Report on the Quality of Marine Surface Observations

Report Number 47

January to June 2012

Met Office Data Assimilation

REPORT ON THE QUALITY OF MARINE SURFACE OBSERVATIONS:

JANUARY TO JUNE 2012

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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 report number 47 and covers the period January to June 2012. 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 global 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 observations nearby. However, such quality checks are unable to identify errors on all occasions and it is recognised that numerical data assimilation systems 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 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 |	≥4.0 hPa
2.	standard deviation of O-B	≥6.0 hPa
3.	percentage of gross errors	≥25

Wind

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

Criteria used for monthly monitoring

Gross errors are defined as observations that depart from the background by more than 15hPa (pressure) or $25ms^{-1}$ (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 $5ms^{-1}$.

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 |	≥3.5 hPa
2.	standard deviation of O-B	≥5.0 hPa
3.	percentage of gross errors	≥25

Wind

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

SST

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

Criteria used for biannual monitoring

Those 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 has a limit of 10°C for SST, but this was 5°C pre-2000, and NCEP use 15°C.)

The limits on the bias and standard deviation of O-B are slightly 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 2012, 4445317 observations of pressure were monitored at Exeter from 2619 manual ships, 922 drifting buoys, and 627 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 46 shows little change in the numbers. 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 numbers of manual ships, automatic ships and drifting buoys reporting pressure all seem to be fairly constant over the last two years.

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, remained generally constant through to 2011, but has decreased slightly in 2012. Reports from drifting buoys now account for 50% of the total, while those from manual ships make up just 12% of the total, and those from automatic ships account for the remaining 38%. 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 from automatic ships.

A histogram of O-B differences for all ship pressure reports in the period January to June 2012 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 the observations, that pass the quality checks, show a distribution of O-B which is very close to Gaussian (Figure 2c) with mean 0.0hPa and standard deviation 1.0hPa. The principal contribution to the standard deviation is assumed to be from background and representativeness 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 0.5 to 1.5 hPa, being 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 2012. 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.

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 the whole 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 46 (July to December 2011) have been indicated with an asterisk.

Statistics for those marine observing platforms listed in report number 46 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 the other 70% of platforms on the list have shown 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 2012, 2162830 wind observations were available for monitoring at the UK Met Office, from 2656 manual ships, 31 drifting buoys, and 622 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.

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 the background, some by as much as 50 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 are nearly Gaussian, with a speed bias of 0.4ms^{-1} relative to the background and a direction bias of just -0.6°.

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 about 2ms^{-1} in middle latitudes and around 1.5ms^{-1} in the tropics. The |bias| is generally less than 1ms^{-1}, but exceeds 2ms^{-1} in a few places. 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 ms^{-1} were used to obtain these values. The magnitude of the bias is less than 5 degrees in most places, but is up to 15 degrees in a few data sparse areas. The standard deviation is generally between 15 and 30 degrees globally, but in some data-sparse areas and near some coasts it is greater 40 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 2012, 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 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 the majority of the cases of 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 which are not included in Tables 5 and 7 but that 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 2012, a total of 6387837 observations of SST were monitored at the Met Office, from 2198 manual ships, 1685 drifting buoys and 601 automatic ships. Of the total, 366778 were from manual ships, 4394714 from drifting buoys and 1626345 from automatic ships. (More detail is given in Table 1.) For the same reasons as stated for pressure observations, it appears that many ship identifiers report only once during the 6-month period. There has been little change in the number of manual ships reporting SST over the last 2 years, but there has been an increase of ~65% in the number of 'automatic ships' (mostly moored buoys) reporting SST, while the number of drifting buoys reporting SST has fallen by 13% over 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 about 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 the observations is nearly Gaussian, with a bias of just 0.2°C relative to the background and a standard deviation of 1.2°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°C and the standard deviation is around 1°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 66 marine observing platforms listed as producing suspect observations of pressure over the period January to June 2012, 78 as producing suspect wind observations and 72 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, then the numbers fluctuated around an average of 130 through to the end of 2008; they dropped slightly during 2009 and have averaged about 70 since then. Considering the fluctuations in numbers of platforms reporting and observations monitored, there seems to be little overall trend in observation quality, as measured by the percentage of suspect platforms.

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, then the numbers fluctuated between about 100 and 150 until 2008. There was a slight decrease in the number of suspect wind platforms up to 2010 and since then the number has averaged about 70.

The number of SST observing platforms listed as being suspect has been fairly constant since 2007, averaging about 60, 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 2012.

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*
1	281	305	237	3	3	4	31	36	27
2-10	285	296	272	3	2	9	13	12	9
11-20	140	138	165	3	0	7	10	11	12
21-40	247	251	240	9	0	9	9	8	11
41-100	563	559	454	13	3	26	14	18	14
101-200	551	561	428	24	0	49	12	13	11
201-500	398	400	286	67	2	132	40	46	40
501-1000	53	54	49	90	5	224	39	47	41
1001-1500	27	24	17	79	3	130	48	44	52
1500+	74	68	50	631	13	1095	411	387	384
Total	2619	2656	2198	922	31	1685	627	622	601
(Report 46)	(2687)	(2730)	(2332)	(1022)	(26)	(1830)	(651)	(666)	(503)

* numbers are for fixed buoys only

TABLE 2: NUMBER OF OBSERVATIONS OF PRESSURE RECEIVED AT EXETER ON THE GTS FOR EACH OF THE 6-MONTH PERIODS COVERING THESE WMO 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

Continued >

Period	WMO report number	Number of Observations			
		Manual ships	Drifting buoys	Automatic ships	Total
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
Jul - Dec 2010	**44**	534594	2730518	1563232	4828344
Jan - Jun 2011	**45**	470337	2631956	1608822	4711115
Jul - Dec 2011	**46**	545536	2651020	1889732	5086288
Jan - Jun 2012	**47**	515154	2242441	1687722	4445317

TABLE 3: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT PRESSURE OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2012.

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 July to December 2011)

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
14538	577	171	2.7	0.6	1	0	1	1	1	Bias
17507	173	90	6.8	-6.7	1	1	1	1	1	Bias
17682	1472	123	4.0	2.7	2	1	2	2	2	Bias + GE
17684	1134	1056	4.3	7.2	2	2	2	2	2	GE
21536	1872	50	5.6	1.1	2	0	0	2	2	Bias + SD
21599	192	0	4.1	4.5	1	0	1	2	0	Bias
21963	217	50	7.9	0.4	1	1	1	1	1	GE
21997	2695	3	4.0	0.2	0	0	0	0	0	SD
23598	280	235	2.2	-12.7	1	0	1	1	1	Bias
23667	4974	4583	0.5	0.4	5	5	5	1	5	GE
31754	615	171	0.4	0.7	1	0	1	0	1	GE
33510	2375	19	3.1	5.2	3	0	4	4	4	Bias
33669	2812	0	3.2	3.4	2	1	1	2	1	Bias
33676	1310	61	3.5	6.4	3	1	3	3	3	Bias
33677	1127	1118	2.9	12.7	2	2	2	1	2	GE
41567	2510	1705	6.5	-4.4	2	2	0	2	2	Bias + GE
41937	239	49	6.7	-3.3	1	1	1	1	1	GE
42539	1419	1070	5.4	-5.7	2	2	0	1	2	Bias + GE
42545	313	259	0.5	-7.3	1	1	0	0	1	Bias + GE
42556	92	75	3.9	-7.1	1	1	0	0	1	Bias
44766	208	31	6.7	-7.5	1	1	1	1	1	Bias
44776	197	34	4.8	-3.0	0	0	0	0	0	Bias
46765	1561	319	5.1	-1.7	1	1	1	1	1	GE
48650	107	98	7.7	-7.5	3	0	3	0	3	GE
54554	1678	445	0.4	0.7	2	2	2	2	2	GE
54930	112	112	---	---	1	1	1	0	1	GE
55910	408	73	6.8	3.6	1	1	1	1	1	SD + Bias
63636	208	101	1.7	-0.2	1	1	1	1	1	GE
72826	845	170	6.8	-2.1	3	2	3	2	3	SD
72827	190	84	4.4	-1.3	1	1	1	1	1	GE
72828	1822	237	5.4	0.9	1	0	1	1	1	SD
72829	147	96	3.3	-1.0	1	1	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
44723	48	44	2.5	-10.7	1	0	1	0	1	Bias + GE

Table 3b: Platforms reporting in SHIP code

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
46124	923	0	1.0	-4.1	1	0	0	1	1	Bias
63116	167	0	3.6	-0.9	2	0	2	0	2	Bias
9V9128	190	0	5.2	1.9	1	0	1	0	1	Bias
9VDD3	88	3	6.8	-1.5	1	0	1	0	1	SD
9VKY2	57	2	1.9	-4.2	0	0	0	0	0	Bias
A8JJ8	59	0	8.1	2.3	1	0	1	0	1	SD
A8SI9	76	0	3.7	-7.5	2	0	2	0	2	Bias
A8WG9	198	0	3.9	0.3	4	0	4	0	4	Bias
A8ZV8	69	0	1.9	-4.0	2	0	2	0	2	Bias
AUYN *	96	8	5.9	5.4	2	0	2	0	2	Bias
AUYR *	105	9	6.1	-1.4	1	0	0	0	1	SD
CG2522 *	312	244	0.6	0.4	1	0	1	0	1	Bias
CG2992 *	348	162	0.5	1.1	1	0	1	0	1	Bias
HQTEST	184	0	0.5	-11.5	1	0	0	0	0	Bias
KQXZ	59	1	3.1	-4.0	0	0	0	0	0	Bias
KS089	73	63	8.9	-2.7	1	0	1	0	1	GE
OZDB2	40	0	7.5	0.0	1	0	1	0	1	SD
UAKA	46	0	0.6	3.4	0	0	0	0	0	Bias
UBAU	88	0	5.1	-0.3	0	0	0	0	0	SD
UCJX	46	1	5.2	1.7	0	0	0	0	0	SD
UDUR	134	0	2.1	-3.6	0	0	0	0	0	Bias
UIAC	171	84	5.7	-7.8	3	0	2	0	2	Bias
V7OQ7	45	0	2.2	-3.7	0	0	0	0	0	Bias
VCTV	107	106	0.0	-5.5	2	0	2	0	3	GE
VCYP	40	39	0.0	-12.6	1	0	1	0	1	GE
VDWC	43	43	---	---	1	0	0	0	1	GE
VGJD	50	27	3.5	-10.2	1	0	0	0	2	Bias
VRXO6	90	25	8.5	-0.7	2	0	1	0	2	Bias + SD
VYNG *	86	86	---	---	3	0	2	0	3	GE
WDF7174	44	2	4.4	4.0	0	0	0	0	0	Bias
WMLF	62	3	7.6	-7.0	0	0	0	0	0	Bias
WTER	1318	19	10.2	3.9	2	0	2	0	2	Bias
YJZJ9	70	0	2.5	5.3	2	0	2	0	2	Bias

TABLE 4: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 3 BUT LISTED AS SUSPECT OVER THE PERIOD JULY TO DECEMBER 2011.

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.

Notes: 1. Units are hPa

Identifier	N Obs.	NGE	SD	Bias	Comments
9HJI9	224	1	2.2	-0.8	Reduced SD
A8AT8	119	0	3.7	3.9	Reduced bias
A8DE3	198	0	1.8	0.5	Reduced SD
CFN4309	12	11	0.0	-11.2	Less than 40 reports
CGDS	2326	1	0.7	0.5	Fewer GEs
CYGR	6	4	2.1	-10.8	Less than 40 reports
CZ3695	44	0	0.4	-0.2	Reduced bias
CZ9742	681	40	0.6	-0.2	Fewer GEs
ONFN	18	0	4.1	-1.3	Less than 40 reports
OZWA2	88	0	1.8	-1.0	Reduced SD
SBPQ	631	0	1.0	-3.2	Reduced bias
TBWUK09	116	0	1.7	0.9	Reduced bias
UCUQ	239	0	1.8	0.2	Reduced bias
UFCK	55	1	3.2	-0.4	Reduced bias
V7DI7	168	0	1.6	0.3	Reduced bias
V7QK3	238	4	4.1	-0.1	Reduced SD
V7SY6	393	59	5.7	5.0	Reduced SD
VDFP	26	11	3.4	-10.1	Less than 40 reports
VDRV	38	9	6.0	-8.9	Less than 40 reports
VRIO2	68	0	2.1	-1.5	Reduced bias & SD
VVKS	7	0	2.8	0.1	Less than 40 reports
WAV4647	70	0	0.8	0.2	Reduced SD
WBN6510	25	0	2.6	-5.8	Less than 40 reports
WCX7445	3811	440	4.2	0.1	Reduced bias & SD
WDC6644	310	1	2.3	-0.3	Reduced SD
WQZ7791	61	2	2.1	0.4	Reduced bias & SD
WUW2120	29	0	0.8	-1.1	Less than 40 reports
ZCDL9	166	0	3.4	0.5	Reduced SD

TABLE 5: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT WIND SPEED OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2012.

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 $^{-1}$ (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 speed observations.

Notes: 1. Units are ms^{-1}
2. Observing platforms marked with an asterisk were listed in the previous report (July to December 2011)

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
41567	1326	1235	5.0	6.7	2	2	0	0	2	GE
42539	924	524	2.8	-0.1	1	1	0	0	1	GE

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

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
31912	66	0	4.4	8.3	1	1	1	0	1	Bias

Table 5b: Platforms reporting in SHIP code

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
62087	1692	28	2.3	-5.7	4	6	4	2	4	Bias
KS078 *	315	12	5.7	3.2	1	0	1	0	2	SD

TABLE 6: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 5 BUT LISTED AS SUSPECT OVER THE PERIOD JULY TO DECEMBER 2011.

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^{-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 ms^{-1}

Identifier	N Obs.	NGE	SD	Bias	Comments
44064	16390	0	1.7	0.7	Reduced SD
WQZ7791	61	0	3.3	2.5	Reduced bias

TABLE 7: LIST OF MARINE OBSERVING PLATFORMS PRODUCING SUSPECT WIND DIRECTION OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2012 .

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 25ms^{-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 (°).
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 ms^{-1} . If no significant speed bias was present, the statistics and plots refer to direction reports with an observed speed greater than 5 ms^{-1}.
3. Observing platforms marked with an asterisk were listed in the previous report (July to December 2011)

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
41567 §	1316	54	0.0	0.0	0	2	0	0	2	GE
48521	1488	3	37.8	84.7	3	0	0	0	3	Bias
64532	516	24	74.0	-115.9	3	0	0	0	3	Bias + SD

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

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
31983	737	0	31.7	33.2	1	1	1	1	1	Bias
47560	1100	0	22.5	37.6	3	0	0	0	3	Bias

Table 7b: Platforms reporting in SHIP code

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
21210 *	710	53	109.4	-5.1	3	2	3	2	3	SD
22108	2116	1	60.5	38.1	2	0	3	2	0	SD
23003	843	0	136.8	-57.6	3	1	3	2	3	SD + bias
23006	385	0	40.5	-41.4	2	2	2	2	2	Bias
23009	1870	1	113.3	-58.1	4	5	6	6	6	SD + bias
23017	64	0	142.3	48.6	1	0	1	1	1	Bias + SD
23492	610	0	94.7	130.4	3	0	3	3	3	Bias
31260 *	1204	0	53.1	30.5	0	0	3	0	2	Bias
3EDA4	256	4	80.4	16.9	3	0	3	0	3	SD
3ETA7	180	1	76.0	13.0	1	0	1	0	1	SD
44014	70	2	43.6	-104.8	1	1	1	0	1	Bias
44060 §	521	0	79.0	-50.0	1	0	1	0	2	Bias
44067	4227	0	53.3	73.9	6	5	0	2	6	Bias
45025	412	0	66.9	-20.2	0	0	0	0	0	SD
45138	1516	0	27.7	46.6	3	3	3	1	0	Bias
45162	209	0	43.1	39.7	0	0	0	0	0	Bias
51308	1223	0	42.3	-37.4	0	1	2	0	1	Bias
53057 *	386	0	155.1	-32.7	1	1	1	1	1	Bias + SD
5BPA3	98	0	68.2	-5.8	0	0	0	0	1	SD
62087 §	1274	28	162.5	-37.5	3	1	4	1	4	Bias + SD
9HA2064	72	0	62.6	-5.1	0	0	0	0	0	SD
A8AD7	184	0	74.1	5.6	0	0	1	0	3	SD
A8PQ6	107	0	78.4	-3.6	0	0	2	0	2	SD
A8PX5	100	0	78.0	-4.3	1	0	1	0	1	SD
A8QY2	188	0	73.7	-21.6	0	0	0	0	0	SD
BAREU6: *	2442	0	53.4	3.8	0	0	4	0	5	SD
C6TF8	167	0	96.2	2.5	0	0	2	0	5	SD
DDIG2 *	199	0	59.0	-11.8	0	0	0	0	1	SD
DQVJ	78	2	73.5	-8.7	1	0	1	0	1	SD
ELWZ5 *	188	1	55.5	1.6	0	0	0	0	0	SD
H9UY §	186	11	99.4	3.8	2	0	2	0	2	SD
HO7723	79	0	80.2	3.4	0	0	0	0	1	SD
ICRA	340	0	70.4	3.0	0	0	0	0	0	SD
J8NW *	219	0	73.0	-16.3	0	0	0	0	5	SD
J8NX	110	0	101.2	-7.7	1	0	0	0	2	SD
KS078 *§	315	12	109.1	-40.3	3	0	3	0	3	SD
KS088	2973	0	50.6	32.6	3	0	4	0	5	Bias
KS089	215	0	36.1	-33.4	0	0	0	0	0	Bias
KS093	123	0	90.5	3.9	0	0	0	0	0	SD
KS096	491	0	70.6	13.5	0	0	1	0	1	SD

Continued >

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
KS098 *	108	0	27.8	-64.0	1	0	1	0	1	Bias
MCUV3 *	270	1	65.8	11.4	2	0	2	0	2	SD
MGRL8 *	47	0	58.4	-17.6	0	0	0	0	0	SD
MGSM5	279	5	66.1	4.2	0	0	0	0	1	SD
MNDC9	145	2	77.9	-13.0	0	0	1	0	4	SD
MRWF2	108	1	64.4	-17.1	0	0	1	0	0	SD
NWS000 §	493	3	87.3	33.2	1	0	2	0	2	Bias + SD
ONAR	120	0	61.7	-17.9	0	0	0	0	0	SD
OXVA2	322	10	80.1	-13.3	2	0	2	0	3	SD
OYYL2	166	0	66.9	-16.1	0	0	0	0	3	SD
PBCK	131	0	73.1	-44.3	0	0	1	0	2	Bias + SD
PDMK	88	1	79.0	-3.0	0	0	1	0	0	SD
S6NK4	121	0	67.6	0.3	0	0	0	0	0	SD
TBWAA10	131	6	77.1	-55.4	1	0	2	0	2	Bias + SD
TBWUK14	150	0	55.7	-52.1	1	0	2	0	1	Bias
UCAD *	103	1	60.0	19.7	0	0	0	0	1	SD
UCUC	157	0	54.5	59.5	0	0	0	0	1	Bias
UGSI	109	1	69.6	-13.2	0	0	0	0	0	SD
UICO	138	0	83.3	13.7	1	0	1	0	2	SD
V7OX3 *	251	0	44.9	26.0	0	0	0	0	1	Bias
VC6750 *	668	0	25.2	72.8	1	0	0	0	2	Bias
VQKZ5	111	0	63.8	0.5	0	0	0	0	1	SD
VREX8	77	0	71.6	-4.8	0	0	0	0	1	SD
VRGA6	101	0	82.2	-9.6	0	0	0	0	2	SD
WCX744 *	3800	29	84.1	-16.0	3	0	3	0	4	SD
WCX910 *	185	0	60.6	-58.6	0	0	0	0	5	Bias + SD
WXY6216	1194	25	77.0	10.9	2	0	2	0	3	SD
ZCBD3	171	1	63.2	0.7	0	0	0	0	1	SD
ZCDN9 *	267	2	63.9	4.7	0	0	0	0	2	SD
ZCDY2 *	934	6	82.8	8.0	2	0	2	0	3	SD
ZCEG5	59	2	80.8	-2.0	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 JULY TO DECEMBER 2011.

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 25ms $^{-1}$ (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.

Notes: 1. Units are degrees (°)

Identifier	N Obs.	NGE	SD	Bias	Comments
23173	385	0	26.5	6.0	Reduced bias
2AKI4	279	0	33.1	-1.9	Reduced SD
3EBL5	99	0	56.5	-20.9	Reduced SD
3EUS	363	0	48.3	-8.5	Reduced SD
46053	4224	0	44.1	-29.7	Reduced bias
51307	1133	0	18.4	-5.0	Reduced bias & SD
8PNQ	30	1	41.9	20.4	Less than 40 reports
A8CH2	132	0	54.5	-0.9	Reduced SD
A8CQ5	44	0	52.1	-19.3	Reduced SD
A8PQ3	33	0	60.4	-14.0	Less than 40 reports
AGRF	37	0	50.3	-55.4	Less than 40 reports
C6FM5	136	0	48.9	-1.4	Reduced SD
CBGR	232	0	46.3	-1.7	Reduced bias & SD
CGBR	4035	1	61.9	-5.6	Reduced bias & SD
DGPT2	75	0	28.9	-6.6	Reduced SD
DGSE	97	0	40.2	-6.3	Reduced SD
DPKZ	39	1	32.2	12.0	Less than 40 reports
ELWG7	72	0	53.3	-7.5	Reduced SD
LEQZ3	95	0	52.7	11.2	Reduced SD
MTFH5	256	0	38.3	7.3	Reduced SD
MYSU5	127	3	54.2	-0.1	Reduced SD
PCBZ	405	0	40.9	2.0	Reduced SD
TBWUK11	349	1	49.2	0.5	Reduced SD
TBWUK16	255	1	52.7	-16.5	Reduced SD
UCTS	309	2	49.5	-5.1	Reduced SD
UDYG	24	0	47.6	47.0	Less than 40 reports
V2OH6	18	0	40.8	-22.8	Less than 40 reports
V2OT9	7	0	36.5	124.8	Less than 40 reports
V7EM3	81	0	52.8	-6.1	Reduced SD
VRFO7	132	0	48.7	-8.8	Reduced SD
WBN4113	83	0	64.9	-29.9	SD
YJZC5	62	0	50.6	7.2	Reduced SD
ZCBE7	98	1	46.6	-10.7	Reduced SD
ZM7552	35	0	37.2	-5.8	Less than 40 reports
ZMENA	145	0	35.2	2.5	Reduced SD

TABLE 9: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT SEA SURFACE TEMPERATURE OBSERVATIONS OVER THE PERIOD JANUARY TO JUNE 2012.

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.

Notes:
1. Units are °C
2. Observing platforms marked with an asterisk were listed in the previous report (July to December 2011)

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
13527	118	91	0.2	8.4	2	-	1	-	1	Bias + GE
13555	187	80	4.0	-3.7	1	-	1	-	1	Bias + GE
13557	2269	1541	4.7	2.6	5	-	2	-	4	Bias + GE
15609	256	6	3.3	5.3	1	-	1	-	1	Bias
17908	134	134	---	---	1	-	0	-	1	GE
21530	163	72	0.9	-4.2	1	-	1	-	1	Bias + GE
21616	619	0	3.6	3.4	1	-	1	-	0	Bias
23667	4947	4560	0.2	0.0	5	-	0	-	5	GE
23731	452	1	0.8	7.6	1	-	0	-	1	Bias
23922	875	1	0.9	2.9	0	-	0	-	0	Bias
23989	781	0	0.3	3.1	0	-	0	-	0	Bias
23990	790	0	0.3	3.0	0	-	0	-	0	Bias
25615	2555	608	0.9	-8.6	5	-	0	-	4	Bias
32524	56	56	---	---	1	-	0	-	1	GE
32559	161	149	2.2	-1.5	1	-	1	-	1	GE
32902	567	150	2.1	2.3	1	-	0	-	1	GE
33662	140	120	1.3	-4.6	1	-	1	-	1	Bias + GE
41927	483	151	0.9	2.3	1	-	0	-	1	Bias + GE
42545	54	1	1.8	5.1	2	-	0	-	1	Bias
46567	150	103	0.1	0.1	1	-	1	-	1	GE
48511	1249	1247	0.6	-7.4	2	-	2	-	2	GE
48654	159	139	1.1	-8.8	2	-	0	-	1	Bias + GE
51665	692	184	2.2	-2.1	1	-	1	-	1	GE
51727	610	0	1.6	3.9	1	-	0	-	0	Bias
52620	104	20	3.3	-2.6	0	-	0	-	0	GE
53606	157	37	4.4	-5.0	1	-	1	-	1	Bias + GE
54554	1157	194	0.5	8.1	2	-	0	-	2	Bias
54930	59	59	---	---	1	-	0	-	1	GE
54953	218	55	3.3	-0.2	2	-	1	-	1	GE
71647	2617	748	3.0	2.3	2	-	2	-	2	Bias

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

Identifier	N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
23673	3566	1023	1.7	-0.9	4	-	0	-	3	Bias
31915	261	5	3.2	4.1	1	-	1	-	1	Bias
72829	3033	916	3.2	-4.0	3	-	1	-	1	Bias

Table9b: Platforms reporting in SHIP code

Identifier		N Obs.	NGE	SD	Bias	B	E	F	T	W	Comments
9VDD3		69	2	2.5	3.4	1	-	0	-	1	Bias
A8CI8	*	302	0	1.9	-3.9	2	-	3	-	3	Bias
A8IN8		251	0	1.2	3.4	3	-	2	-	0	Bias
A8IX8	*	136	1	0.9	-3.2	2	-	1	-	0	Bias
A8PK9		143	0	0.8	3.0	0	-	1	-	0	Bias
A8TH7		51	0	2.6	-3.4	0	-	0	-	0	Bias
A8WC8	*	217	0	2.2	-2.1	2	-	2	-	0	Bias
C6CN4	*	96	1	2.7	-4.0	3	-	3	-	1	Bias
C6YT4	*	107	0	1.2	3.8	3	-	3	-	0	Bias
CGDR	*	1356	5	1.5	3.4	3	-	5	-	5	Bias
DEGL		102	0	2.4	-3.5	2	-	2	-	1	Bias
DNDD	*	176	1	2.4	3.3	2	-	1	-	1	Bias
ELVB3		205	0	1.7	3.3	4	-	5	-	0	Bias
ELWZ5	*	175	2	1.5	4.0	2	-	2	-	1	Bias
IBLC		131	0	2.0	-3.7	1	-	2	-	1	Bias
ICRA		332	0	3.2	-3.3	1	-	1	-	0	Bias
J8AZ3		40	0	1.1	3.1	0	-	0	-	0	Bias
KHRC		51	1	1.0	-4.4	0	-	0	-	3	Bias
KIRH		270	0	1.5	-3.4	4	-	5	-	0	Bias
KS094		1132	874	0.9	-0.9	2	-	0	-	2	Bias
KS096		243	0	0.3	-9.1	2	-	2	-	2	Bias
MGRX9		111	0	1.7	-3.3	2	-	2	-	1	Bias
OYGC2		43	0	1.0	3.2	1	-	1	-	0	Bias
PBHZ	*	56	0	2.0	4.0	1	-	1	-	1	Bias
S6NK4		154	24	3.4	-4.4	1	-	2	-	2	Bias
V7DZ8		116	1	1.8	-6.3	2	-	3	-	3	Bias
V7QN8		147	5	2.6	-3.3	1	-	1	-	1	Bias
V7SY6		382	4	2.9	-3.7	5	-	4	-	2	Bias
VMGO	*	52	0	3.4	-2.3	1	-	0	-	0	Bias
VRCV5		53	1	2.6	-3.6	0	-	0	-	0	Bias
VRDG4		122	1	2.7	-3.6	0	-	2	-	1	Bias
VRXO6		94	86	5.0	-4.7	2	-	0	-	2	Bias + GE
VRZT9		63	0	2.3	-3.1	0	-	0	-	0	Bias
WADN		77	1	2.4	4.2	1	-	1	-	1	Bias
WCX888	*	112	26	3.6	-3.4	2	-	2	-	2	Bias
WE4879		47	31	0.9	0.8	1	-	0	-	2	GE
WFLG		450	0	0.9	-3.1	5	-	2	-	0	Bias
WSLH	*	193	0	1.8	-3.6	5	-	4	-	0	Bias
WZJD		209	0	0.8	-4.0	3	-	4	-	1	Bias

TABLE 10: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 9 BUT LISTED AS SUSPECT OVER THE PERIOD JULY TO DECEMBER 2011.

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
2AUO5	30	0	0.6	-1.2	Less than 40 reports
53056	2782	959	0.3	0.0	Fewer GEs
9V8739	112	0	2.9	2.5	Reduced bias
9VBM6	808	1	1.3	2.7	Reduced bias
A8KW3	156	1	2.6	0.6	Reduced bias
A8LP6	114	0	1.8	-2.5	Reduced bias
A8SZ3	37	0	2.1	-0.7	Less than 40 reports
A8TG2	18	0	2.0	-4.0	Less than 40 reports
C6QM8	283	0	2.8	1.2	Reduced bias
CG2992	34	1	2.5	0.7	Less than 40 reports
ELNY2	13	0	2.2	-0.9	Less than 40 reports
KS098	27	0	0.0	-9.3	Less than 40 reports
KS099	580	40	3.8	2.7	Reduced bias
LEQZ3	93	0	2.9	1.9	Reduced bias
MGSH7	17	0	2.0	0.8	Less than 40 reports
MRWF2	98	0	1.0	1.1	Reduced bias
ZCDQ5	182	2	1.6	-2.9	Reduced bias

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

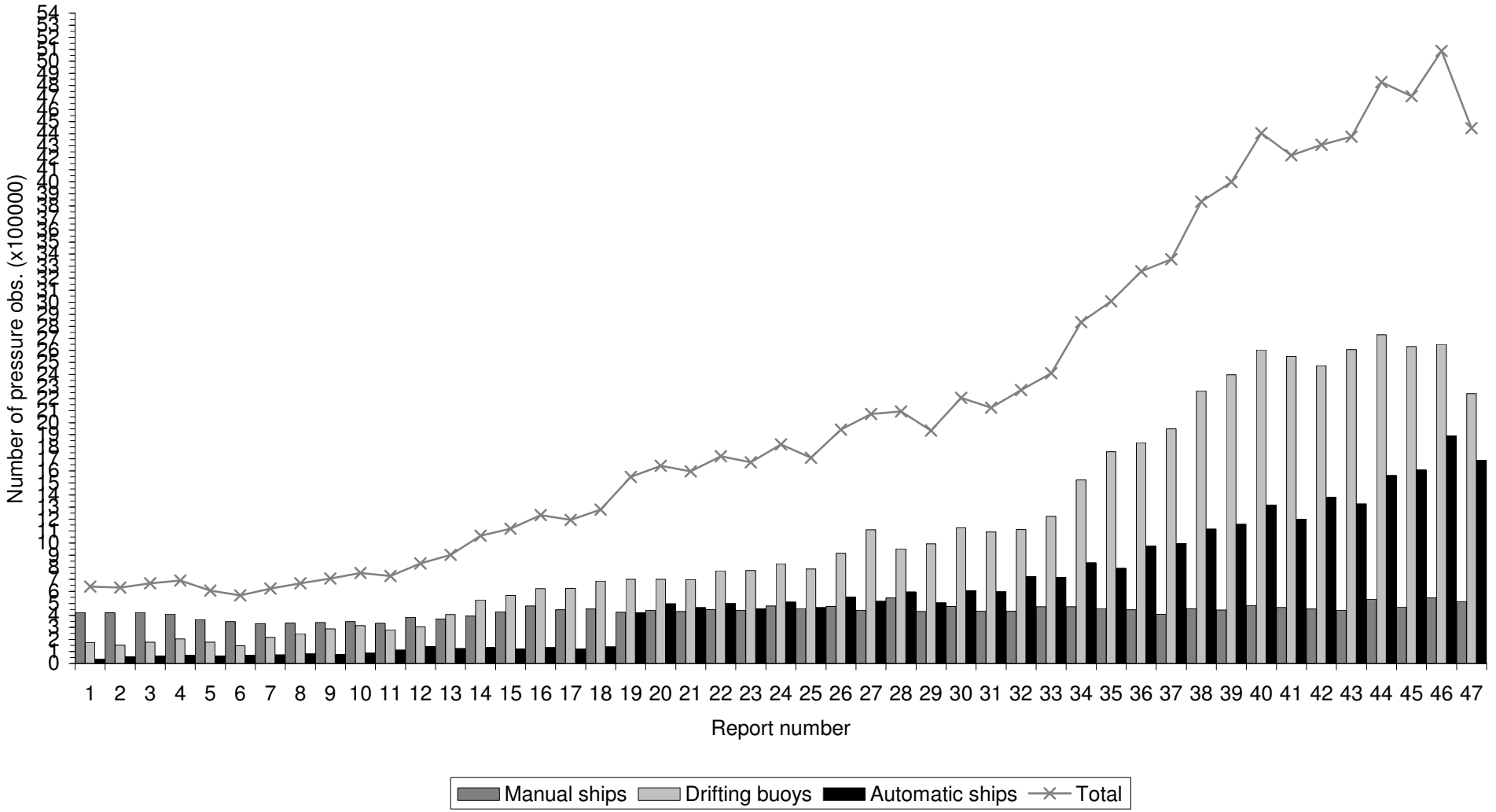
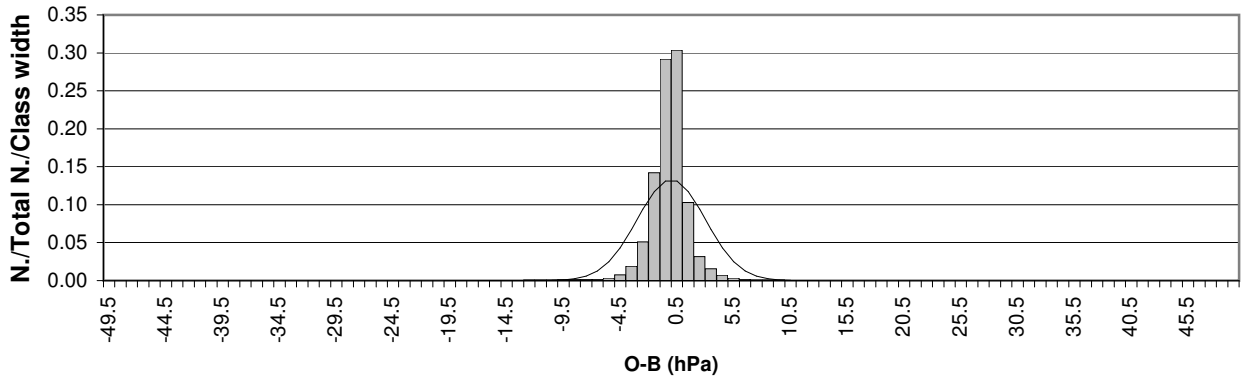
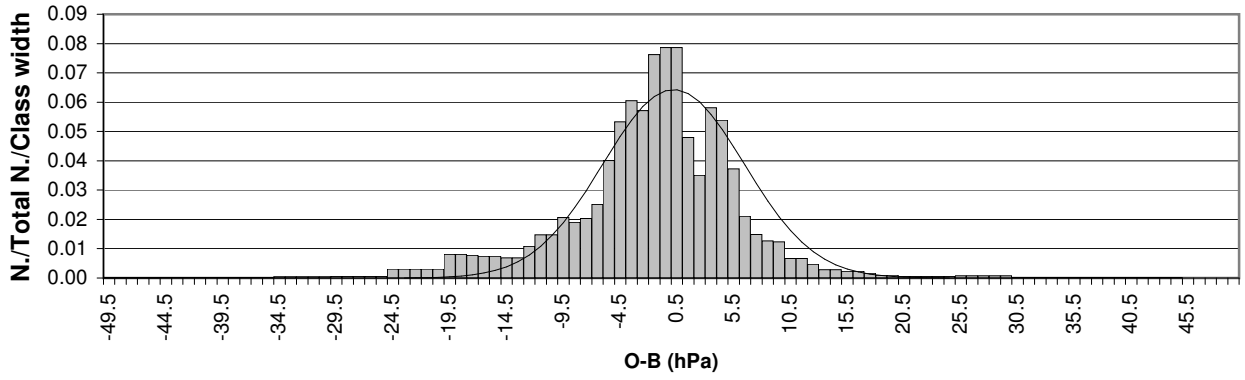


Figure 2a: Distribution of ship O-B pressure (hPa)
Period of data: JAN-JUN 2012 Data used: All observations



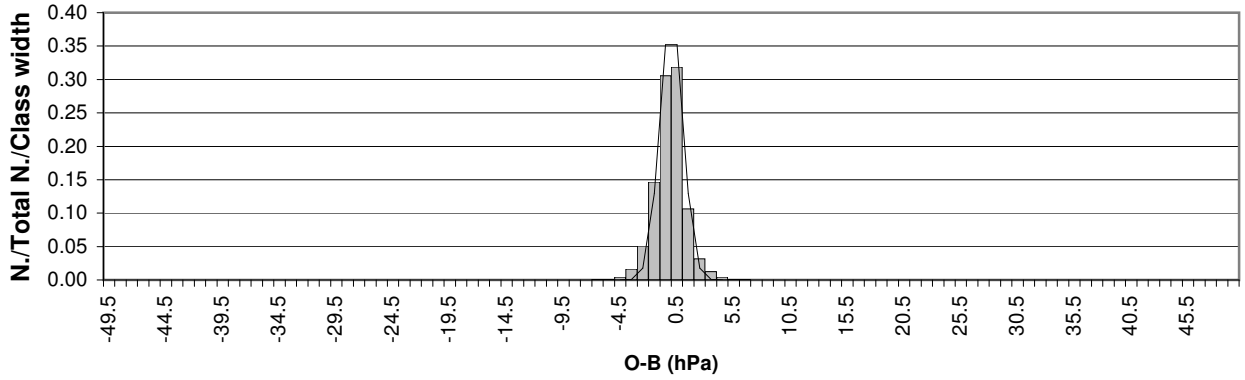
Mean O-B = 0.0 SD O-B = 3.0

Figure 2b: Distribution of ship O-B pressure (hPa)
Period of data: JAN-JUN 2012 Data used: Flagged observations



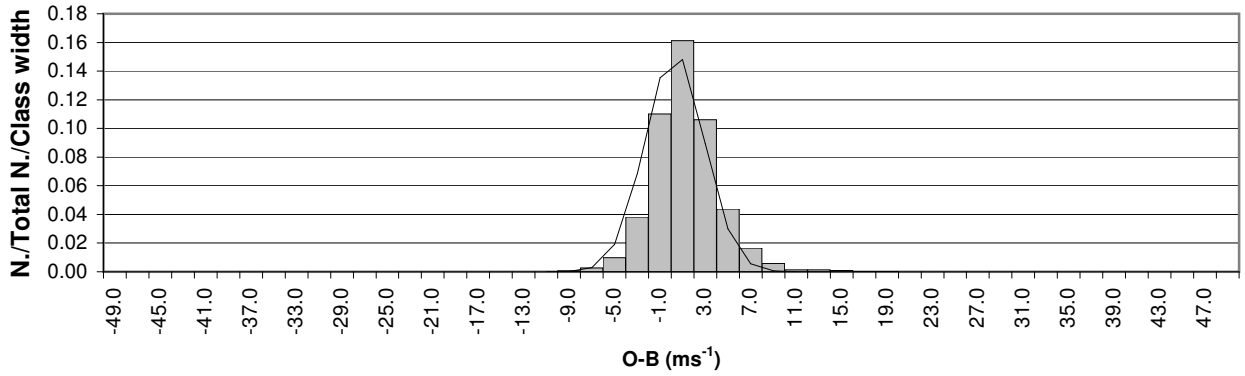
Mean O-B = 0.2 SD O-B = 6.2

Figure 2c: Distribution of ship O-B pressure (hPa)
Period of data: JAN-JUN 2012 Data used: Unflagged observations



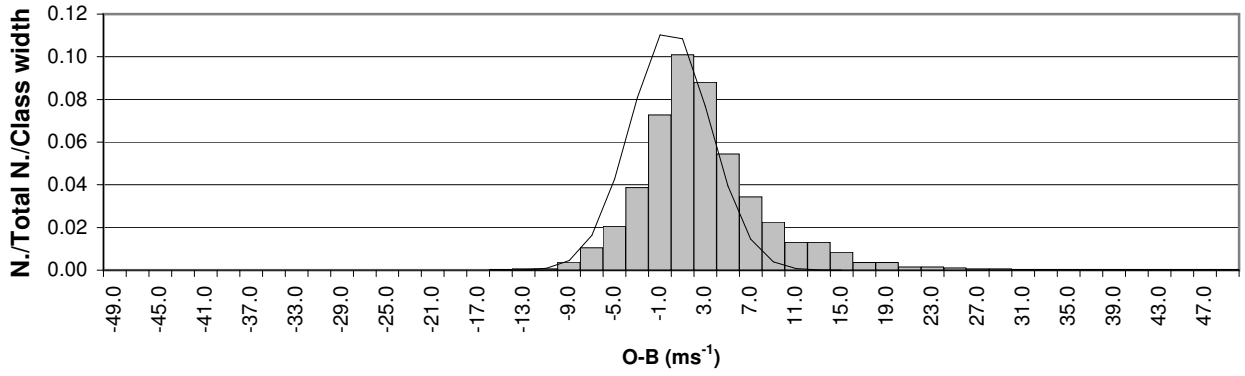
Mean O-B = 0.0 SD O-B = 1.0

Figure 2d: Distribution of ship O-B wind speed (ms^{-1})
Period of data: JAN-JUN 2012 Data used: All observations



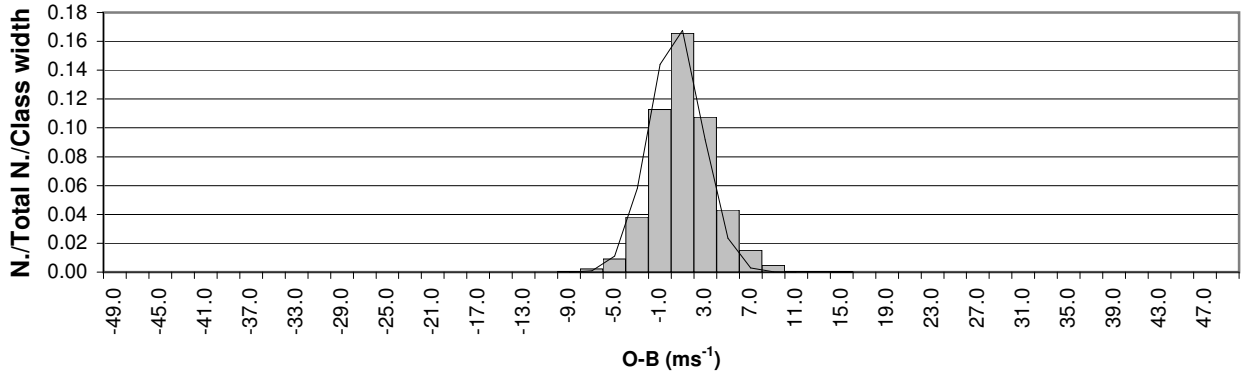
Mean O-B = 0.3 SD O-B = 2.6

Figure 2e: Distribution of ship O-B wind speed (ms^{-1})
Period of data: JAN-JUN 2012 Data used: Flagged observations



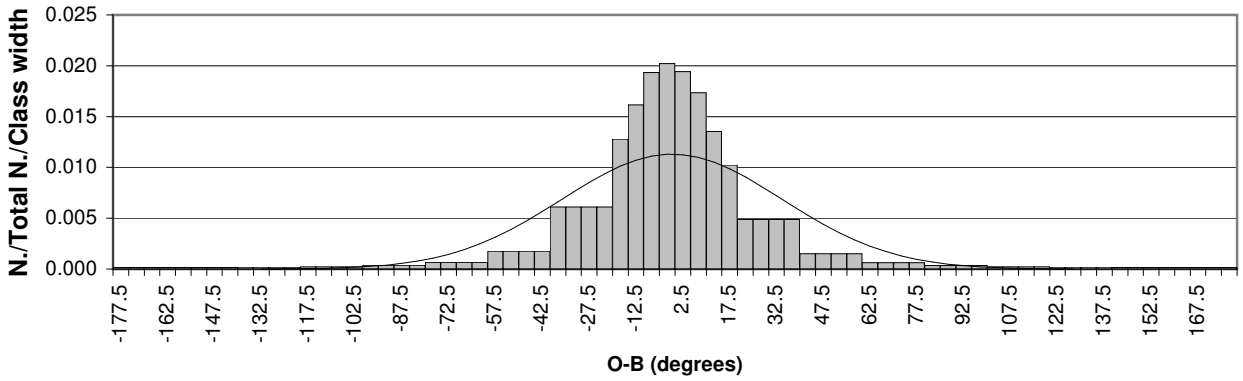
Mean O-B = -0.1 SD O-B = 3.5

Figure 2f: Distribution of ship O-B wind speed (ms^{-1})
Period of data: JAN-JUN 2012 Data used: Unflagged observations



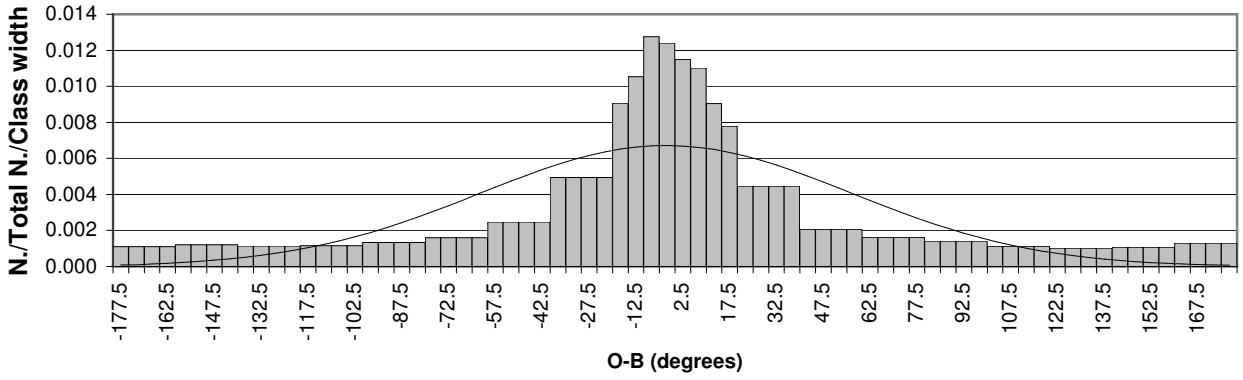
Mean O-B = 0.4 SD O-B = 2.3

Figure 2g: Distribution of ship O-B wind direction (degrees)
Period of data: JAN-JUN 2012 Data used: All observations



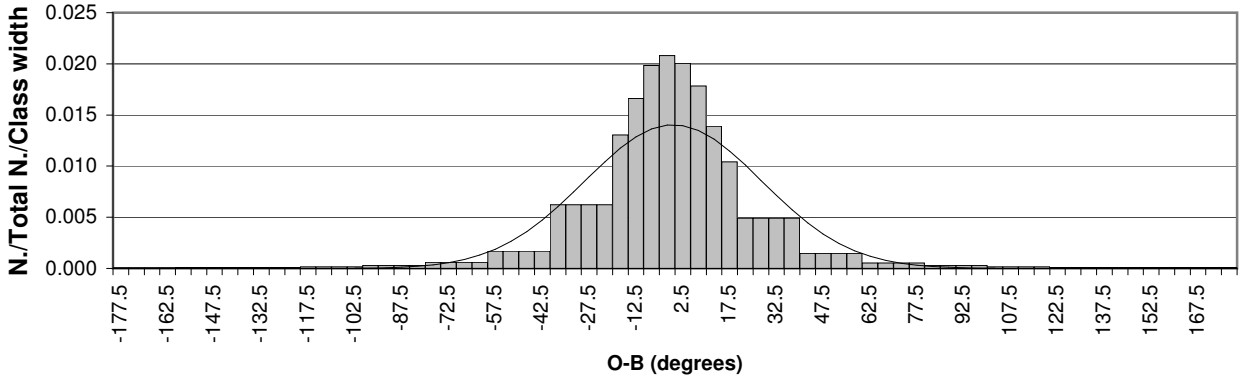
Mean O-B = -1.0 SD O-B = 35.3

Figure 2h: Distribution of ship O-B wind direction (degrees)
Period of data: JAN-JUN 2012 Data used: Flagged observations



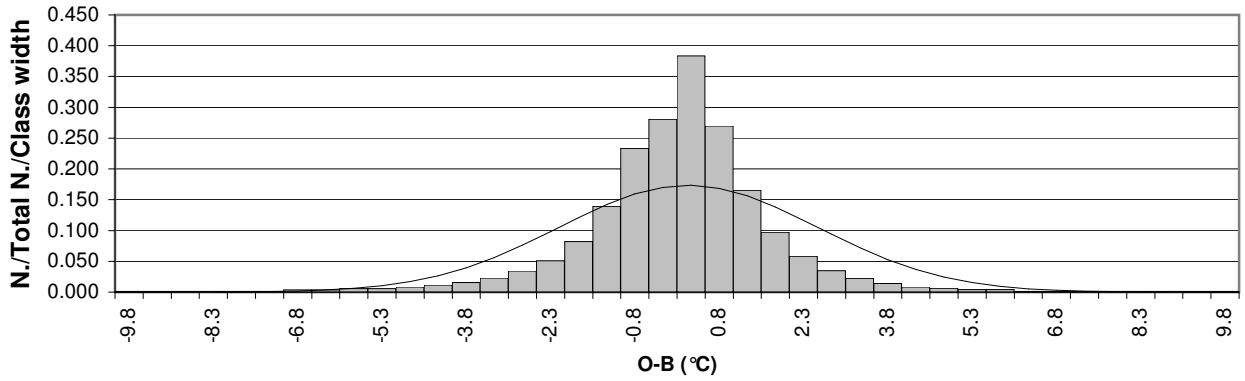
Mean O-B = -2.9 SD O-B = 59.4

Figure 2i: Distribution of ship O-B wind direction (degrees)
Period of data: JAN-JUN 2012 Data used: Unflagged observations



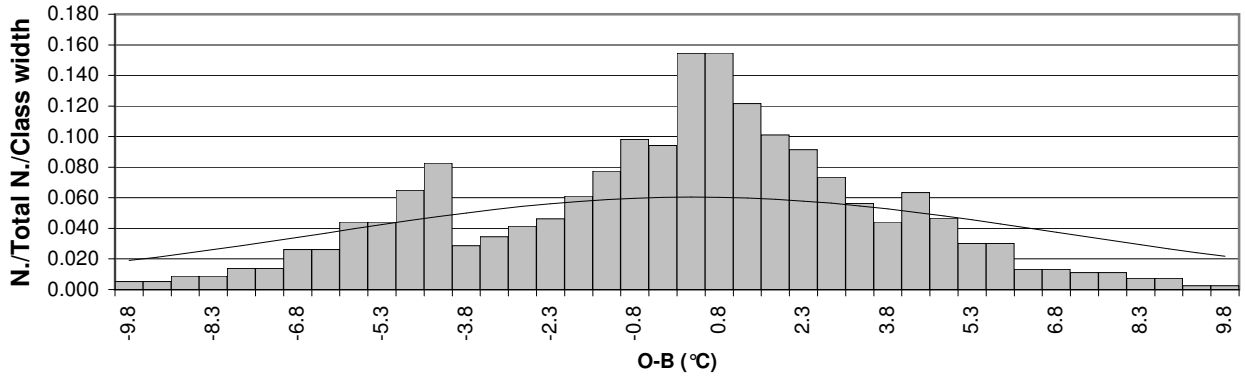
Mean O-B = -0.6 SD O-B = 28.4

Figure 2j: Distribution of ship O-B SST (°C)
Period of data: JAN-JUN 2012 Data used: All observations



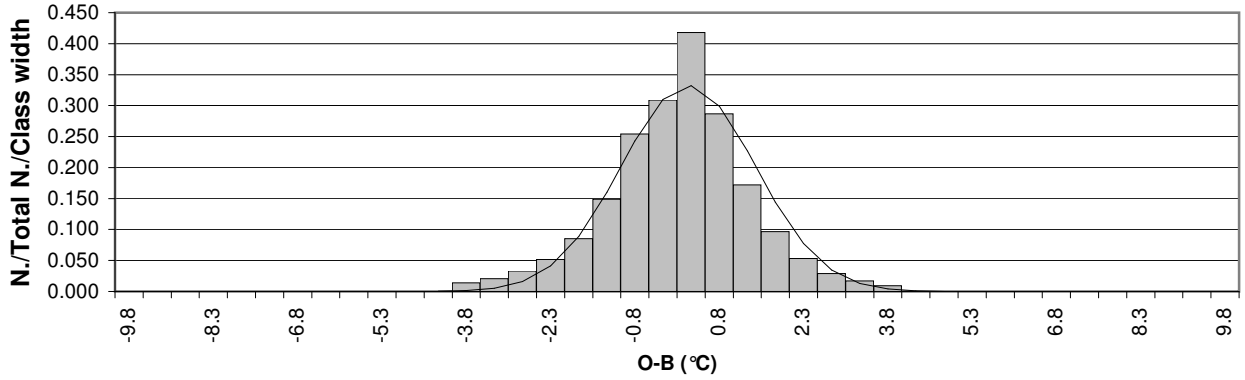
Mean O-B = 0.2 SD O-B = 2.3

Figure 2k: Distribution of ship O-B SST (°C)
Period of data: JAN-JUN 2012 Data used: Flagged observations



Mean O-B = 0.3 SD O-B = 6.6

Figure 2l: Distribution of ship O-B SST (°C)
Period of data: JAN-JUN 2012 Data used: Unflagged observations



Mean O-B = 0.2 SD O-B = 1.2

Figure 3: Bias of Ship O-B Pressure (hPa). Date:- January - June 2012
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

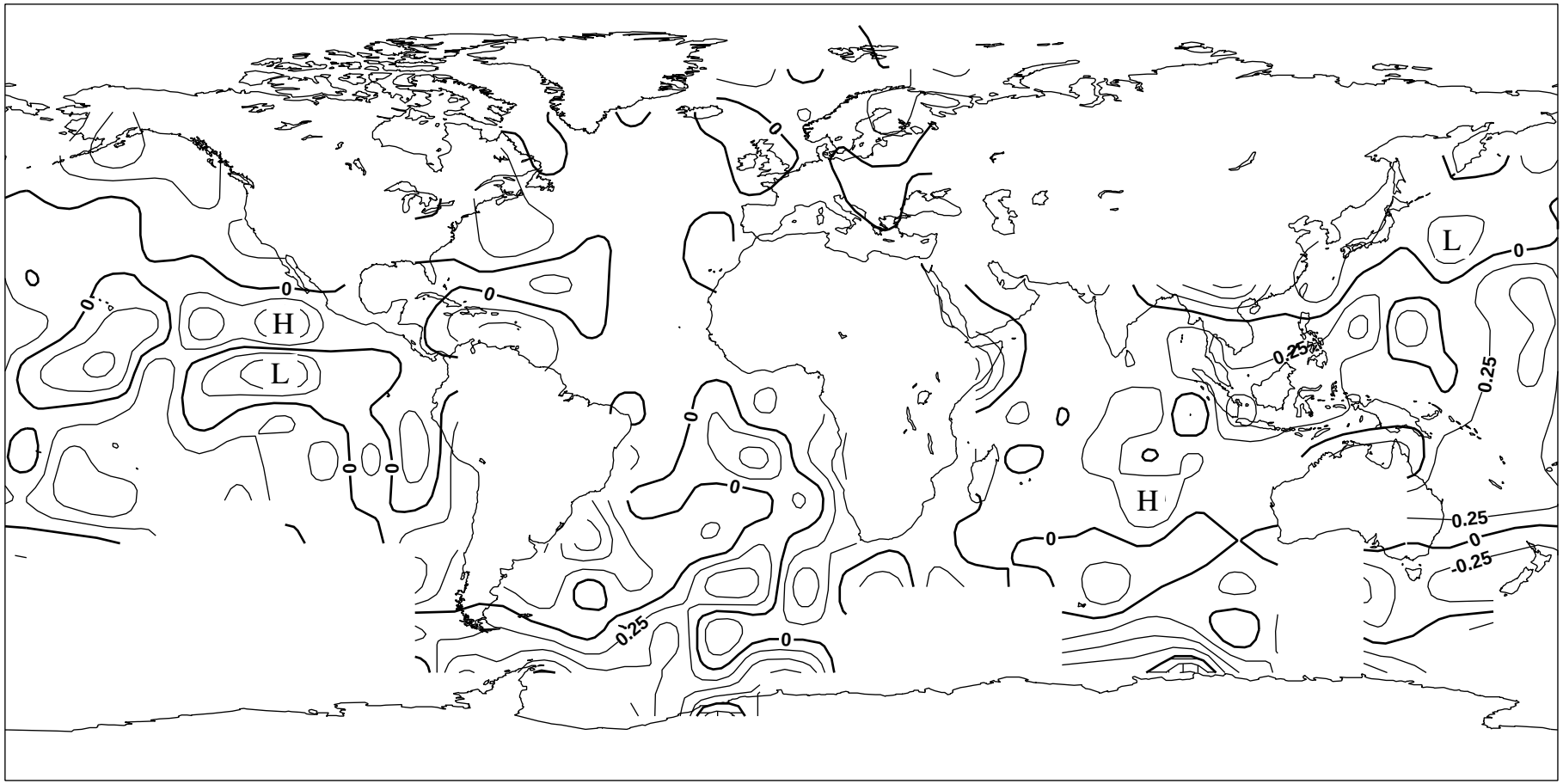


Figure 4: Standard Deviation of Ship O-B Pressure (hPa). Date:- January - June 2012
Only Observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a standard deviation of greater than 2.0 hPa

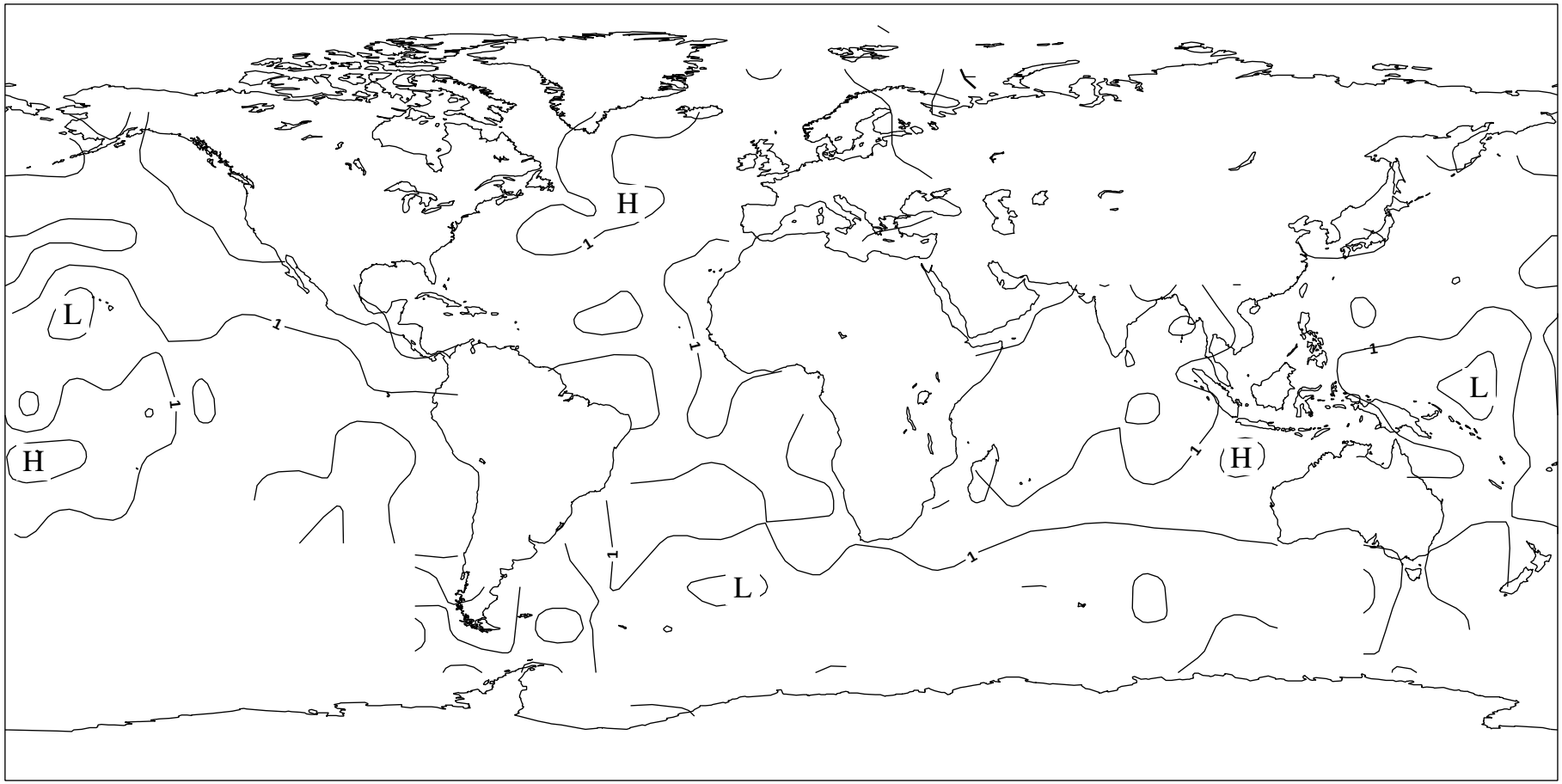


Figure 5:
Plot of the Number of Ship Pressure Observations. Date:- January - June 2012
Only observations passing quality control included

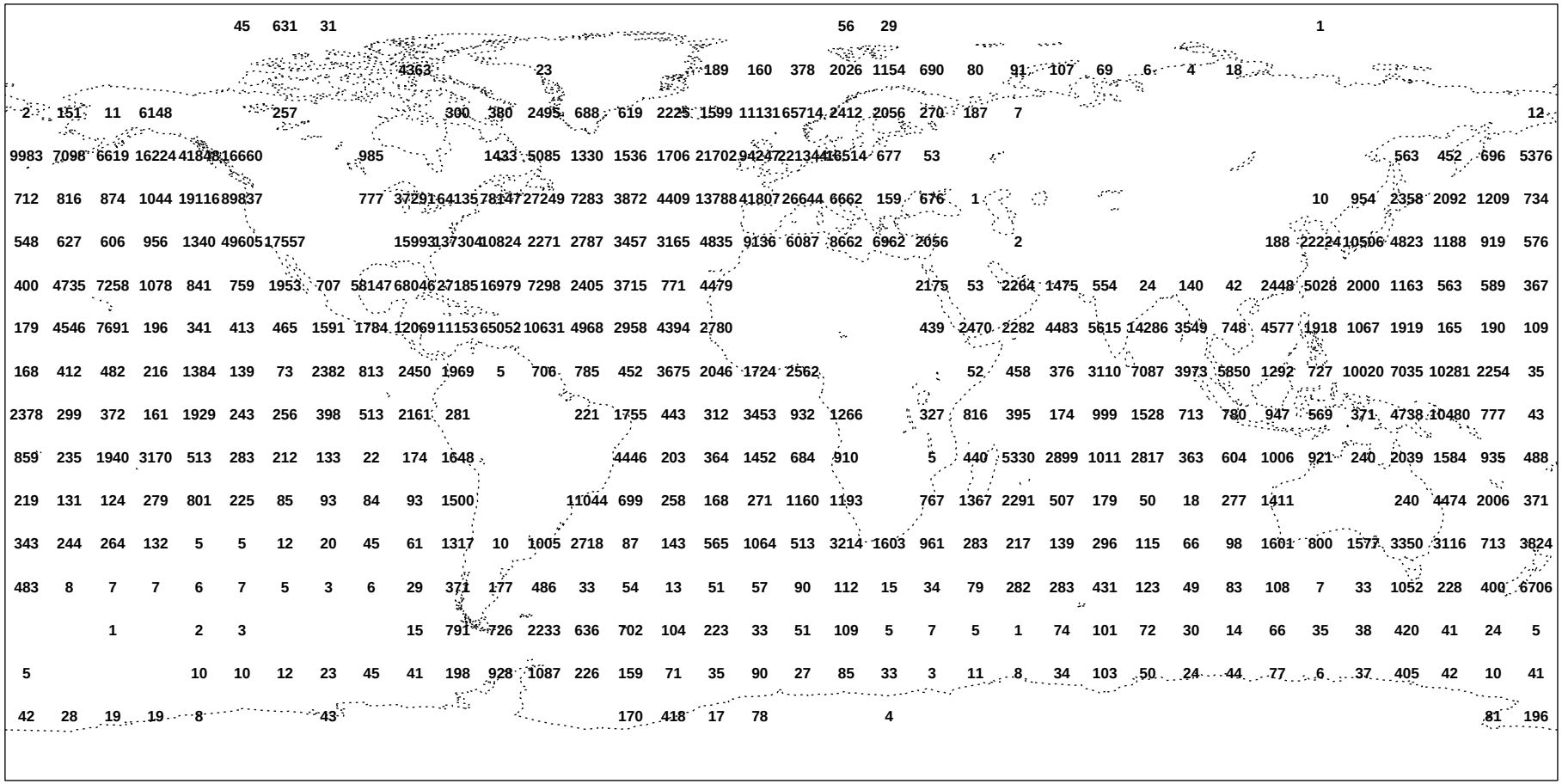


Figure 6: Bias of Ship O-B Wind Speed (ms-1). Date:- January - June 2012
Only observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a bias of magnitude greater than 2.0 ms-1

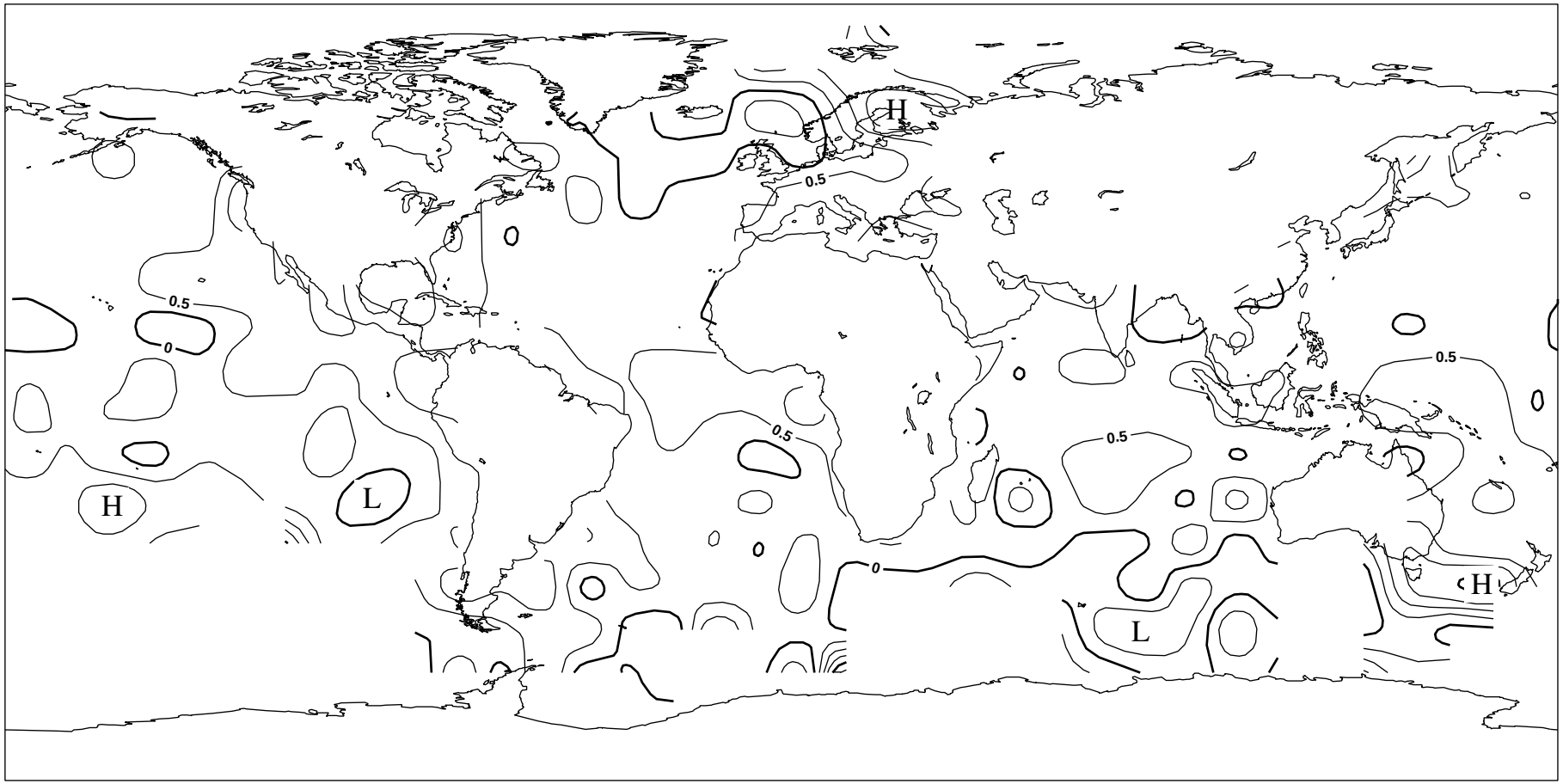


Figure 7: Standard Deviation of Ship O-B Wind Speed (ms-1). Date:- January - June 2012
Only Observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a standard deviation of greater than 4.0 ms-1

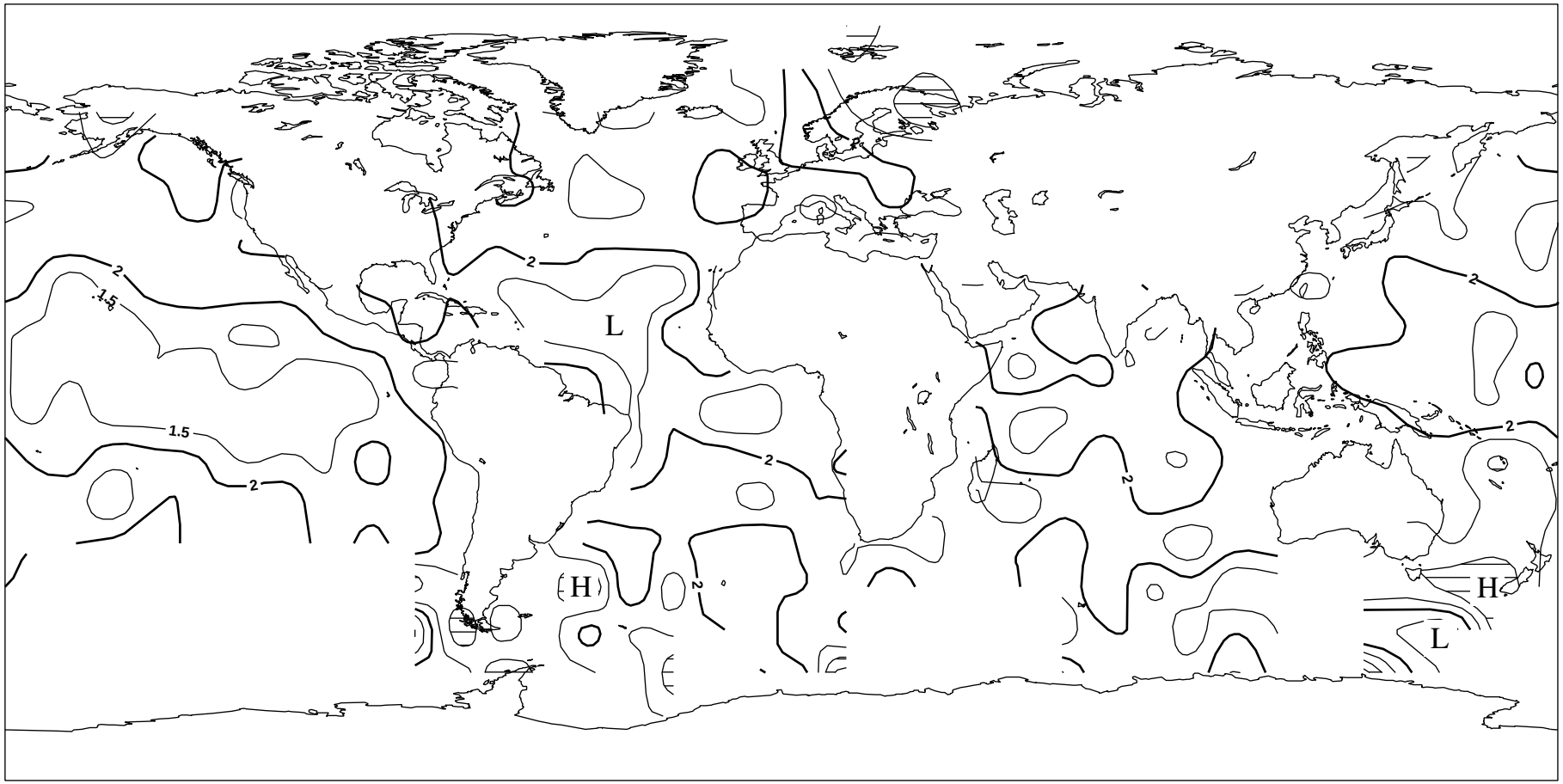


Figure 8:
Plot of the Number of Ship Wind Speed Observations. Date:- January - June 2012
Only observations passing quality control included

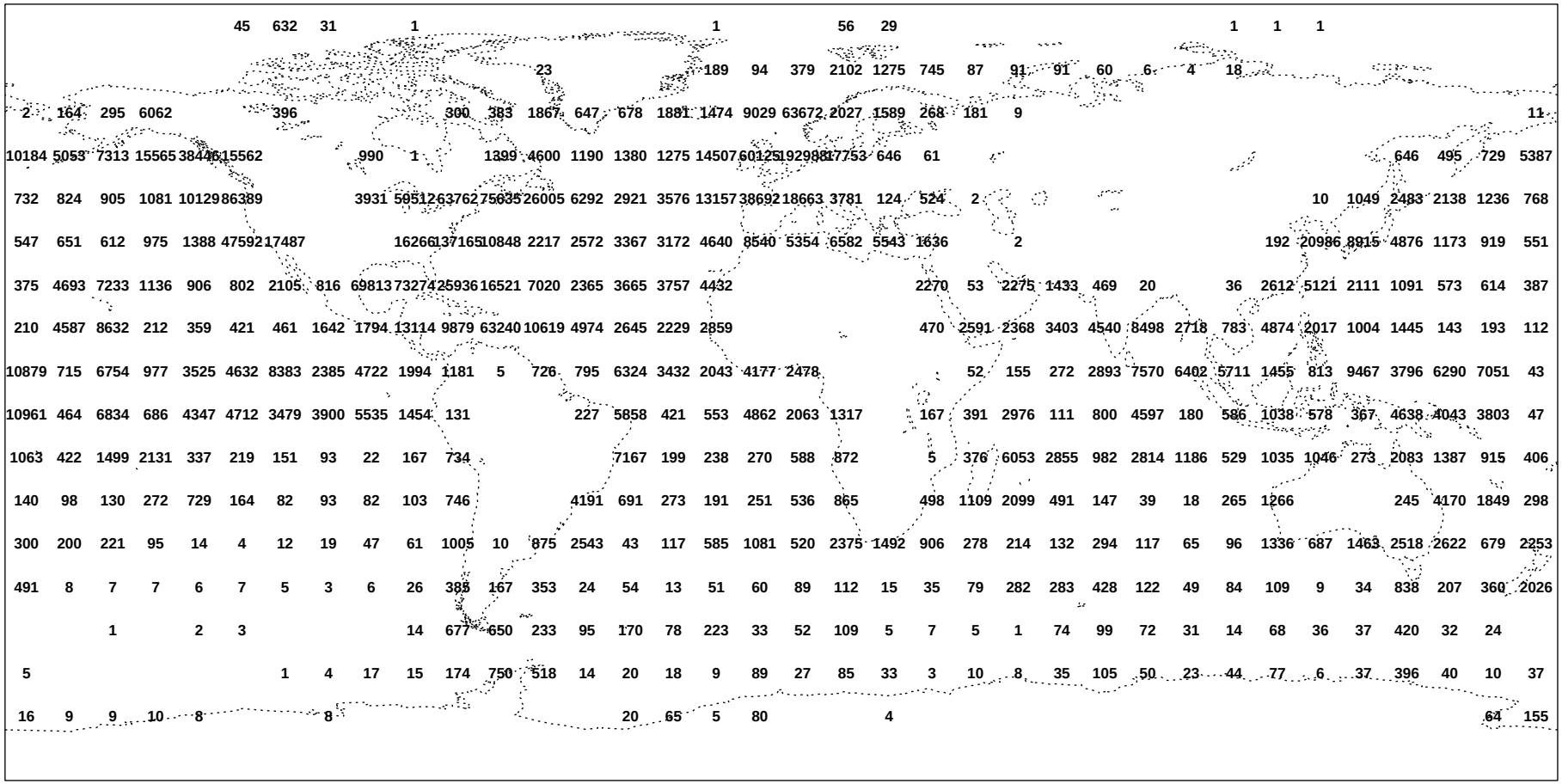


Figure 9: Bias of Ship O-B Wind Direction (degrees). Date:- January - June 2012
Only observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a bias of magnitude greater than 10 degrees

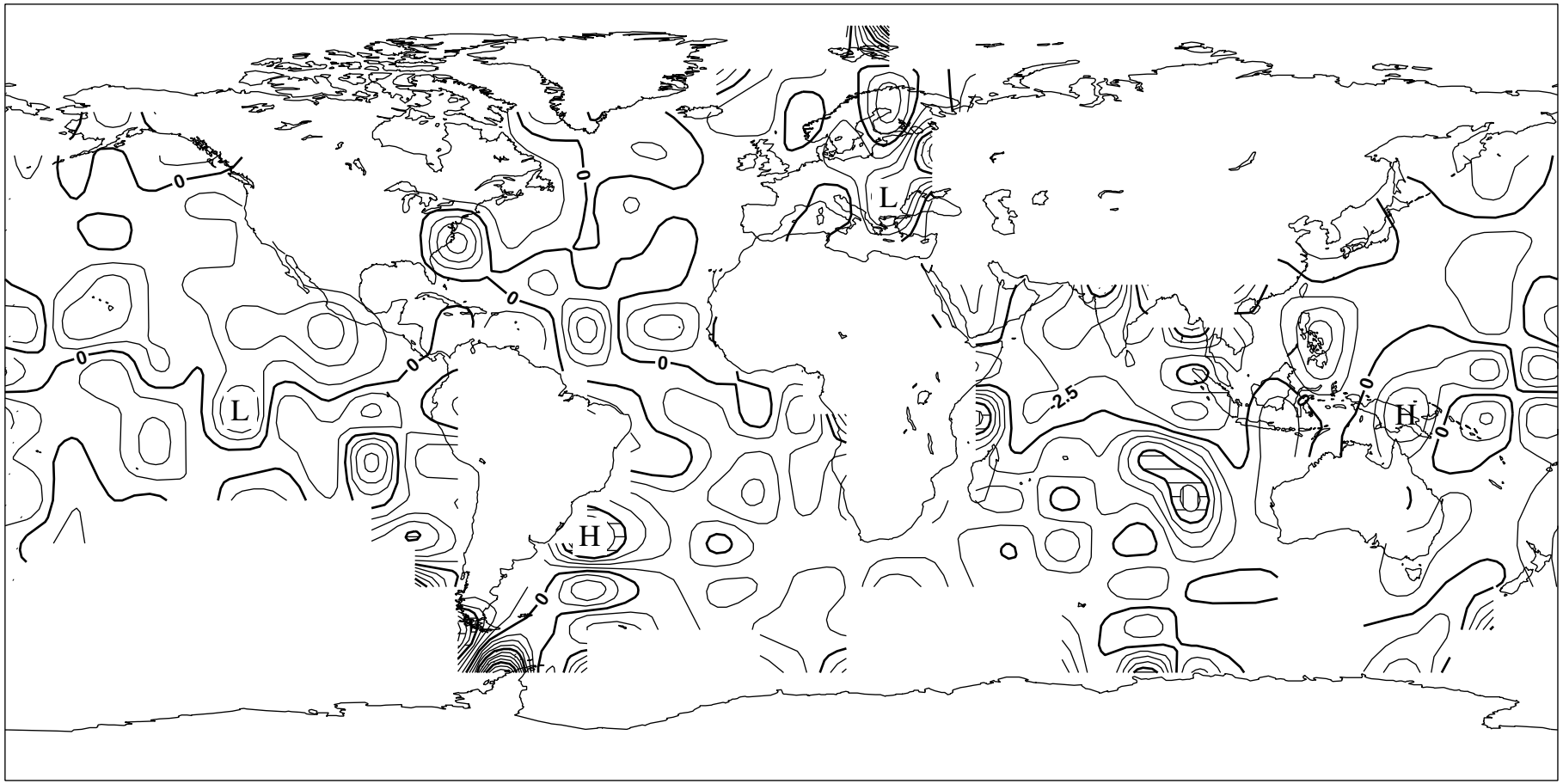


Figure 10: Standard Deviation of Ship O-B Wind Direction (degrees). Date:- January - June 2012
Only Observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a standard deviation of greater than 40 degrees

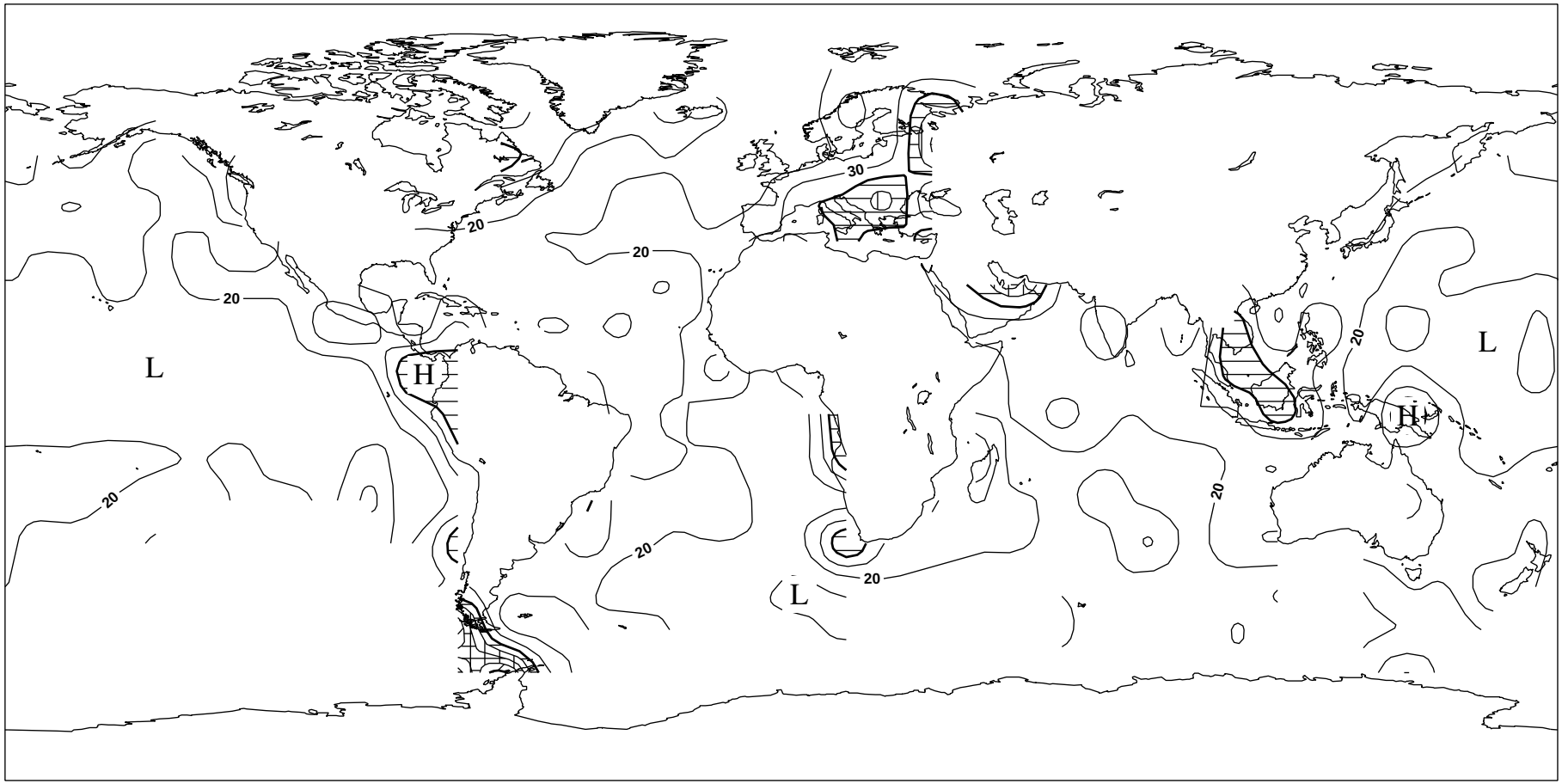


Figure 11:
Plot of the Number of Ship Wind Direction Observations. Date:- January - June 2012
Only observations passing quality control included

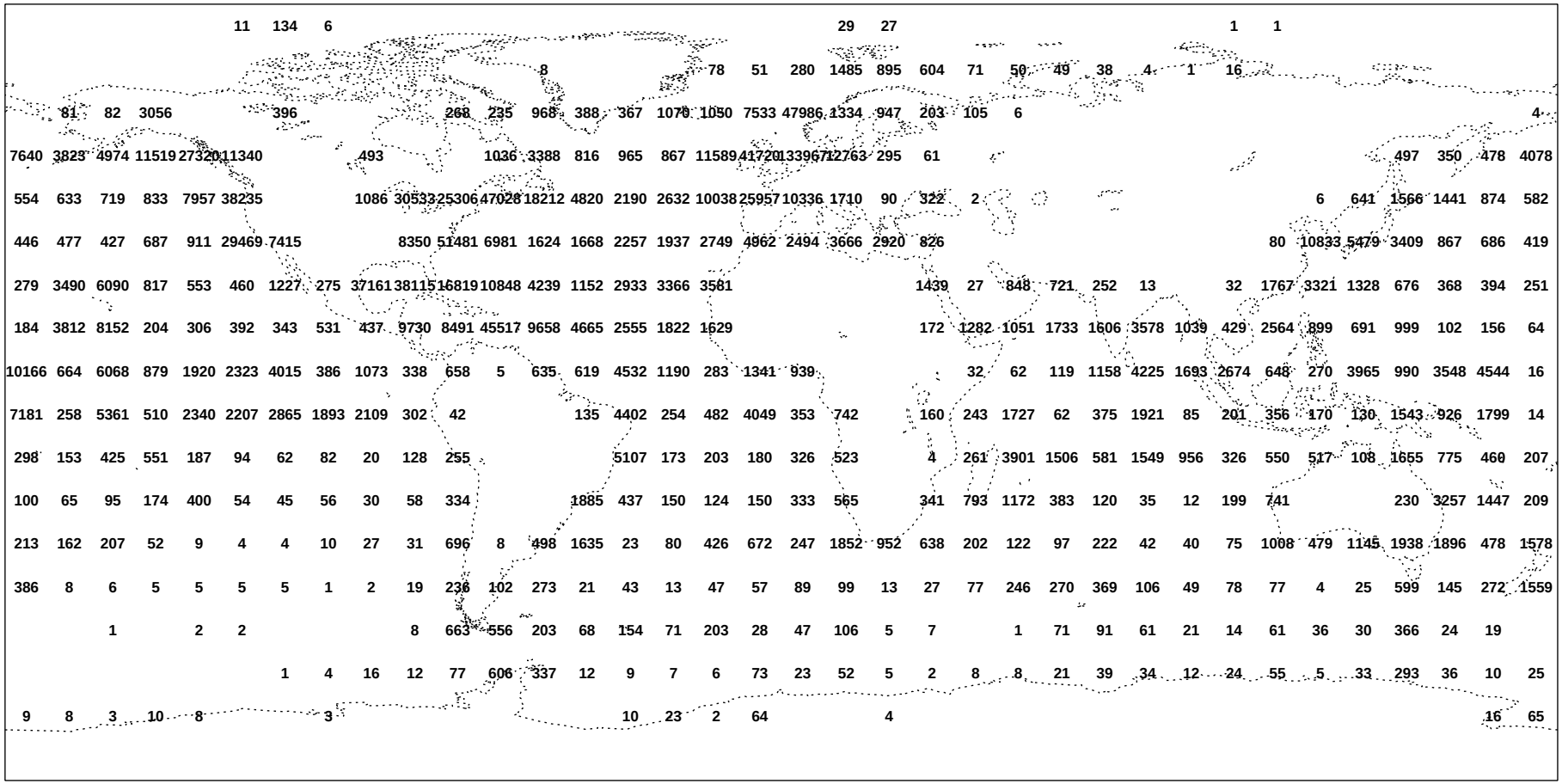


Figure 12: Bias of Ship O-B SST (degrees C). Date:- January - June 2012
Only observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a bias of magnitude greater than 1.0 degree C

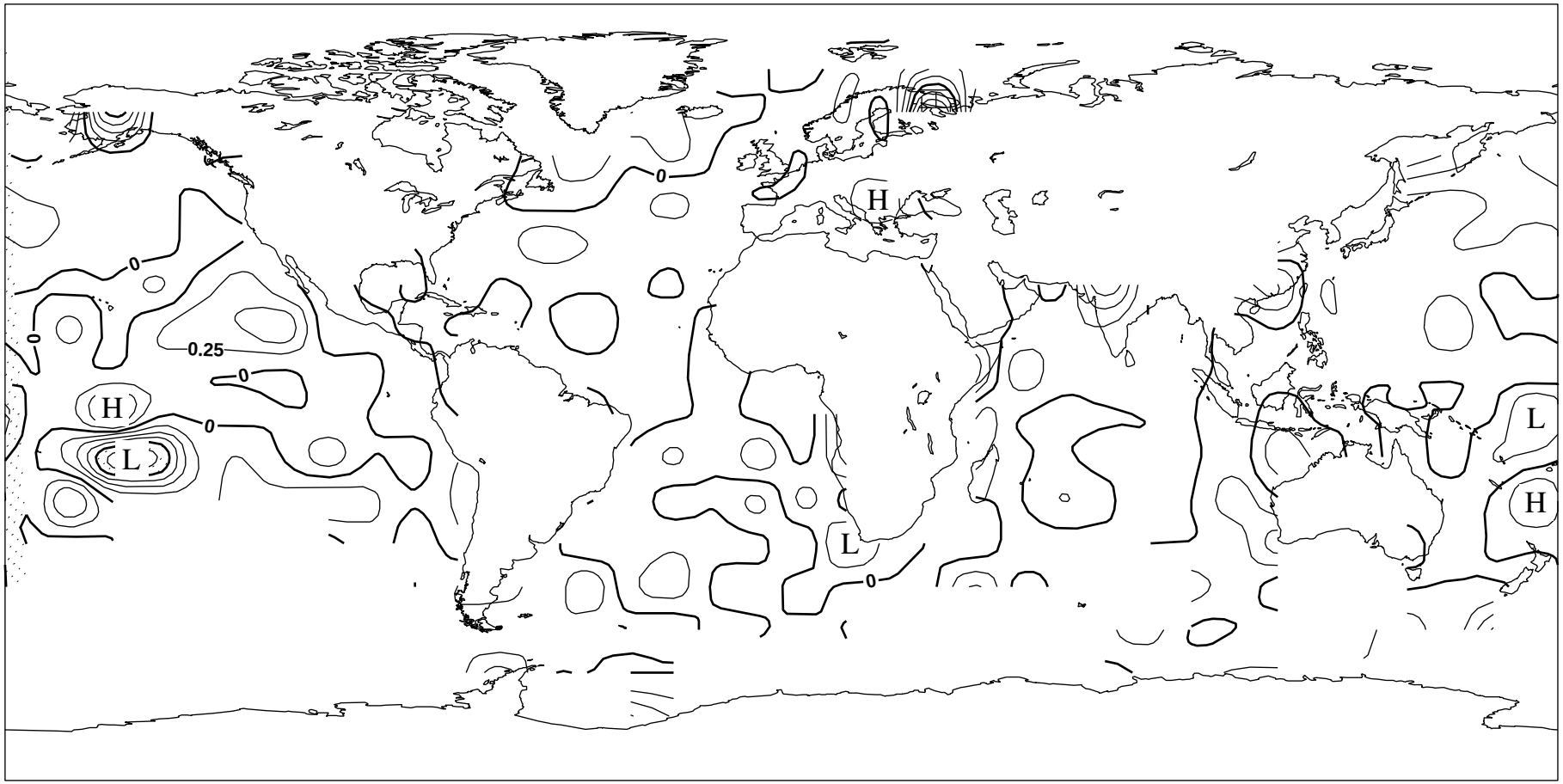


Figure 13: Standard Deviation of Ship O-B SST (degrees C). Date:- January - June 2012
Only Observations passing quality control used in statistics
Contours drawn to 10 degree boxes, if the number of observations is greater than 10
Shaded areas have a standard deviation of greater than 2.0 degrees C

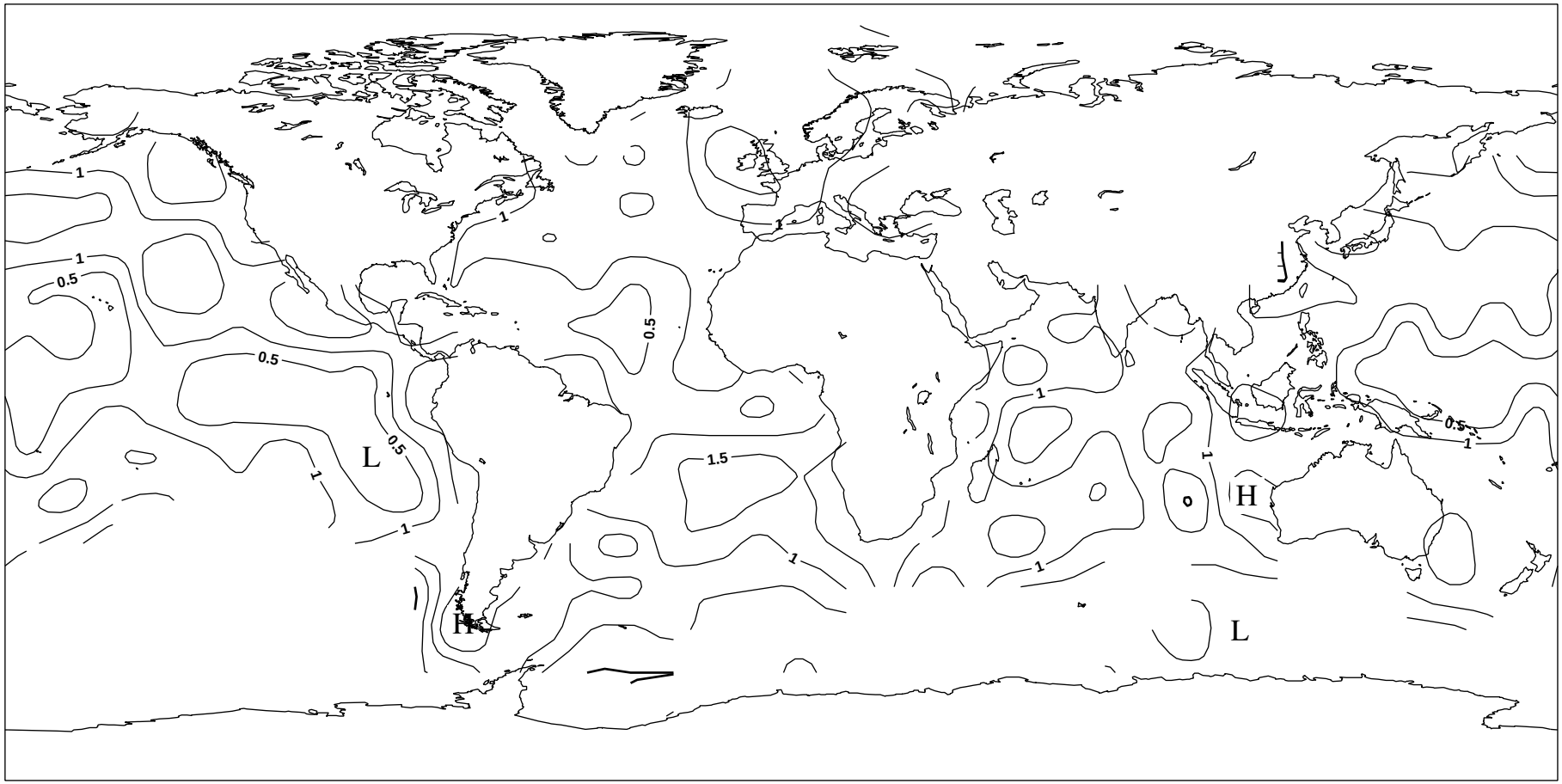


Figure 14:
Plot of the Number of Ship SST Observations. Date:- January - June 2012
Only observations passing quality control included