Bias
51822	345	0	1.7	3.5	1	-	0	-	0	Bias
51826	223	3	1.2	7.8	1	-	0	-	1	Bias
51964	344	141	0.3	0.1	1	-	0	-	1	GE
52676	374	149	3.1	-1.8	1	-	1	-	1	GE & bias
52805	238	91	1.1	-7.7	2	-	1	-	2	GE & bias
52810	296	97	3.2	0.0	1	-	1	-	0	GE
54914	1212	858	2.2	6.5	2	-	2	-	2	Bias
56517	135	135	---	---	2	-	0	-	1	GE
56528	199	199	---	---	1	-	0	-	1	GE
61854	152	1	3.5	-3.4	1	-	0	-	0	Bias
63529	7686	1413	1.9	-7.0	4	-	0	-	0	Bias
64931	88	43	1.1	-0.8	1	-	1	-	1	GE
64932	86	41	1.2	-0.2	1	-	1	-	1	GE
64933	81	43	0.7	-0.3	1	-	1	-	1	GE
64935	92	41	0.1	-1.9	1	-	1	-	1	GE

*ii): Platforms operational at the end of the reporting period*

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
13544	1526	9	2.4	3.0	2	-	0	-	0	Bias
51955	243	1	0.3	3.4	1	-	0	-	0	Bias
64930	81	34	1.1	-1.6	1	-	1	-	1	GE

Table9b: Platforms reporting in SHIP code

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
3FNZ5	118	0	1.8	-3.0	1	-	1	-	0	Bias
41112	8112	47	3.3	-2.4	2	-	2	-	2	Bias
41113	5989	43	2.7	-3.8	3	-	3	-	1	Bias
41114	8390	0	2.0	-2.3	3	-	0	-	0	Bias
42363	14010	0	1.7	-3.1	2	-	1	-	2	Bias
44041	4217	0	3.0	2.4	4	-	1	-	0	Bias since March
44043	2960	12	2.5	3.3	3	-	0	-	0	Bias
44057	1529	77	1.7	6.4	3	-	1	-	2	Bias
44063	1018	0	1.7	3.8	2	-	0	-	0	Bias
A8AX8	58	0	1.0	-3.1	1	-	2	-	0	Bias
A8GA8	* 65	0	2.4	3.0	0	-	0	-	0	Bias
A8JM3	112	0	1.0	-3.4	3	-	3	-	0	Bias
BATFR20	420	5	1.5	5.8	3	-	4	-	3	Bias
C6FM9	83	0	1.7	3.0	1	-	1	-	1	Bias
DANV	* 42	0	0.9	-2.7	0	-	0	-	0	Bias
DGTX	* 234	0	2.0	3.4	4	-	2	-	0	Bias
DNDD	40	1	1.6	4.3	1	-	1	-	1	Bias
ICRA	110	0	2.3	-4.9	1	-	1	-	1	Bias
KS034	* 171	0	0.6	3.8	2	-	2	-	0	Bias
KS088	59	0	2.6	-3.4	0	-	0	-	0	Bias
LEQZ3	54	1	1.5	3.0	1	-	0	-	0	Bias
S6TD	103	6	2.7	5.2	2	-	2	-	2	Bias
UCJL	135	0	1.8	3.3	4	-	3	-	0	Bias
UEYO	97	42	2.6	-5.1	2	-	0	-	2	Bias
V7LU5	90	4	2.3	5.5	2	-	1	-	2	Bias
VRDR8	70	0	2.6	-3.7	1	-	1	-	0	Bias
VRDT7	73	1	2.4	3.8	2	-	0	-	2	Bias
WGJT	210	1	1.7	-3.0	3	-	2	-	0	Bias
WRFJ	89	1	2.5	4.2	1	-	0	-	1	Bias
WZZF	148	0	0.9	3.1	5	-	2	-	0	Bias
ZCBP6	* 44	0	0.7	5.5	0	-	0	-	0	Bias

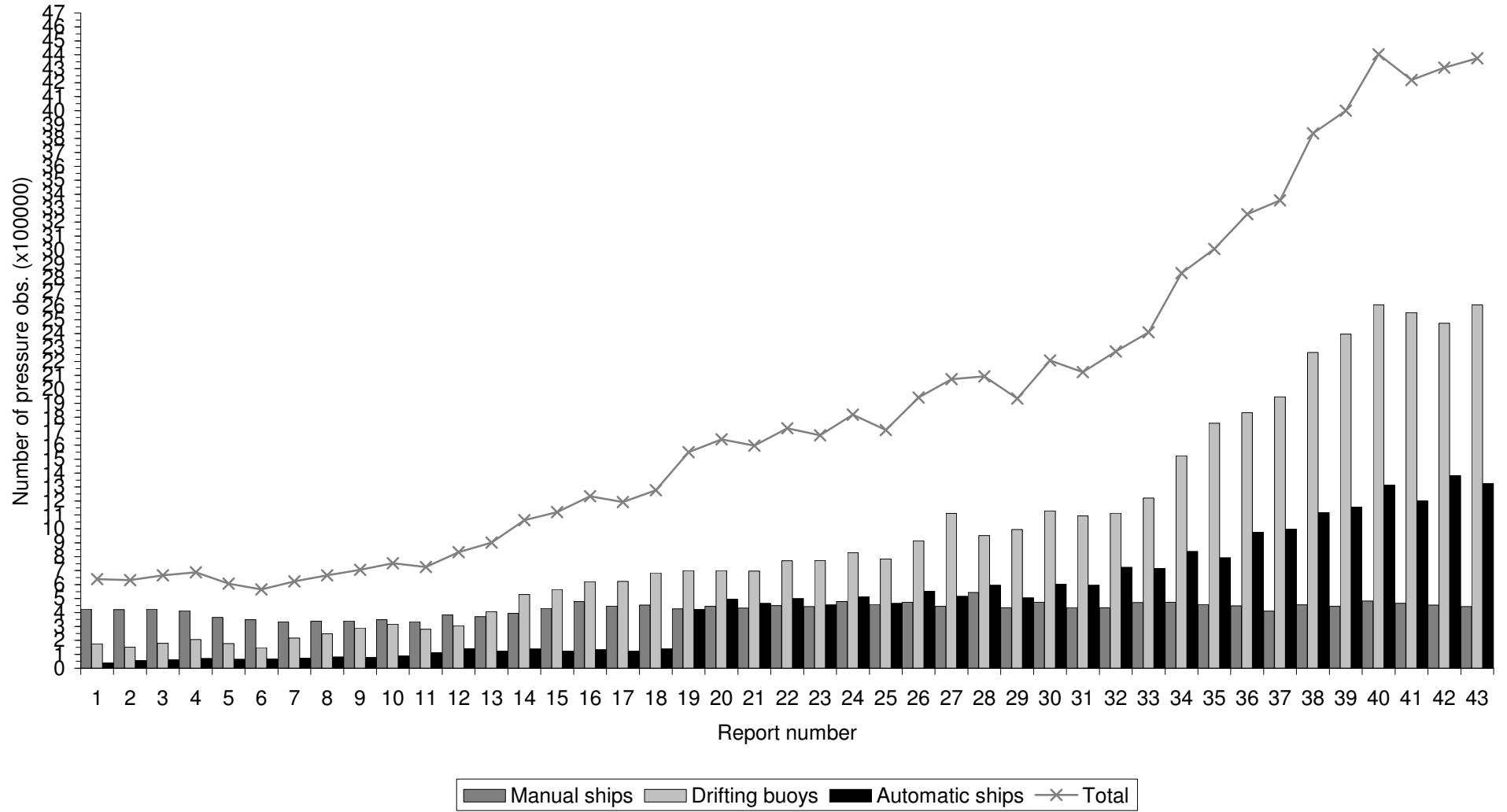
**TABLE 10: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 9 BUT LISTED AS SUSPECT OVER THE PERIOD JANUARY TO JUNE 2010.**

- Column 1 Call sign or identifier  
 Column 2 Number of sea-surface temperature observations available for monitoring over the 6-month period, including any observations with gross errors.  
 Column 3 Number of sea surface temperature observations differing by more than 10 °C from the background (gross error).  
 Column 4 Standard deviation of observation-minus-background differences excluding cases of gross error.  
 Column 5 Mean of observation-minus-background differences excluding cases of gross error.  
 Column 6 Comments on quality of sea surface temperature observations.

Notes: 1. Units are °C

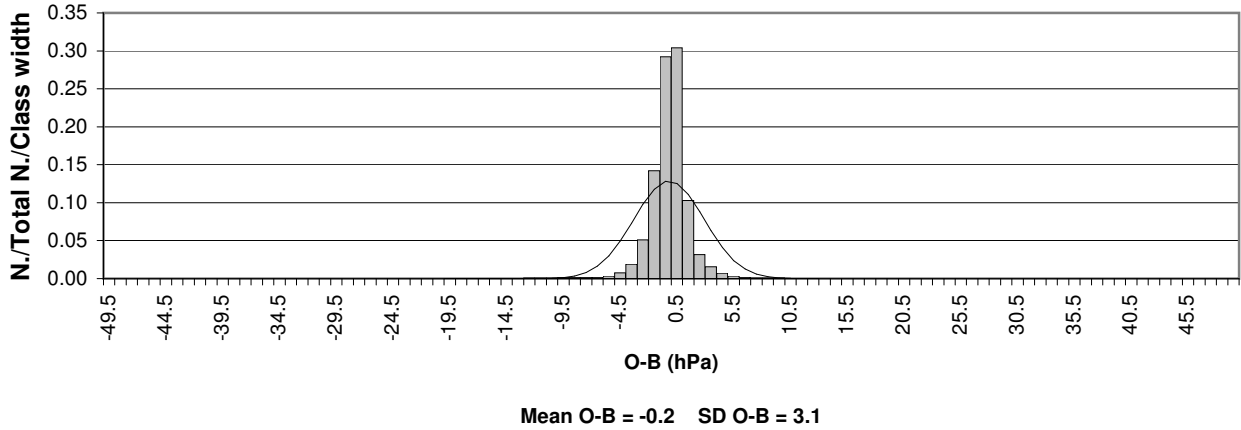
Identifier	N Obs.	NGE	SD	Bias	Comments
3FJY6	30	0	0.9	-4.2	Less than 40 reports
9HJB9	1502	208	1.5	-0.3	Bias removed in Feb
9HOB8	495	0	3.3	-1.0	Bias reduced
9V7954	53	0	1.9	-0.9	Bias reduced
9V8258	89	28	2.1	-0.1	Bias & GE reduced
9VAY4	156	2	2.7	-2.2	Bias reduced
A81V4	34	8	2.0	-6.9	Less than 40 reports
A8CS3	50	0	2.9	-1.2	Bias reduced
A8HF6	48	0	2.6	0.7	SD reduced
A8IN8	297	0	1.7	0.9	Bias reduced
B2M1297	38	0	2.5	2.0	Less than 40 reports
CGDP	1354	538	0.8	1.0	Bias reduced in March
DEAL	10	0	1.5	-3.2	Less than 40 reports
DIBZ	9	0	1.4	0.6	Less than 40 reports
DPCK	132	1	1.0	-0.4	Bias reduced
J8PD	4	0	2.0	-2.3	Less than 40 reports
KS078	1	0	0.0	7.3	Less than 40 reports
ONAN	241	2	3.4	-2.8	Bias reduced
ONEQ	1	0	0.0	-5.1	Less than 40 reports
PDWZ	46	0	1.4	1.1	Bias reduced
PHAL	2	0	2.8	-0.2	Less than 40 reports
SAMARIA	15	0	0.9	-0.6	Less than 40 reports
SIWN	326	0	1.7	1.9	Bias reduced
VRXK4	176	0	2.9	-0.2	Bias reduced
ZDGR8	180	1	2.3	1.4	Bias reduced

**Figure 1: Number of observations of pressure received at Exeter on the GTS for each of the six-month periods covered by the WMO reports on the quality of marine surface observations**

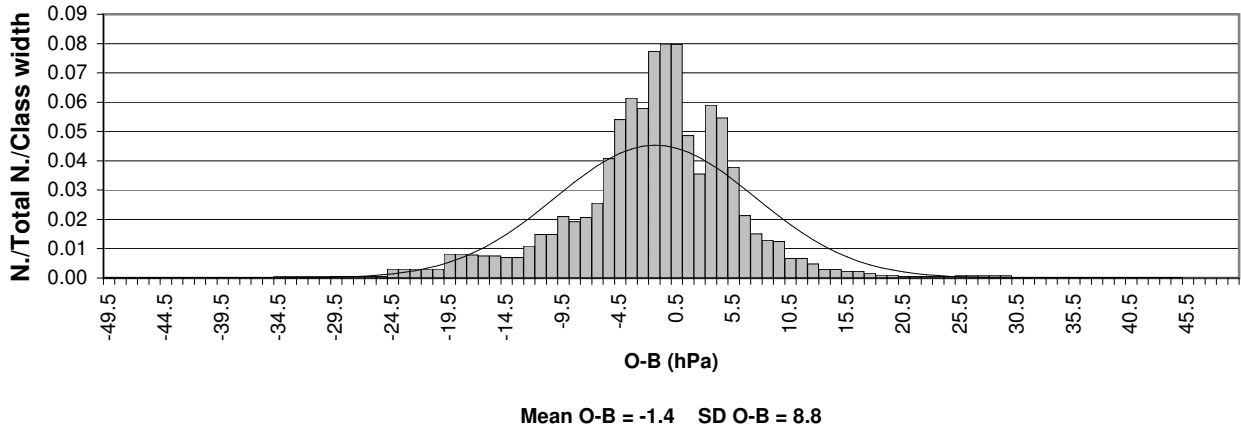




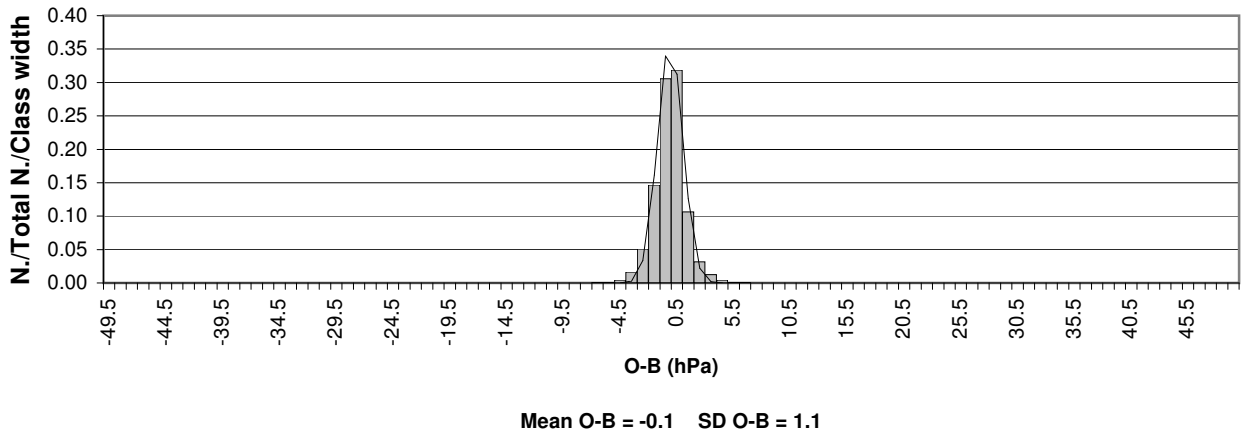
**Figure 2a: Distribution of ship O-B pressure (hPa)**  
Period of data: JAN-JUN 2010 Data used: All observations



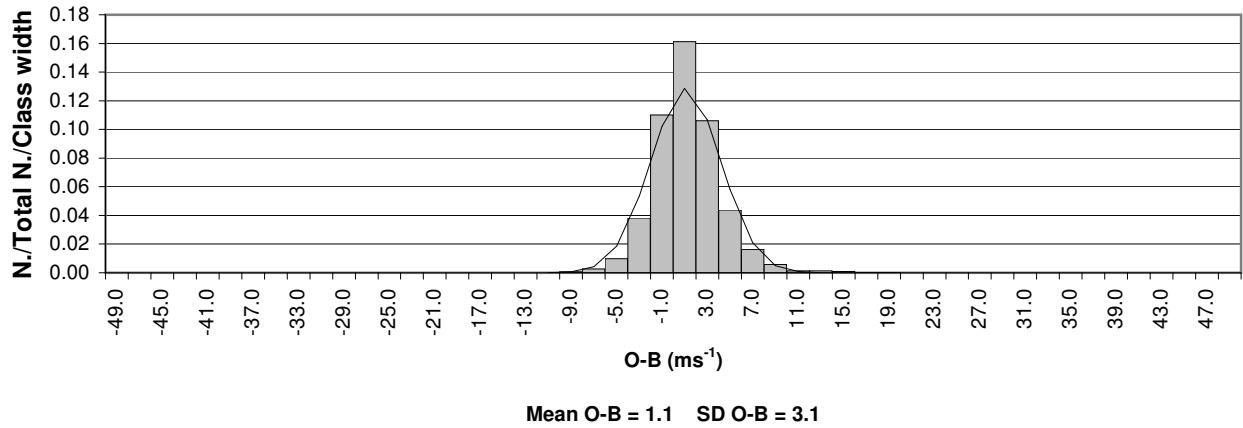
**Figure 2b: Distribution of ship O-B pressure (hPa)**  
Period of data: JAN-JUN 2010 Data used: Flagged observations



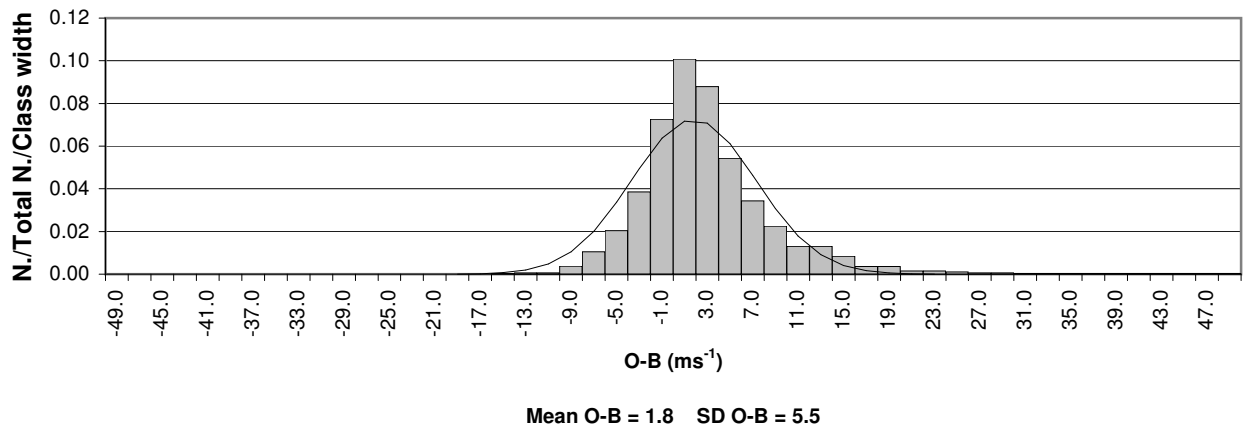
**Figure 2c: Distribution of ship O-B pressure (hPa)**  
Period of data: JAN-JUN 2010 Data used: Unflagged observations



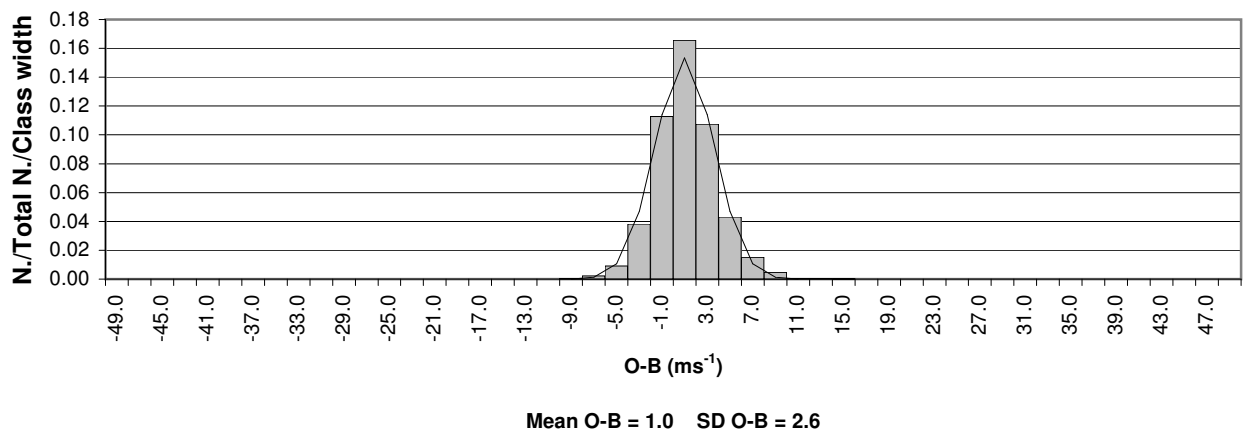
**Figure 2d: Distribution of ship O-B wind speed ( $\text{ms}^{-1}$ )**  
Period of data: JAN-JUN 2010 Data used: All observations



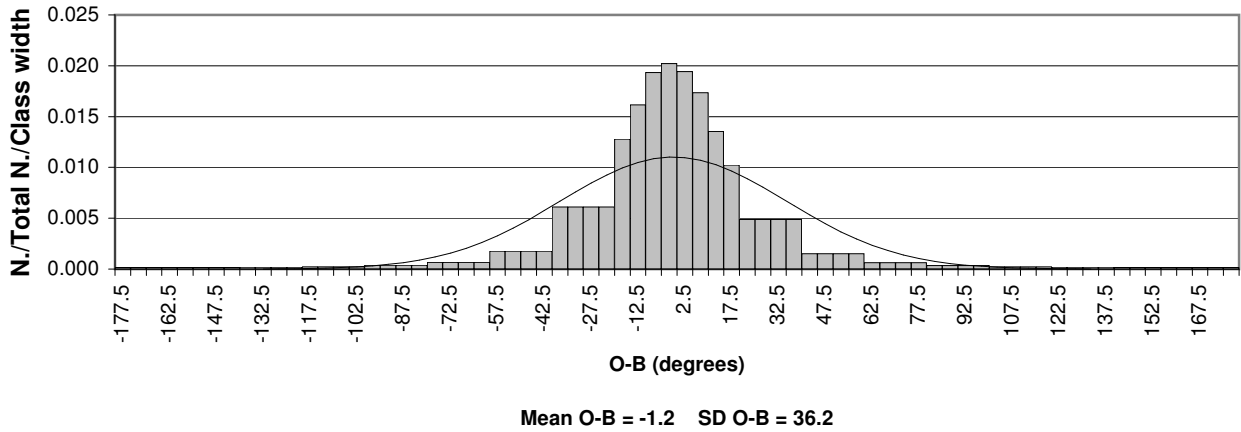
**Figure 2e: Distribution of ship O-B wind speed ( $\text{ms}^{-1}$ )**  
Period of data: JAN-JUN 2010 Data used: Flagged observations



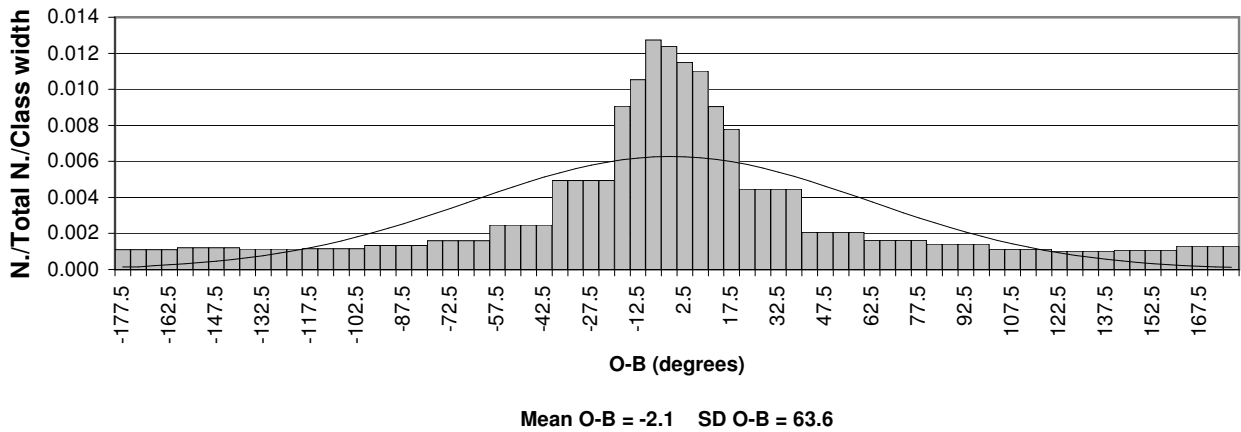
**Figure 2f: Distribution of ship O-B wind speed ( $\text{ms}^{-1}$ )**  
Period of data: JAN-JUN 2010 Data used: Unflagged observations



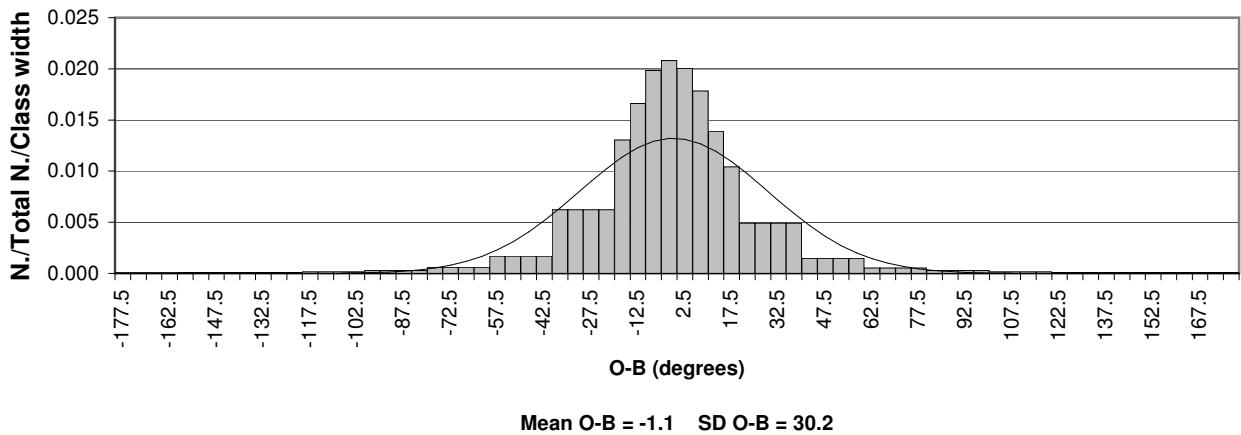
**Figure 2g: Distribution of ship O-B wind direction (degrees)**  
Period of data: JAN-JUN 2010 Data used: All observations



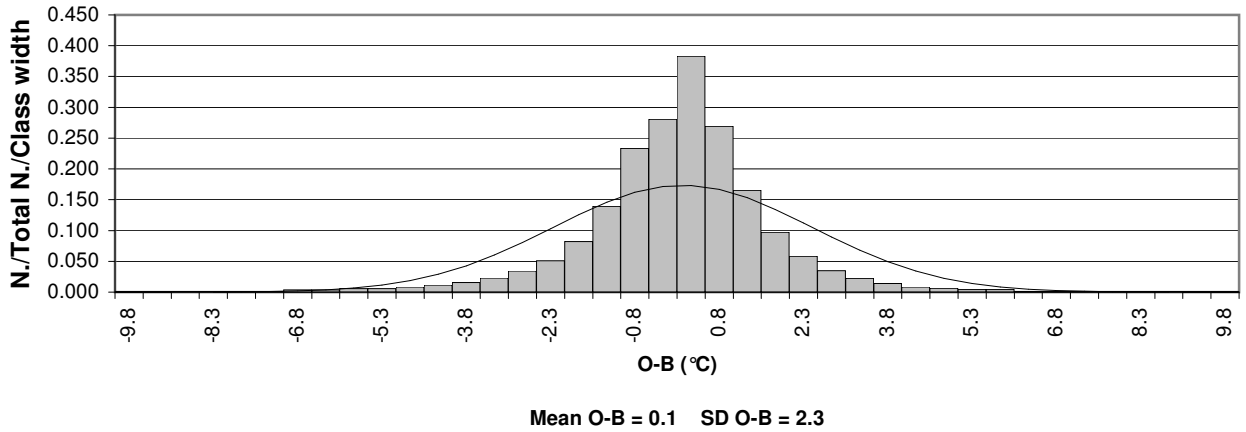
**Figure 2h: Distribution of ship O-B wind direction (degrees)**  
Period of data: JAN-JUN 2010 Data used: Flagged observations



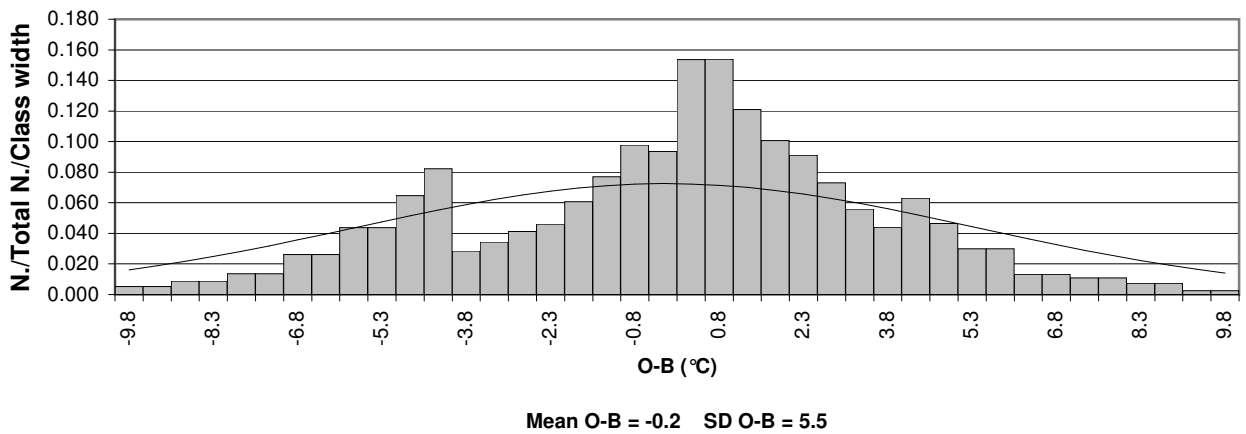
**Figure 2i: Distribution of ship O-B wind direction (degrees)**  
Period of data: JAN-JUN 2010 Data used: Unflagged observations



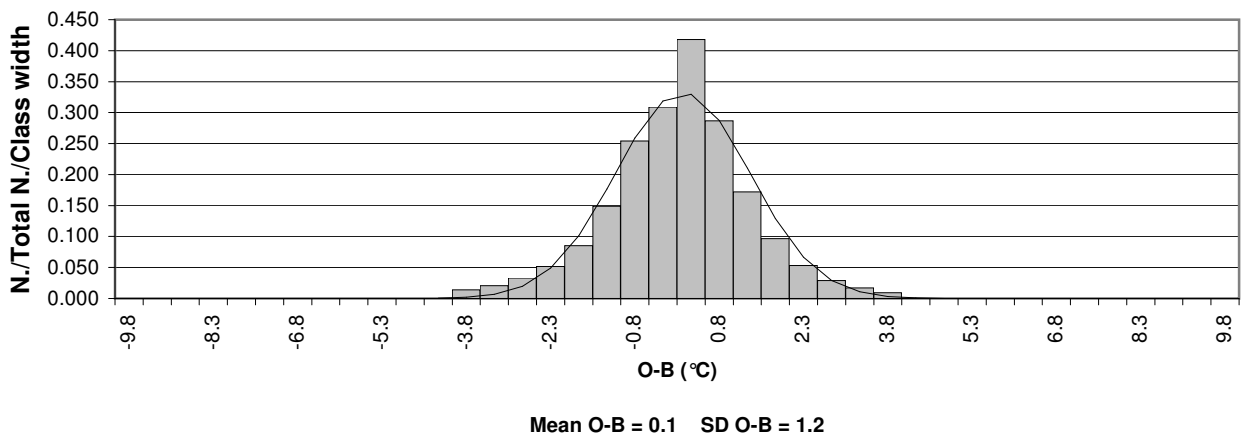
**Figure 2j: Distribution of ship O-B SST (°C)**  
Period of data: JAN-JUN 2010 Data used: All observations



**Figure 2k: Distribution of ship O-B SST (°C)**  
Period of data: JAN-JUN 2010 Data used: Flagged observations

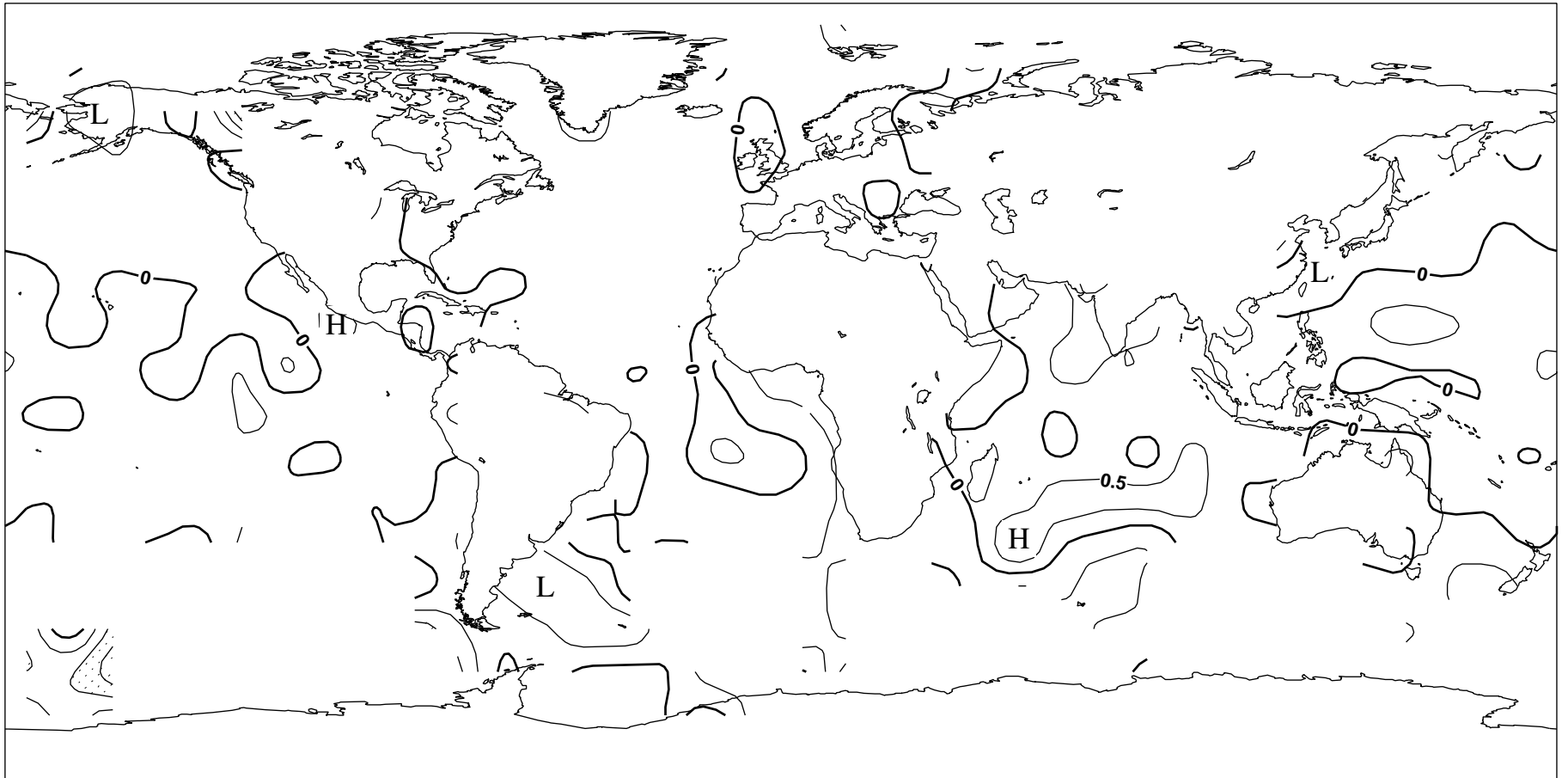


**Figure 2l: Distribution of ship O-B SST (°C)**  
Period of data: JAN-JUN 2010 Data used: Unflagged observations

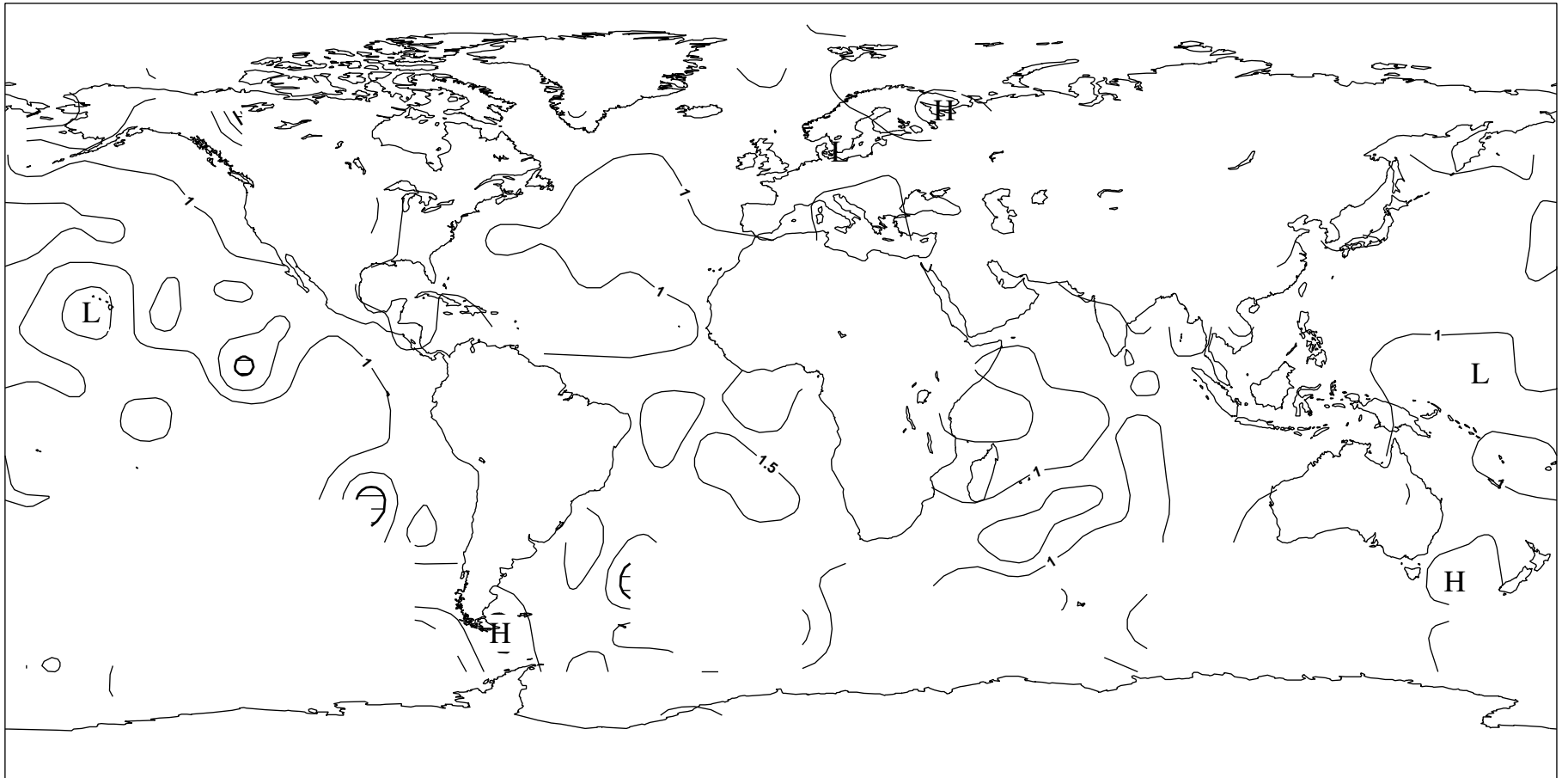




**Figure 3: Bias of Ship O-B Pressure (hPa). Date:- January - June 2010**  
**Only observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a bias of magnitude greater than 1.0 hPa**



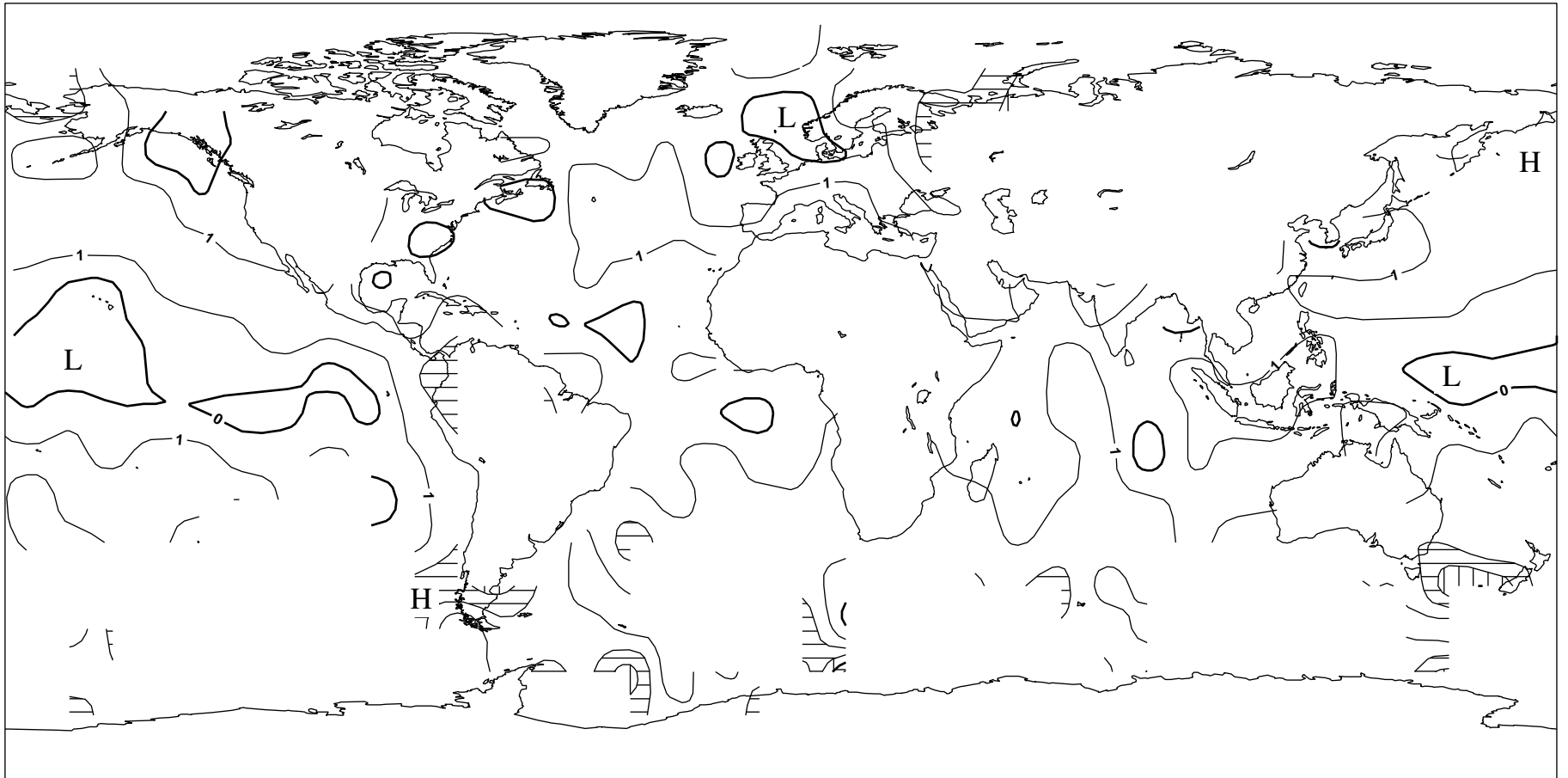
**Figure 4: Standard Deviation of Ship O-B Pressure (hPa). Date:- January - June 2010**  
**Only Observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a standard deviation of greater than 2.0 hPa**



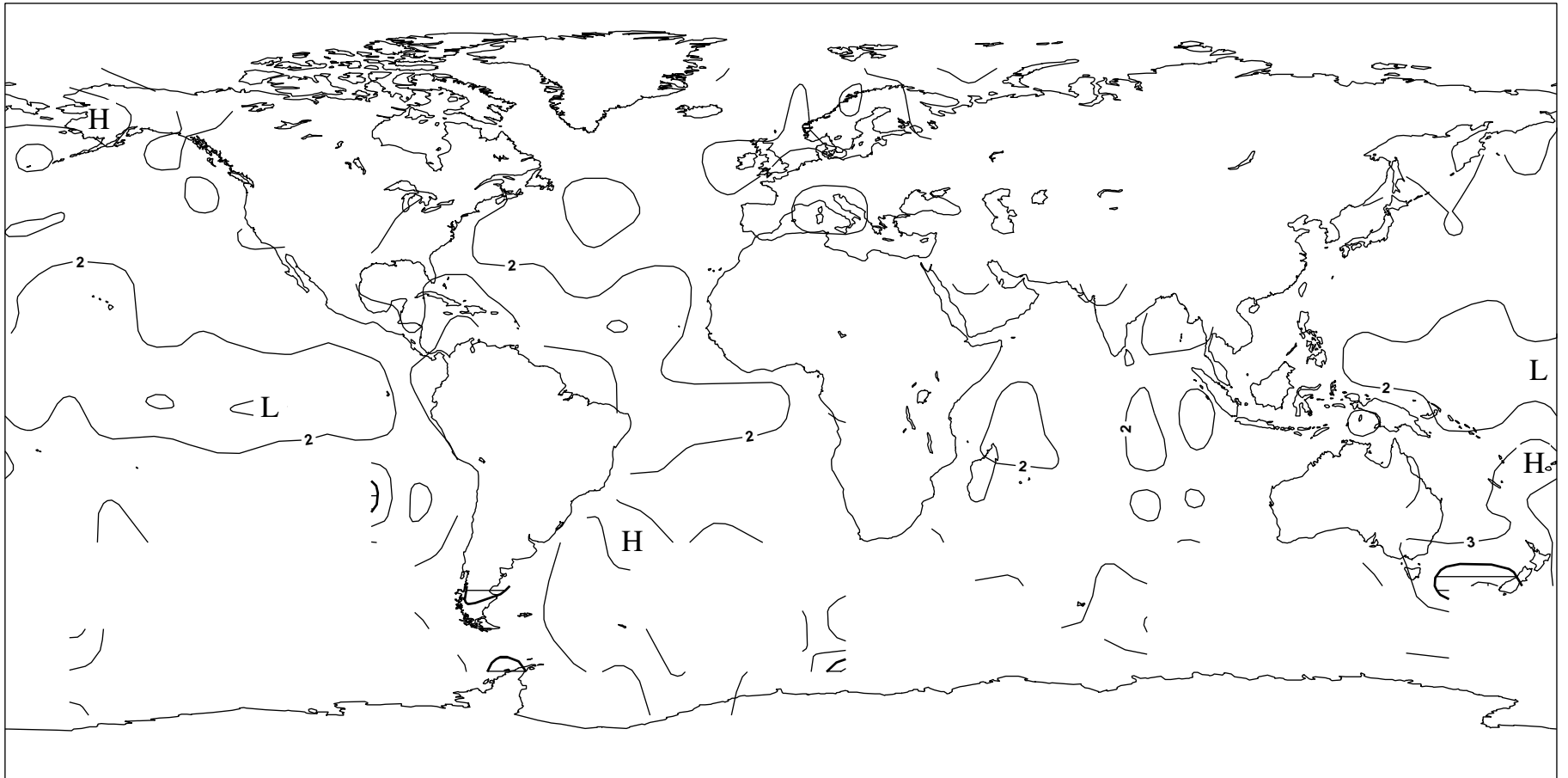




**Figure 6: Bias of Ship O-B Wind Speed (ms-1). Date:- January - June 2010**  
**Only observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a bias of magnitude greater than 2.0 ms-1**

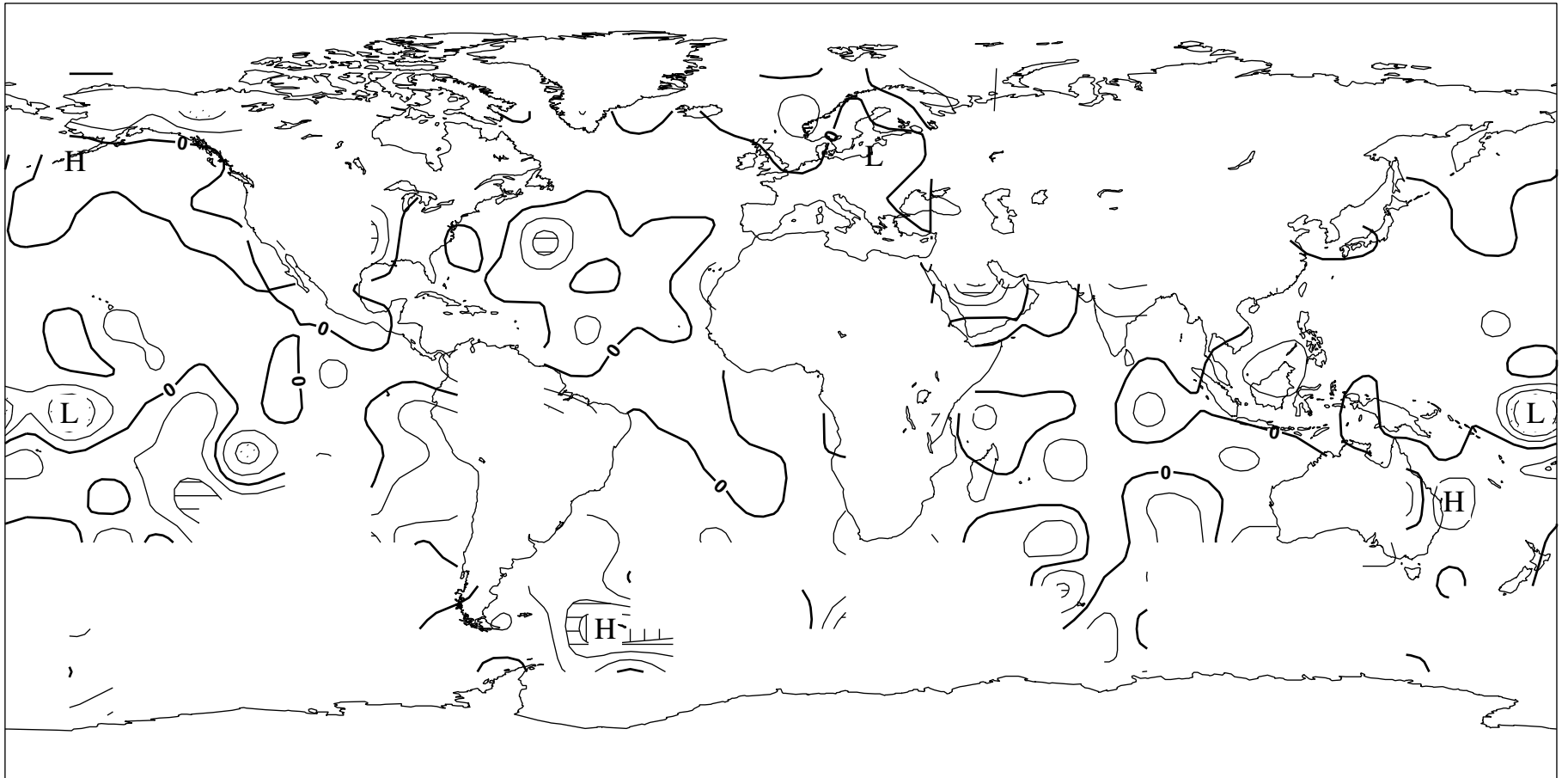


**Figure 7: Standard Deviation of Ship O-B Wind Speed (ms-1). Date:- January - June 2010**  
**Only Observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a standard deviation of greater than 4.0 ms-1**

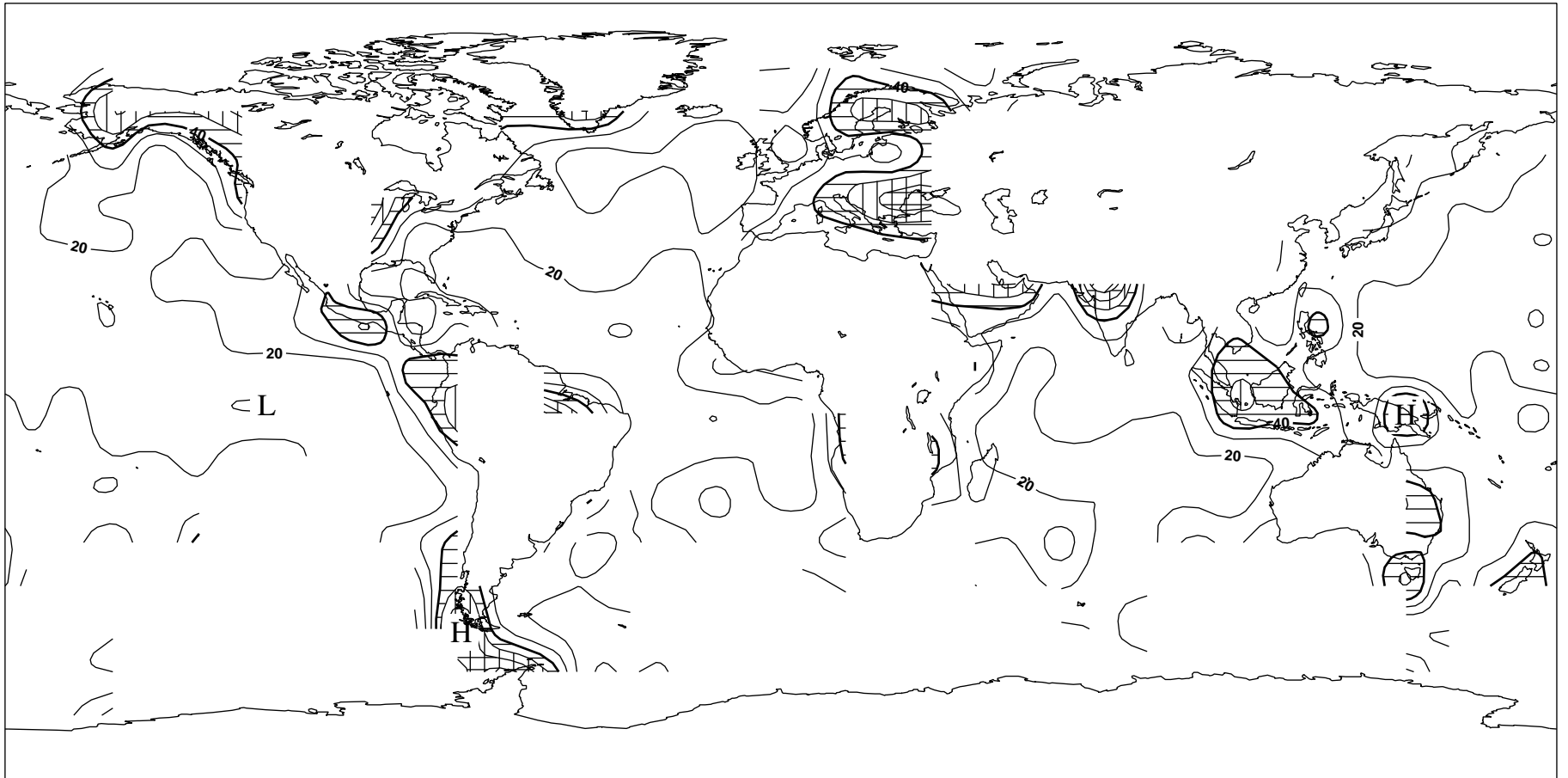




**Figure 9: Bias of Ship O-B Wind Direction (degrees). Date:- January - June 2010**  
**Only observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a bias of magnitude greater than 10 degrees**

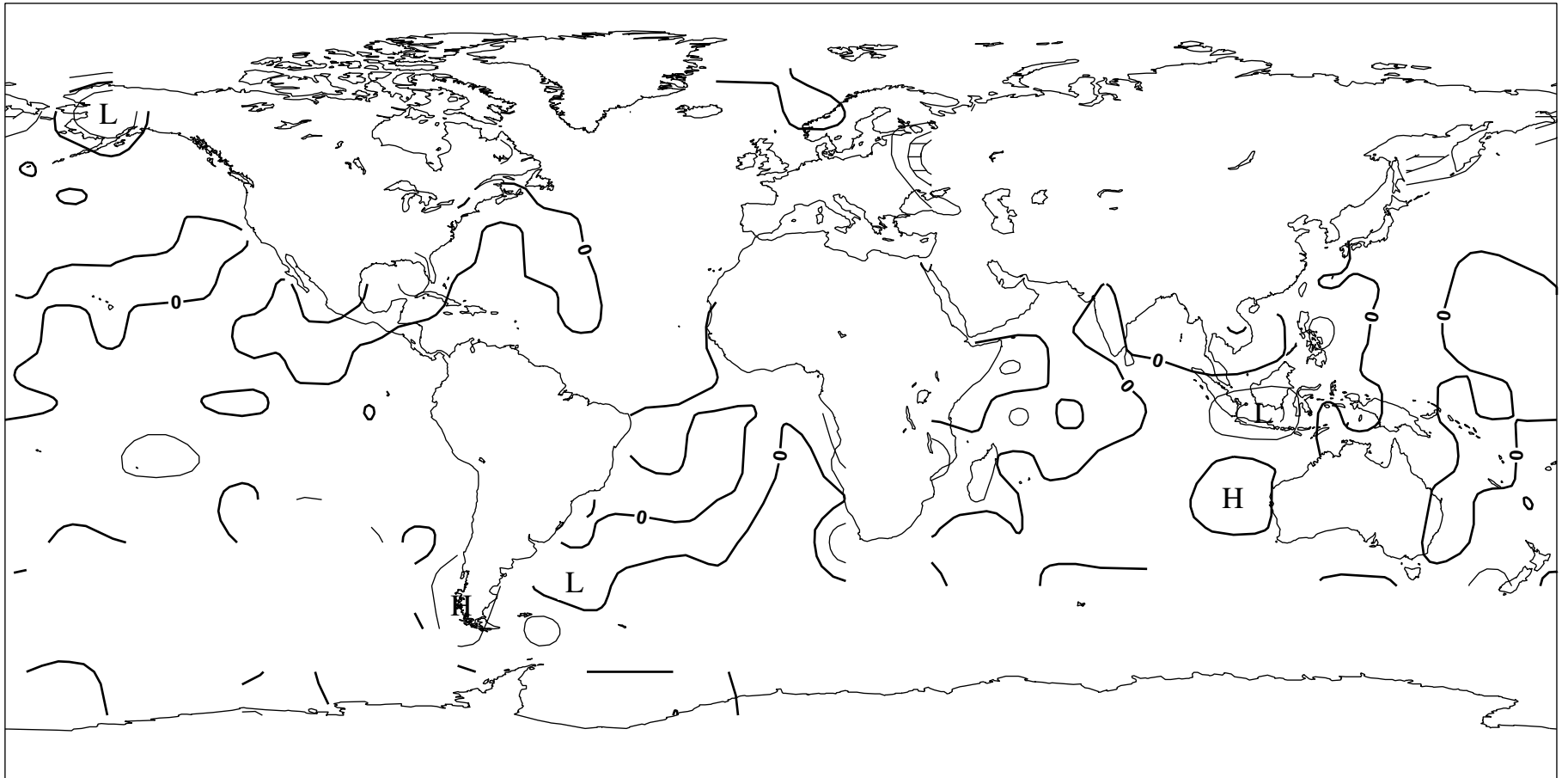


**Figure 10: Standard Deviation of Ship O-B Wind Direction (degrees). Date:- January - June 2010**  
**Only Observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a standard deviation of greater than 40 degrees**





**Figure 12: Bias of Ship O-B SST (degrees C). Date:- January - June 2010**  
**Only observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a bias of magnitude greater than 1.0 degree C**



**Figure 13: Standard Deviation of Ship O-B SST (degrees C). Date:- January - June 2010**  
**Only Observations passing quality control used in statistics**  
**Contours drawn to 10 degree boxes, if the number of observations is greater than 10**  
**Shaded areas have a standard deviation of greater than 2.0 degrees C**

