

Report on the Quality of Marine Surface Observations

Report Number 52

July to December 2014

REPORT ON THE QUALITY OF MARINE SURFACE OBSERVATIONS:

JULY TO DECEMBER 2014

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This report and other related documents can be found at the following URL:
<http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/Biannual/index.html>

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1. INTRODUCTION

In 1985, the WMO 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 responsibility 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 52 and covers the period July to December 2014. 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 devn of O-B ≥ 6.0 hPa
3. % of gross errors ≥ 25

Wind

1. | mean of O-B | $\geq 5.0\text{ms}^{-1}$ (Speed)
 $\geq 30^\circ$ (Directn)
2. standard devn of O-B $\geq 80^\circ$ (Directn)
3. % 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.

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 devn of O-B ≥ 5.0 hPa
3. % of gross errors ≥ 25

Wind

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

SST

1. | mean of O-B | ≥ 3.0 °C
2. standard devn of O-B ≥ 5.0 °C
3. % 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 sets 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, July to December 2014, 5740265 observations of pressure were monitored at Exeter from 2438 manual ships, 1031 drifting buoys, and 625 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 51 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 number of manual ships reporting seems to have stabilised over the last two years, following a slow decline; while the number of drifting buoys reporting has returned to the peak values seen 3-4 years ago, following a temporary dip in numbers.

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 40 (2005-2008). 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 through 2008-2011, with a decrease of ~25% from 2011 to 2013, but the numbers have increased again now to the 2011 value. Reports from drifting buoys now account for 57% of the total, while those from manual ships make up just 9% of the total, and those from automatic ships account for the remaining 34%. 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. From 1998 through to 2011 there was a fairly steady increase in the total number of pressure reports from automatic ships, but that increase seems to have slowed down recently.

A histogram of O-B differences for all ship pressure reports in the period July to December 2014 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 0.0 hPa and standard deviation 1.0 hPa. 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 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. 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 July to December 2014. 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

Many of the errors identified here can be attributed to a bias in the observed pressure. In some cases the bias is constant over most of the monitoring period; although some values depart greatly from the sample mean due to some gross errors in the observation. In fewer cases there are regular large random departures from background. Those observing platforms listed in Table 3 which appeared in report number 51 (January to June 2014) have been indicated with an asterisk.

Statistics for those marine observing platforms listed in report number 51 and which do not appear in Table 3b, are given in Table 4 along with comments on the quality of their pressure observations. Less than 40 reports were received in the 6-month period for two of these platforms, but the other 8 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 affect the measurement. (These factors do not apply to those ship observations where wind speed is based on visual estimates of the sea state.)

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 wind 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 July to December 2014, 2534432 wind observations were available for monitoring at the UK Met Office, from 2447 manual ships, 29 drifting buoys, and 623 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 0.3 ms^{-1} relative to the background and a direction bias of just -0.3° .

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 mostly between 1.5 and 2.5 ms^{-1} , with highest values in the extra-tropics and lowest values in the tropics. The |bias| is generally less than 1 ms^{-1} , but is around 2 ms^{-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 greater than 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 July to December 2014, 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. In the majority of the cases of suspect speed observations, a bias is evident. Errors in observations of direction are more random in nature, but many also show a bias. 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.

3.3 Sea-surface temperature

In the 6-month period July to December 2014, a total of 8341350 observations of SST were monitored at the Met Office, from 1926 manual ships, 1808 drifting buoys and 614 automatic ships. Of the total, 364307 were from manual ships, 6005587 from drifting buoys and 1971456 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 are more manual ships reporting SST than drifting buoys, but manual ships account for less than 5% of the total number of observations. This is due to the greater frequency of buoy and automatic ship observations, hourly in many cases, with manual ships tending to report only at the main synoptic hours when at sea.

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 85% of the observations is nearly Gaussian, with a bias of just 0.1°C relative to the background and a standard deviation of 0.8°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 mostly less than 0.3°C and the standard deviation varies from just 0.3°C in parts of the tropics to 1.8°C near some coasts.

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. 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 46 marine observing platforms listed as producing suspect observations of pressure over the period July to December 2014, 105 as producing suspect wind observations and 99 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 until 2012, since when they have dropped further. 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, although there are signs of some improvement in quality over the past few 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, 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 averaged about 70 for a few years, but has increased again recently.

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; although the number for this period is somewhat higher than the recent average.

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, JULY TO DECEMBER 2014.

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	320	329	172	5	6	9	14	15	14
2-10	309	311	246	7	1	9	15	17	14
11-20	134	131	122	2	0	5	3	3	3
21-40	231	236	209	3	1	3	6	4	12
41-100	467	475	392	5	0	12	12	17	11
101-200	446	448	372	11	0	22	22	20	19
201-500	383	385	301	26	2	63	23	28	24
501-1000	53	52	46	74	0	129	21	30	44
1001-1500	20	17	16	67	2	136	39	41	42
1500+	75	63	50	831	17	1420	470	448	431
Total	2438	2447	1926	1031	29	1808	625	623	614
(Report 51)	(2363)	(2372)	(1960)	(978)	(28)	(1796)	(649)	(623)	(590)

* 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
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

Continued >

Period	WMO report number	Number of Observations			
		Manual ships	Drifting buoys	Automatic ships	Total
Con					
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
Jul - Dec 2012	48	491700	2331570	1899860	4723130
Jan - Jun 2013	49	457038	1723955	1646432	3827425
Jul - Dec 2013	50	484885	2042223	1896909	4424017
Jan - Jun 2014	51	470934	2707428	1761547	4939909
Jul - Dec 2014	52	499050	3264416	1976799	5740265

TABLE 3: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT PRESSURE OBSERVATIONS OVER THE PERIOD JULY TO DECEMBER 2014.

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 2014)

Table 3a: Platforms reporting in BUOY code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
23991	1204	1159	3.0	-2.1	2	2	2	1	2	GE
25523	894	894			2	2	2	1	2	GE
25524	3995	2017	2.3	0.7	3	3	3	2	3	GE
26543 *	779	779			3	1	3	2	3	GE
47579	4371	1448	5.7	-2.0	3	3	3	4	3	SD + GE
48519	63	63			1	1	3	4	1	GE
48546	929	250	4.4	-2.1	1	1	1	1	1	GE
48548	931	423	4.7	-1.7	1	1	1	1	1	GE
48549	931	241	6.3	-0.4	1	1	1	1	1	SD + GE
48554	410	410			2	1	2	1	2	GE
48557	919	69	7.0	0.9	2	2	2	2	2	SD
48560	931	247	7.5	-3.1	2	2	2	2	2	SD + GE
48599	610	41	5.8	0.2	2	2	2	2	2	SD
51747	1507	4	4.1	8.0	2	2	2	1	2	Bias

Table 3b: Platforms reporting in SHIP code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
A8PQ4 *	53	0	2.2	-3.6	2	2	2	1	2	Bias
C6Z19	278	0	5.2	-0.4	2	2	1	1	2	SD
C6ZL6 *	80	0	5.5	3.4	2	2	1	1	2	SD
CFK9698	63	20	4.6	-5.4	2	2	1	1	2	Bias + GE
IBJD *	622	4	6.0	-3.7	3	2	3	1	3	Bias + SD
OYGA2	43	1	2.2	3.6	3	2	1	1	1	Bias
PJLL	123	0	5.6	0.7	2	2	1	1	2	SD
UASU *	3	3			2	2	1	1	2	GE
UBVF4 *	99	11	7.7	-1.7	1	2	1	1	1	SD
UBXS *	159	29	6.6	-7.8	2	2	2	1	1	Bias + SD
UCFH	145	24	5.7	-1.0	2	2	2	1	2	SD
UDKG *	28	13	4.9	-6.7	1	2	2	1	2	Bias + GE
UDYG *	117	117			1	2	2	1	2	GE
UFLT	129	2	4.9	4.5	2	2	2	1	2	Bias
V7CV8	514	15	8.4	-2.2	1	2	1	1	1	SD
V7JX5	428	22	6.2	-2.0	1	2	1	1	1	SD
V7PR8	200	29	7.6	0.7	2	2	2	1	1	SD
V7UT6 *	9	0	3.8	9.3	2	2	2	1	1	Bias
VCTV	40	32	5.0	5.3	2	2	2	1	1	Bias + GE
VDJB	68	24	2.8	0.0	2	2	2	1	2	GE
VDWC	121	13	3.8	-6.6	3	2	3	1	3	Bias
VRBH3	63	0	6.3	-3.4	3	2	3	1	3	SD
VRBI8	58	0	5.2	-0.1	3	2	3	1	3	SD
VRCE5	112	4	5.2	-1.1	1	2	3	1	3	SD
VREP3	128	0	5.9	1.5	1	2	3	1	3	SD
VRGT2	118	25	8.1	6.7	3	2	3	1	3	Bias + SD
VRIM5	100	0	3.3	4.9	1	1	1	1	1	Bias
VRLL2	154	16	7.1	5.7	1	1	1	1	1	Bias + SD
WCX7445 *	2919	458	5.4	-0.5	1	1	1	1	1	SD
WCX9104	51	0	6.0	5.1	1	1	1	1	1	Bias + SD
WDD2876	1100	297	2.1	-0.2	1	1	1	1	1	GE
WGEB	76	0	2.1	-3.8	1	1	1	1	1	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 2014.

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	Comment
31262	3011	708	0.6	0.7	Reduced Bias/SD/GE
3FOC5	1	0	0.0	-0.5	Less than 40 reports
62087	1653	3	0.4	-0.3	Reduced Bias/SD/GE
UCTS	37	0	1.6	2.2	Less than 40 reports
VRHE3	450	3	3.5	-0.6	Reduced Bias/SD/GE
VRKX8	258	0	1.9	-1.6	Reduced Bias/SD/GE
VRWS5	129	0	3.2	-0.3	Reduced Bias/SD/GE
WDE3569	203	1	2.4	0.5	Reduced Bias/SD/GE
WDE8264	152	4	2.8	0.6	Reduced Bias/SD/GE
WWMZ	82	0	3.1	-2.9	Reduced Bias/SD/GE

TABLE 5: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT WIND SPEED OBSERVATIONS OVER THE PERIOD JULY TO DECEMBER 2014.

- 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 (January to June 2014)

Table 5a: Platforms reporting in BUOY code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments

Table 5b: Platforms reporting in SHIP code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
31053 *	3995	6	4.9	-5.8	4	4	4	4	4	Bias
53057	1857	1	2.3	-5.1	3	1	1	2	3	Bias
9MCD3	61	0	6.5	4.4	1	1	1	2	1	SD
AMOUK45	102	32	2.3	-0.7	1	1	1	2	1	GE
SYSV *	16	1	4.0	9.7	1	1	1	2	1	Bias
V77E5	58	0	2.7	5.1	1	1	1	2	1	Bias
WTER	102	38	4.1	1.0	1	1	1	2	1	GE

TABLE 6: LIST OF PLATFORMS REPORTING IN SHIP CODE NOT APPEARING IN TABLE 5 BUT LISTED AS SUSPECT OVER THE PERIOD JANUARY TO JUNE 2014.

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	Comment
62087	521	0	3.2	-2.8	Reduced Bias/SD/GE
CGCX	2673	0	2.9	-1.9	Reduced Bias/SD/GE
UDKG	28	0	2.2	1.3	Less than 40 reports

TABLE 7: LIST OF MARINE OBSERVING PLATFORMS PRODUCING SUSPECT WIND DIRECTION OBSERVATIONS OVER THE PERIOD JULY TO DECEMBER 2014 .

- 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 5ms^{-1} . If no significant speed bias was present, the statistics and plots refer to direction reports with an observed speed greater than 5ms^{-1} .
 3. Observing platforms marked with an asterisk were listed in the previous report (January to June 2014)

Table 7a: Platforms reporting in BUOY code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
48597 *	2677	1	39	-31.2	3	3	2	2	1	Bias
48598 *	3076	62	58.1	76.6	6	3	2	2	1	Bias
48783	1155	11	78.7	-44.9	3	3	2	2	1	Bias + SD
48784	1246	0	60.4	-117.3	2	3	2	2	1	Bias + SD

Table 7b: Platforms reporting in SHIP code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments	
23098	753	0	50.7	-79.0	5	2	6	5	1	Bias	
23170	*	84	0	116.6	-105.5	5	2	1	5	1	Bias + SD
23451	1037	0	78.2	30.2	3	3	3	3	1	Bias + SD	
23492	*	1056	0	45.1	54.4	4	3	6	5	1	Bias
23494	952	0	67.7	-25.4	1	1	4	2	1	SD	
31051	*	936	17	118.2	35.3	4	4	5	4	1	Bias + SD
31053	1007	6	66.7	-68.7	2	2	2	2	1	Bias + SD	
31374	966	0	63.2	23.9	1	1	2	1	1	SD	
31375	2366	0	41.4	52.0	2	2	6	2	1	Bias	
3FPQ9	102	0	45.0	-30.2	2	2	6	2	1	Bias	
42394	1207	0	36.1	42.3	2	2	2	2	1	Bias	
45161	903	0	36.1	-53.3	1	1	3	1	1	Bias	
45162	1309	0	44.6	-58.4	3	3	3	3	1	Bias	
45164	406	0	64.8	-2.2	2	2	2	3	1	SD	
45168	7210	0	33.0	-32.0	3	3	2	2	1	Bias	
46053	2912	0	46.1	-30.9	3	3	2	2	1	Bias	
53005	*	155	0	38.9	-65.3	1	1	1	1	1	Bias
53040	*	1854	18	162.2	-28.5	4	2	4	3	1	SD
53056	*	900	0	157.0	12.8	2	2	2	2	1	SD
9HJB9	1057	6	62.2	-2.9	2	2	2	2	1	SD	
9V8208	125	0	50.6	-35.0	1	2	1	2	1	Bias	
9V9144	*	14	0	48.5	34.5	1	2	1	2	1	Bias
9V9746	*	146	0	66.5	-5.4	1	2	1	2	1	SD
9VAX2	*	85	0	60.8	-18.6	1	2	1	2	1	SD
9VHG	231	0	63.5	-9.4	1	2	1	2	1	SD	
A8CF3	73	0	50.1	-35.7	1	2	1	2	1	Bias	
A8IP2	243	4	79.4	12.1	1	2	2	2	1	SD	
A8PX5	*	60	0	113.3	-15.7	1	2	1	1	1	SD
A8SC4	*	3	0	21.8	-78.3	1	2	1	1	1	Bias
ASES01	428	0	70.9	4.7	1	2	3	1	1	SD	
BATFR01	344	0	65.5	-1.8	1	2	1	1	1	SD	
C6AV5	142	1	76.4	-5.7	1	2	1	1	1	SD	
C6CL6	721	19	85.2	-8.5	4	2	5	1	1	SD	
C6CU6	132	1	64.1	-29.1	1	2	1	1	1	SD	
C6HS4	65	0	61.0	2.9	1	2	1	1	1	SD	
C6NI8	101	0	85.6	20.4	1	2	1	1	1	SD	
C6XP7	230	0	73.4	9.1	1	2	1	1	1	SD	
C6ZL6	85	0	63.2	-11.6	1	2	1	1	1	SD	
CG2522	1377	0	96.1	-21.2	2	2	1	1	1	SD	
CZ3695	1223	0	29.8	-91.4	2	2	3	1	1	Bias	
DVRF	*	241	0	50.0	-66.1	2	2	1	1	1	Bias
ELLP9	123	0	78.2	17.0	2	2	1	1	1	SD	
ELXX8	227	0	69.0	4.7	2	2	1	1	1	SD	
IBNY	203	2	67.2	1.3	2	2	1	1	1	SD	
J8AZ2	581	1	68.3	-27.2	2	2	2	1	1	SD	
J8NW	*	77	0	64.2	-11.8	2	2	2	1	1	SD
J8NX	179	0	60.4	-27.6	2	2	2	1	1	SD	
J8NY	*	180	0	58.7	-34.9	2	2	2	1	1	Bias
Continued >											

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
> Continuec										
J8NZ	127	0	95.2	34.9	2	2	1	1	1	Bias + SD
J8PD *	192	0	46.2	-73.1	2	2	1	1	1	Bias
J8PE4 *	213	0	44.9	-49.6	1	2	1	1	1	Bias
LAVW4 *	6	0	43.1	34.4	1	2	1	1	1	Bias
MGRX2	224	0	37.3	-33.0	3	2	1	1	1	Bias
MHNN5 *	265	3	64.1	-8.5	3	2	1	1	1	SD
MYRF	111	0	64.1	-53.5	1	2	2	1	1	Bias + SD
MYSU5 *	207	0	65.2	-5.3	1	2	2	1	1	SD
N8Z001	51	0	64.9	-3.4	1	2	2	1	1	SD
ONDE	151	2	78.4	-26.1	1	2	1	1	1	SD
ONGA	301	0	65.7	-19.4	1	2	1	1	1	SD
OXBB2 *	168	3	60.2	20.6	1	2	1	1	1	SD
OZDB2	265	2	72.5	-8.4	1	2	3	1	1	SD
OZGQ2	294	3	65.9	4.7	1	2	1	1	1	SD
PJRH	119	1	63.8	4.5	1	2	1	1	1	SD
S6ES6 *	1505	0	71.0	16.0	1	2	1	1	1	SD
S6NK2	107	0	60.6	-7.7	1	2	1	1	1	SD
TBWUK31	68	1	68.8	-2.2	1	2	1	1	1	SD
TBWUK47 *	298	0	56.8	31.0	2	2	3	1	1	Bias
UCFH	127	0	97.9	-4.4	1	2	2	1	1	SD
V7JX5	434	1	68.7	1.5	1	2	2	1	1	SD
V7OL2	105	0	61.7	20.8	1	2	2	1	1	SD
V7ZZ5	61	0	66.4	-10.7	1	2	2	1	1	SD
VRBH6	173	2	67.0	-19.3	1	2	1	1	1	SD
VRBQ2 *	137	0	64.5	6.6	1	2	1	1	1	SD
VRCC8	86	0	64.1	-21.4	1	2	1	1	1	SD
VRCP2	73	0	61.1	-21.3	1	2	1	1	1	SD
VRDB3	136	1	94.3	11.2	1	2	2	1	1	SD
VRDW2	190	1	74.9	-12.7	1	2	2	1	1	SD
VRGO6	113	0	63.7	-0.9	1	2	1	1	1	SD
VRIA3	124	0	60.1	9.6	1	2	1	1	1	SD
VRJC9	297	2	61.6	1.6	1	2	1	1	1	SD
VRJM7	151	0	61.0	22.9	1	2	1	1	1	SD
VRJQ4	79	1	64.5	-1.8	1	2	1	1	1	SD
VRKK2	123	0	77.5	6.1	1	2	1	1	1	SD
VRWM2	926	0	64.8	1.5	1	2	1	1	1	SD
VRWY9 *	461	0	64.0	-5.7	1	2	1	1	1	SD
WBM5092	88	0	54.7	-42.1	1	2	1	1	1	Bias
WBP3210 *	1762	1	68.6	-2.3	1	2	1	1	1	SD
WCX7445 *	2910	16	79.9	4.6	1	2	6	1	1	SD
WCX9106 *	219	0	57.4	-44.5	1	2	2	1	1	Bias
WDA5598	78	0	64.3	-16.7	1	2	2	1	1	SD
WDD9278	90	0	70.8	9.8	1	2	2	1	1	SD
WDE7904	78	0	46.7	-31.7	1	2	2	1	1	Bias
WDF6832	201	0	77.7	-2.2	2	2	2	1	1	SD
WTEF *	751	0	78.8	5.8	1	2	1	1	1	SD
ZCDD6	115	1	66.2	-3.4	1	2	1	1	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 2014.

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 (°)

Identifiant	N Obs	NGE	SD	Bias	Comment
23002	1383	0	51.2	-10.5	Reduced Bias/SD/GE
31260	2491	0	34.5	-7.2	Reduced Bias/SD/GE
3FFL8	308	0	55.1	-19.9	Reduced Bias/SD/GE
3FTO6	35	0	17.0	-4.7	Less than 40 reports
3FZO8	107	0	42.6	-23.1	Reduced Bias/SD/GE
45022	4309	0	47.9	-10.0	Reduced Bias/SD/GE
45027	5747	0	37.0	-18.2	Reduced Bias/SD/GE
45136	2961	0	32.2	3.4	Reduced Bias/SD/GE
45166	2969	0	31.0	26.3	Reduced Bias/SD/GE
46131	3898	0	17.7	1.4	Reduced Bias/SD/GE
4XFV	166	0	33.2	3.9	Reduced Bias/SD/GE
53057	43	1	0.0	0.0	Reduced Bias/SD/GE
62086	316	0	29.4	-6.8	Reduced Bias/SD/GE
9HJC9	619	0	55.0	-5.6	Reduced Bias/SD/GE
9KWH	108	0	43.8	-6.0	Reduced Bias/SD/GE
9VKQ2	31	0	41.7	7.0	Less than 40 reports
A8HO3	89	0	48.9	4.8	Reduced Bias/SD/GE
A8NF2	69	0	47.7	-11.8	Reduced Bias/SD/GE
A8PQ7	179	0	52.8	-4.5	Reduced Bias/SD/GE
A8RW5	27	0	54.6	24.6	Less than 40 reports
A8VG3	104	0	52.4	-17.8	Reduced Bias/SD/GE
C6AB8	225	1	57.9	-5.9	Reduced Bias/SD/GE
C6QK	20	0	38.4	12.9	Less than 40 reports
CGCX	2634	0	37.0	-7.4	Reduced Bias/SD/GE
DDSC2	362	0	48.2	-2.1	Reduced Bias/SD/GE
H3VR	52	0	46.1	-20.5	Reduced Bias/SD/GE
J8PB	135	0	43.5	16.2	Reduced Bias/SD/GE
KCDK	107	0	59.8	-1.6	Reduced Bias/SD/GE
LAQJ7	322	0	35.5	-3.7	Reduced Bias/SD/GE
MMER9	256	0	34.4	-11.1	Reduced Bias/SD/GE
MVQP8	68	0	53.5	7.6	Reduced Bias/SD/GE
ONFI	150	0	36.7	-11.0	Reduced Bias/SD/GE
PCCL	202	0	49.5	6.6	Reduced Bias/SD/GE
PENR	283	0	52.1	-7.4	Reduced Bias/SD/GE
UBBH5	62	0	57.9	11.0	Reduced Bias/SD/GE
UDYG	111	0	33.4	5.6	Reduced Bias/SD/GE
UFLC	15	0	9.2	-5.9	Less than 40 reports
UFLT	127	0	56.9	-12.8	Reduced Bias/SD/GE
UISD	138	1	45.8	7.8	Reduced Bias/SD/GE
V7AT9	38	0	48.6	17.2	Less than 40 reports
V7UT8	170	0	33.5	16.7	Reduced Bias/SD/GE

Continued >

> Continue						
VRQ2	107	0	59.1	-23.6	Reduced Bias/SD/GE	
VREF5	101	1	40.6	-5.5	Reduced Bias/SD/GE	
VRFI2	187	0	39.2	24.6	Reduced Bias/SD/GE	
VRGN7	384	0	46.3	-11.7	Reduced Bias/SD/GE	
VRGO2	103	0	46.7	8.3	Reduced Bias/SD/GE	
VRKC8	17	0	23.4	-27.5	Less than 40 reports	
VRWS4	51	0	34.4	-3.5	Reduced Bias/SD/GE	
VRZZ2	9	0	45.4	18.2	Less than 40 reports	
WBN4113	367	0	46.6	-28.0	Reduced Bias/SD/GE	
WDE8264	157	0	49.2	12.7	Reduced Bias/SD/GE	

TABLE 9: LIST OF MARINE OBSERVING PLATFORMS REPORTING SUSPECT SEA SURFACE TEMPERATURE OBSERVATIONS OVER THE PERIOD JULY TO DECEMBER 2014.

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 (January to June 2014)

Table 9a: Platforms reporting in BUOY code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
13595	74	74			1	1	1	2	1	GE
13668	49	49			1	1	1	2	1	GE
14905	722	464	0.6	-0.2	2	1	2	2	2	GE
15639	176	176			1	1	2	2	1	GE
25524	4136	2969	3.8	3.6	6	1	6	2	6	Bias + GE
25534	2320	1764	3.1	-5.5	3	1	3	2	2	Bias + GE
25535	2320	1877	3.0	-5.2	4	1	2	2	2	Bias + GE
25540	2321	1912	2.8	-5.6	4	1	3	2	2	Bias + GE
25575	2320	198	2.1	-5.0	3	1	1	2	3	Bias
25605 *	694	20	1.9	3.2	1	1	1	2	3	Bias
25616	2991	783	4.3	-0.9	3	1	1	2	3	GE
25617	2362	598	3.7	-4.2	2	1	2	2	3	Bias + GE
25620	2114	1361	3.3	-4.5	3	1	2	2	1	Bias + GE
32627 *	235	0	0.3	9.3	2	1	2	2	2	Bias
41602	1715	867	0.3	0.1	2	1	2	2	2	GE
41605	359	359			1	1	1	2	1	GE
41615	675	397	0.3	0.0	1	1	1	2	1	GE
41651 *	5243	5222	4.5	-1.0	5	1	1	2	5	GE
41678	4423	1307	0.4	0.0	2	1	2	2	2	GE
41684	369	289	0.2	-0.1	1	1	1	2	1	GE
41685	1611	747	0.4	0.1	2	1	2	2	2	GE
41687	1622	868	0.6	-0.1	2	1	2	2	2	GE
41691	3267	845	0.5	0.1	2	1	2	2	2	GE
41697	2283	590	0.4	0.0	1	1	1	2	1	GE
41698	1936	692	0.5	0.0	1	1	1	2	1	GE
41701	3206	984	0.5	0.1	2	1	2	2	2	GE
41714	4447	1514	0.6	0.1	2	1	2	2	2	GE
47503	2321	1676	2.3	-7.0	4	1	2	2	4	Bias + GE
48564	4365	1095	2.7	-1.4	3	1	2	2	2	GE
48617	2547	1237	2.5	-4.7	3	1	2	2	4	Bias + GE
48627	1691	1083	2.4	-6.7	4	1	2	2	3	Bias + GE
48731	890	890			2	1	2	2	2	GE
48776	773	0	2.6	-4.8	3	1	1	2	3	Bias
48777	713	0	2.2	-4.8	2	1	1	2	1	Bias
51673	209	209			1	1	1	2	1	GE
52913	168	131	2.2	-5.4	2	1	2	2	2	Bias + GE
54552	170	170			2	1	2	2	2	GE
63921	2520	1076	2.9	-4.2	3	1	1	2	4	Bias + GE
63922	2537	1280	2.7	-4.7	3	1	1	2	3	Bias + GE
64532	2321	906	3.0	-5.1	4	1	2	2	3	Bias + GE
64533	2319	1403	1.8	-6.2	4	1	2	2	4	Bias + GE
64534	2323	538	2.6	-5.7	4	1	2	2	4	Bias
64535	2319	1855	2.3	-7.2	4	1	2	2	3	Bias + GE
64725	1216	152	2.9	3.4	1	1	2	2	1	Bias

Table9b: Platforms reporting in SHIP code

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments	
45025	828	24	1.9	4.4	2	1	2	2	2	Bias	
48021	1171	143	3.5	4.3	2	1	2	2	2	Bias	
9V2165	143	2	2.5	-3.5	3	1	3	2	2	Bias	
9V2873	45	2	2.7	4.8	1	1	1	2	1	Bias	
9V7951	55	17	3.2	-0.3	1	1	1	2	1	GE	
9V8779	175	21	3.1	-4.3	4	1	1	2	2	Bias	
9V8798	*	196	1	1.5	6.1	5	1	5	2	5	Bias
9V9374	53	2	2.1	-5.6	1	1	1	2	1	Bias	
A8IX8	56	0	0.6	-3.7	1	1	1	2	1	Bias	
A8JZ4	85	6	3.3	-4.8	2	1	1	2	1	Bias	
A8MW8	*	69	0	0.8	3.3	2	1	2	2	1	Bias
A8OH4	68	0	1.7	3.1	2	1	2	2	1	Bias	
A8SC4	*	3	0	0.4	-3.1	2	1	2	2	1	Bias
C6OM8	44	0	3.1	-3.3	2	1	2	2	1	Bias	
C6RM7	*	21	0	1.1	-3.5	2	1	2	2	1	Bias
C6VV8	406	0	1.9	-3.1	3	1	3	2	1	Bias	
CFN5517	42	0	4.1	-4.5	3	1	3	2	1	Bias	
CFO383	*	1337	1337		3	1	1	2	3	GE	
CQIU	*	194	1	1	3.3	3	1	3	2	1	Bias
IBNY	114	1	2.8	-4.3	3	1	2	2	2	Bias	
ICIC	*	134	4	3.5	-3.7	3	1	2	2	1	Bias
J8NX	151	3	1.8	-3.8	4	1	3	2	2	Bias	
J8QB8	170	59	2.1	1.3	2	1	3	2	2	GE	
KGTZ	*	232	62	0.7	0.4	3	1	3	2	2	GE
LF3F	*	1385	834	0.6	-9.1	6	1	6	2	6	Bias + GE
MVQP8	52	0	2.4	-3.4	1	1	1	2	1	Bias	
ONDE	146	3	2.4	-4.1	3	1	3	2	3	Bias	
ONEQ	134	11	1.9	-6.2	2	1	2	2	3	Bias	
PJLL	129	40	2.6	-1.1	3	1	2	2	3	GE	
SYQO	51	0	0.9	4.4	1	1	1	2	3	Bias	
UCTS	*	37	37		1	1	1	2	1	GE	
V2CN5	136	1	2.2	-4.1	3	1	2	2	2	Bias	
V7JX5	428	4	3.1	3.2	3	1	3	2	1	Bias	
V7OE5	89	0	1.4	3.6	1	1	1	2	1	Bias	
V7SG8	44	0	2.2	3.5	2	1	1	2	1	Bias	
V7YW3	205	118	3.3	-2.4	1	1	1	2	1	GE	
VCRG	*	1081	0	0.9	5.4	5	1	8	2	5	Bias
VMGO	148	1	1.5	-3.3	3	1	2	2	5	Bias	
VRBH6	138	0	3	-4.1	3	1	3	2	1	Bias	
VRCY6	111	0	1.3	-4.2	4	1	3	2	2	Bias	
VRDY5	345	0	1.1	4.1	4	1	3	2	2	Bias	
VRFX6	95	0	1	3.2	1	1	1	2	2	Bias	
VRGG6	114	0	1.1	-3.5	2	1	1	2	2	Bias	
Continued >											

Identifier	N Obs	NGE	SD	Bias	B	E	F	T	W	Comments
> Continued										
VRGI8	241	0	1.3	4.1	5	1	2	2	2	Bias
VRHD8	117	0	2	4	3	1	2	2	2	Bias
VRIZ5	157	0	1.1	3.1	3	1	2	2	2	Bias
VRLX5	53	0	2.4	-3.2	3	1	2	2	2	Bias
WCF3012 *	3349	3342	3.9	4.1	6	1	2	2	6	Bias + GE
WDE9193 *	164	91	1.2	-0.5	4	1	2	2	4	GE
WDF3296 *	24	0	3.8	3.5	4	1	2	2	4	Bias
WL3108 *	3401	3401			6	1	2	2	6	GE
WSLH	213	0	1.5	-3.7	6	1	6	2	1	Bias
WZD2465	47	0	2.6	-3.2	6	1	6	2	1	Bias
WZJD *	485	0	0.7	-3.1	4	1	4	2	1	Bias
ZCDH7	75	0	1.4	3.7	2	1	1	2	1	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 2014.

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	Comment
45027	5813	0	1.3	-0.2	Reduced Bias/SD/GE
45166	727	0	1.1	-0.3	Reduced Bias/SD/GE
AUTV	59	0	1.4	0.8	Reduced Bias/SD/GE
BATFR12	310	0	0.2	0.8	Reduced Bias/SD/GE
C6FY8	9	2	0.5	0.5	Less than 40 reports
C6YZ5	233	0	2.1	-0.7	Reduced Bias/SD/GE
DCCM2	5	0	0.6	2.8	Less than 40 reports
DGTX	145	0	1.2	2.5	Reduced Bias/SD/GE
HO7723	15	0	0.5	-1.0	Less than 40 reports
J8PB	123	2	1.8	0.7	Reduced Bias/SD/GE
TBWUK69	301	0	3.2	2.0	Reduced Bias/SD/GE
UBSF2	61	0	2.9	1.7	Reduced Bias/SD/GE
UDKG	26	0	1.9	-2.7	Less than 40 reports
V2OB9	19	0	1.2	1.0	Less than 40 reports
VREO9	100	1	2.2	2.2	Reduced Bias/SD/GE
VYNG	95	4	3.9	0.3	Reduced Bias/SD/GE
WOSI	80	0	1.8	2.0	Reduced Bias/SD/GE
WZZF	196	0	1.0	-0.1	Reduced Bias/SD/GE

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

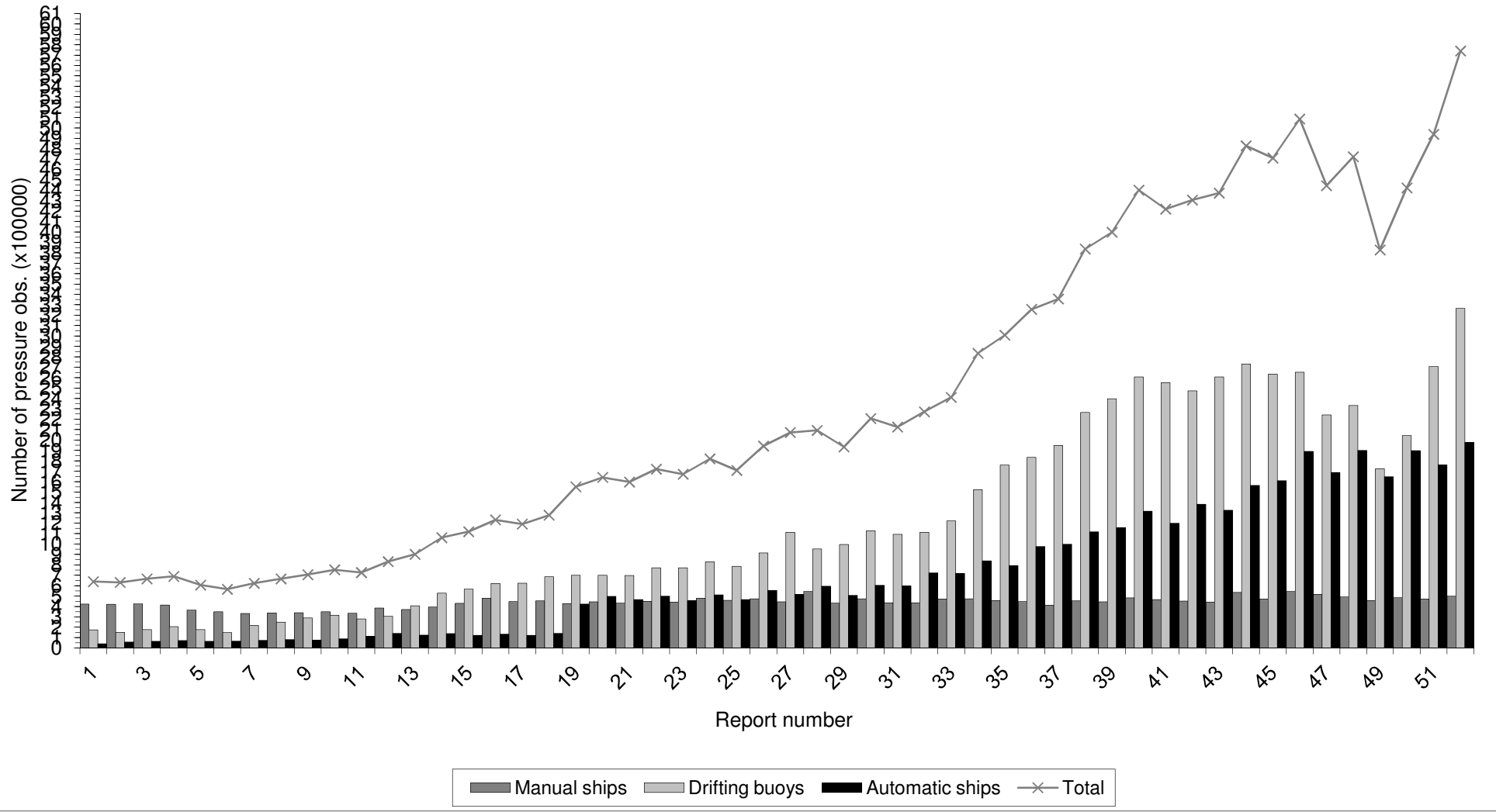


Figure 2. Distribution of ship O-B values for Jul-Dec 2014

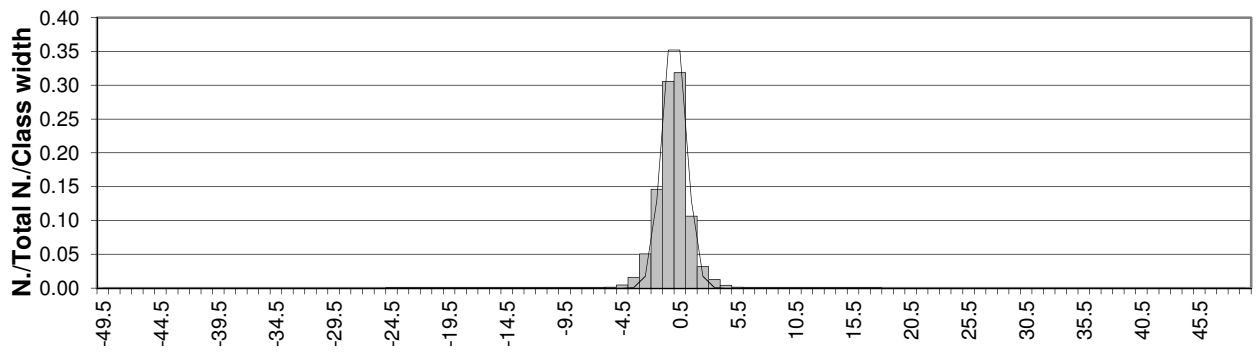
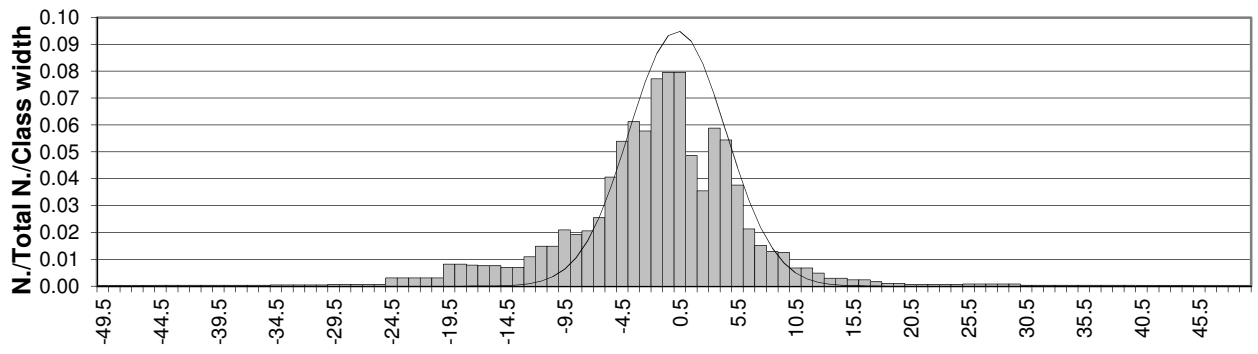
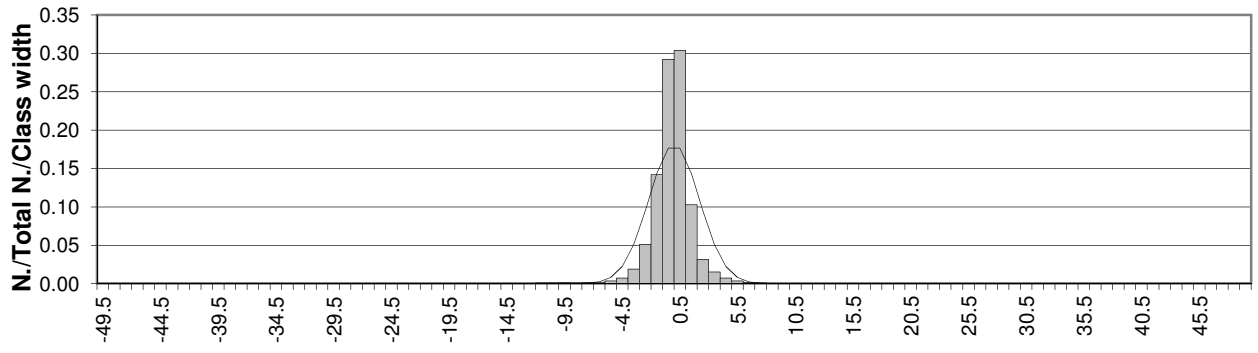
Figs 2a-c : Pmsl (hPa)

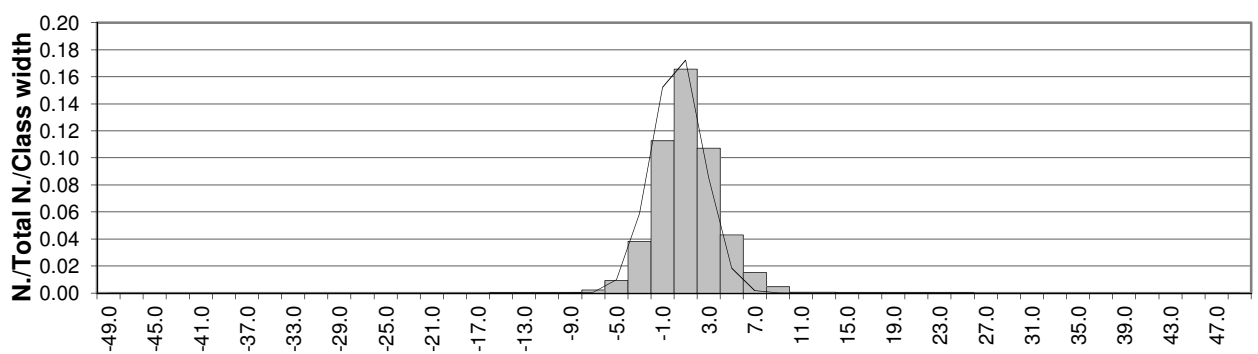
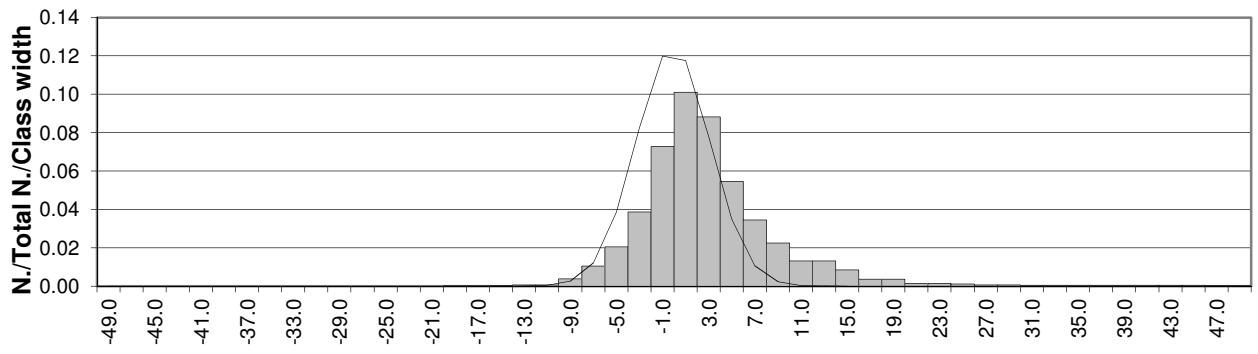
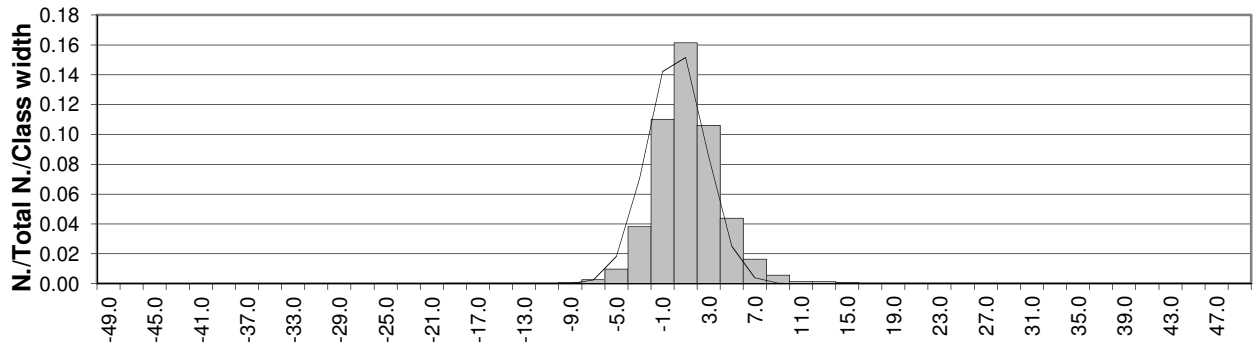
Figs 2d-f : Wind Speed (m/s)

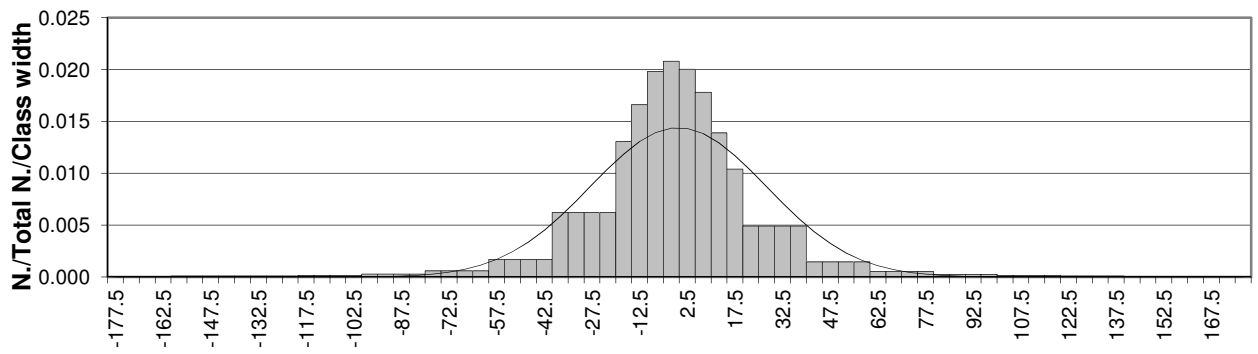
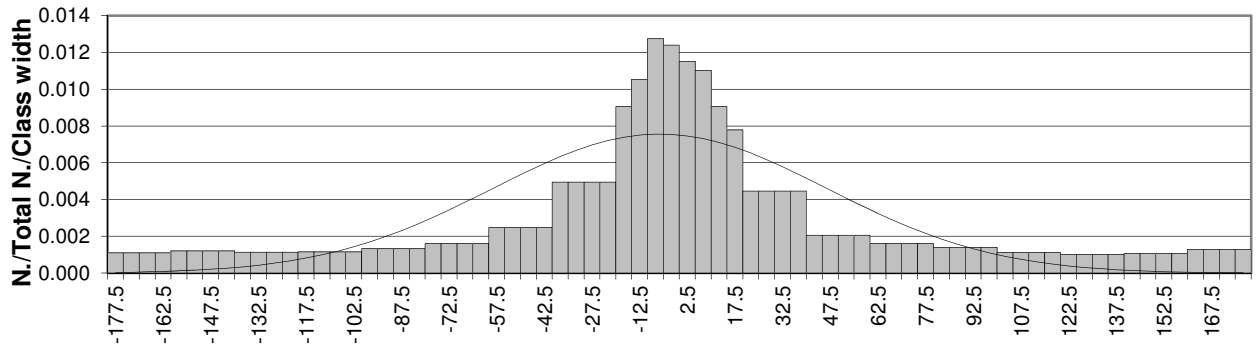
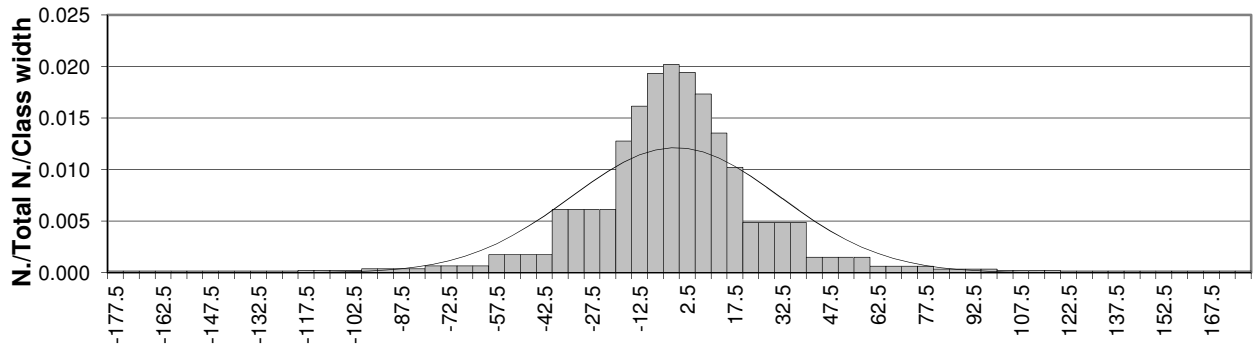
Figs 2g-i : Wind Direction (degrees)

Figs 2j-l : SST (deg C)

(for **All**, **Flagged** and **Unflagged** observations, respectively)







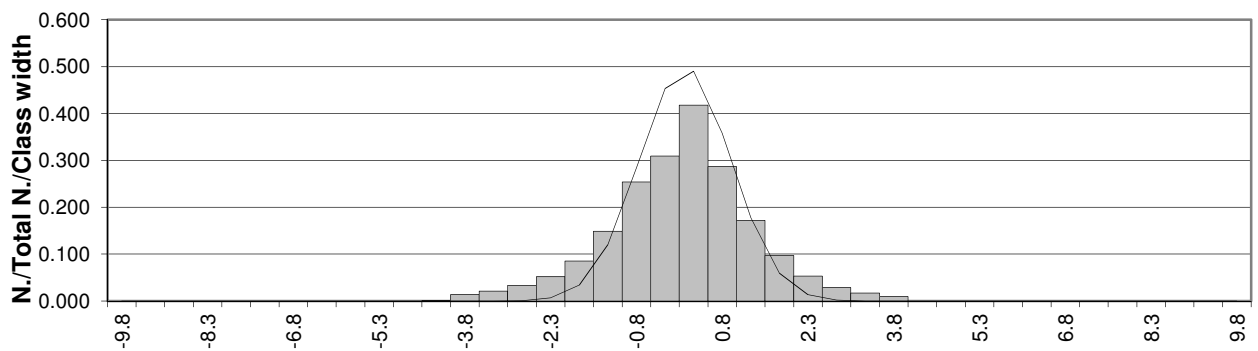
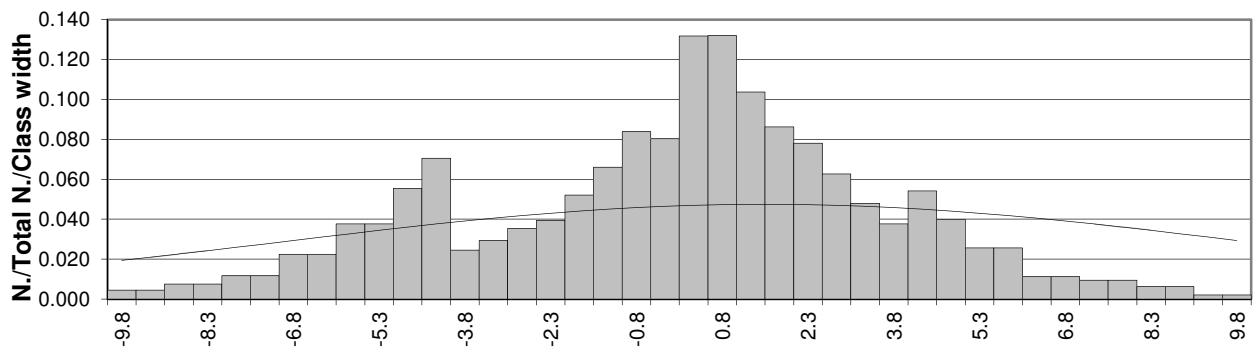
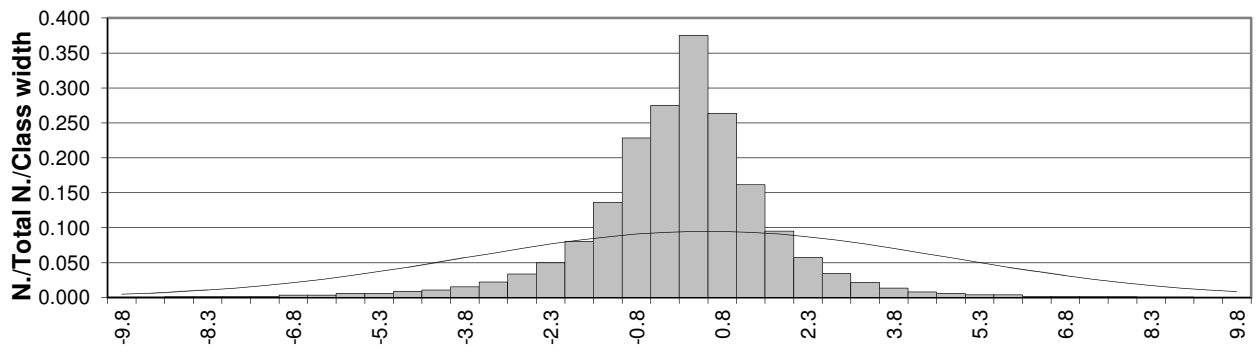


Figure 4: Standard Deviation of Ship O-B Pressure (hPa). Date:- July - December 2014
 Only Observations passing quality control used in statistics
 10 degree box values plotted if the number of observations is greater than 10

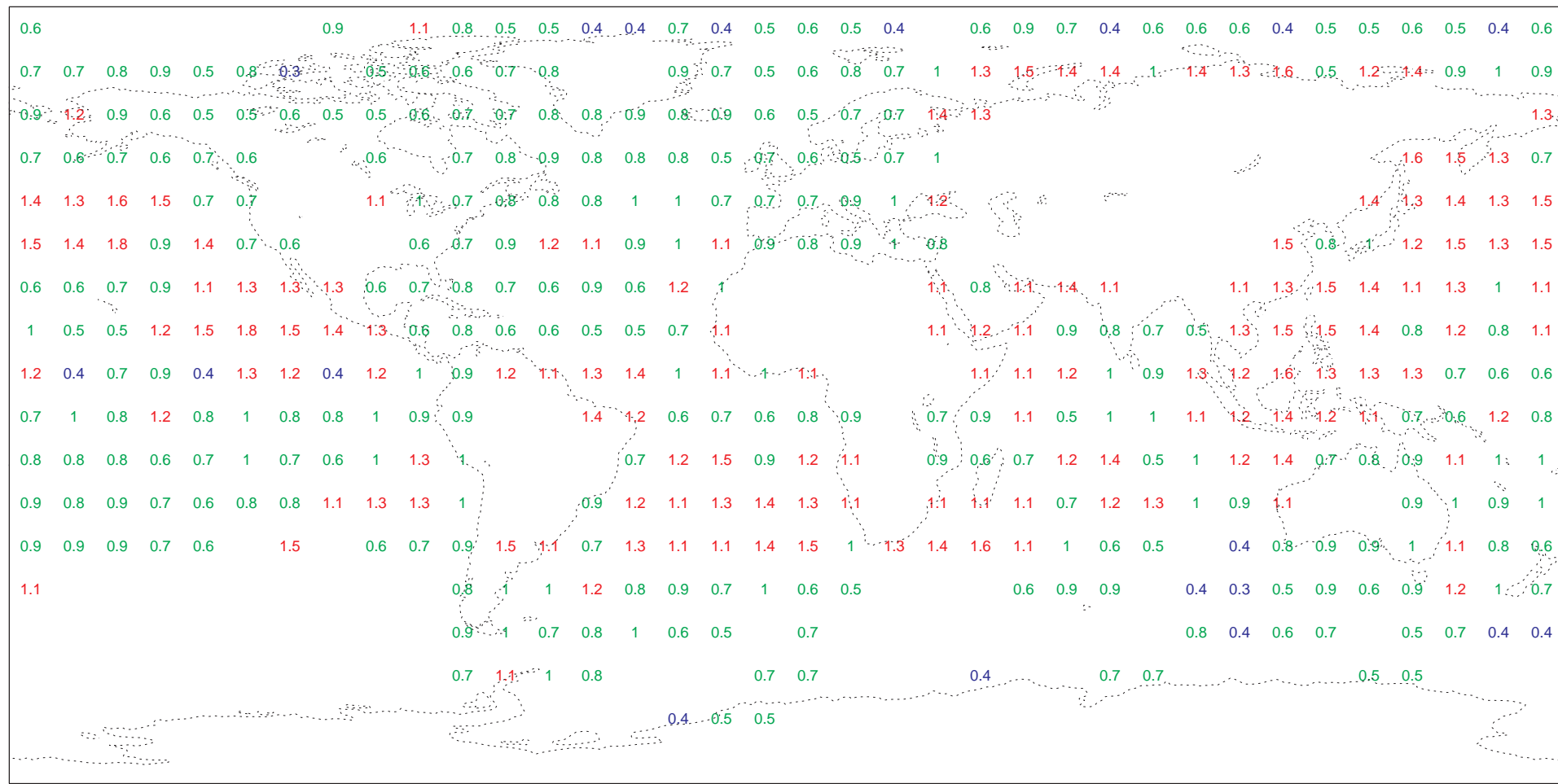


Figure 5:
 Plot of the Number of Ship Pressure Observations. Date:- July - December 2014
 Only observations passing quality control included

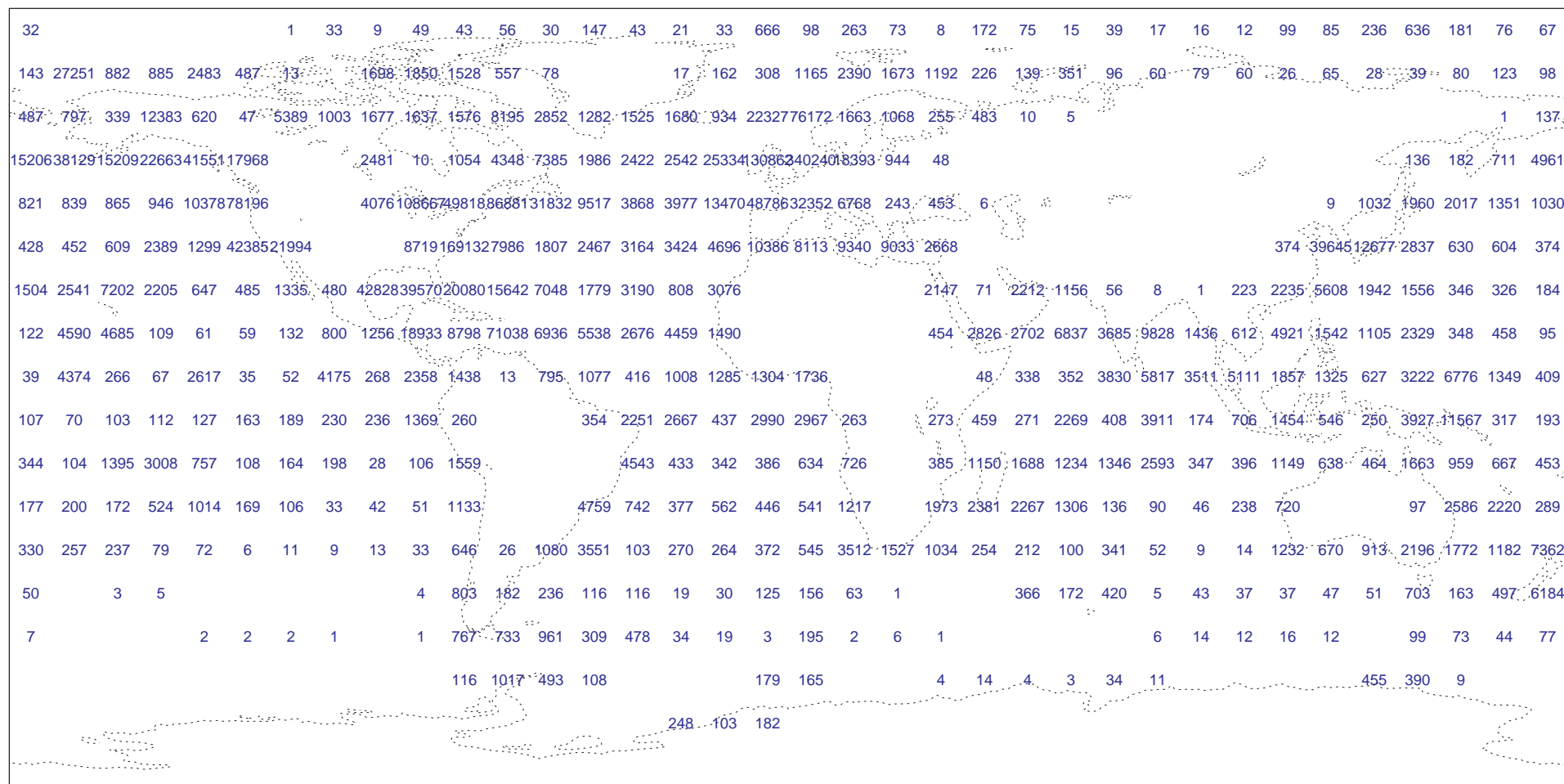


Figure 8:
 Plot of the Number of Ship Wind Speed Observations. Date:- July - December 2014
 Only observations passing quality control included

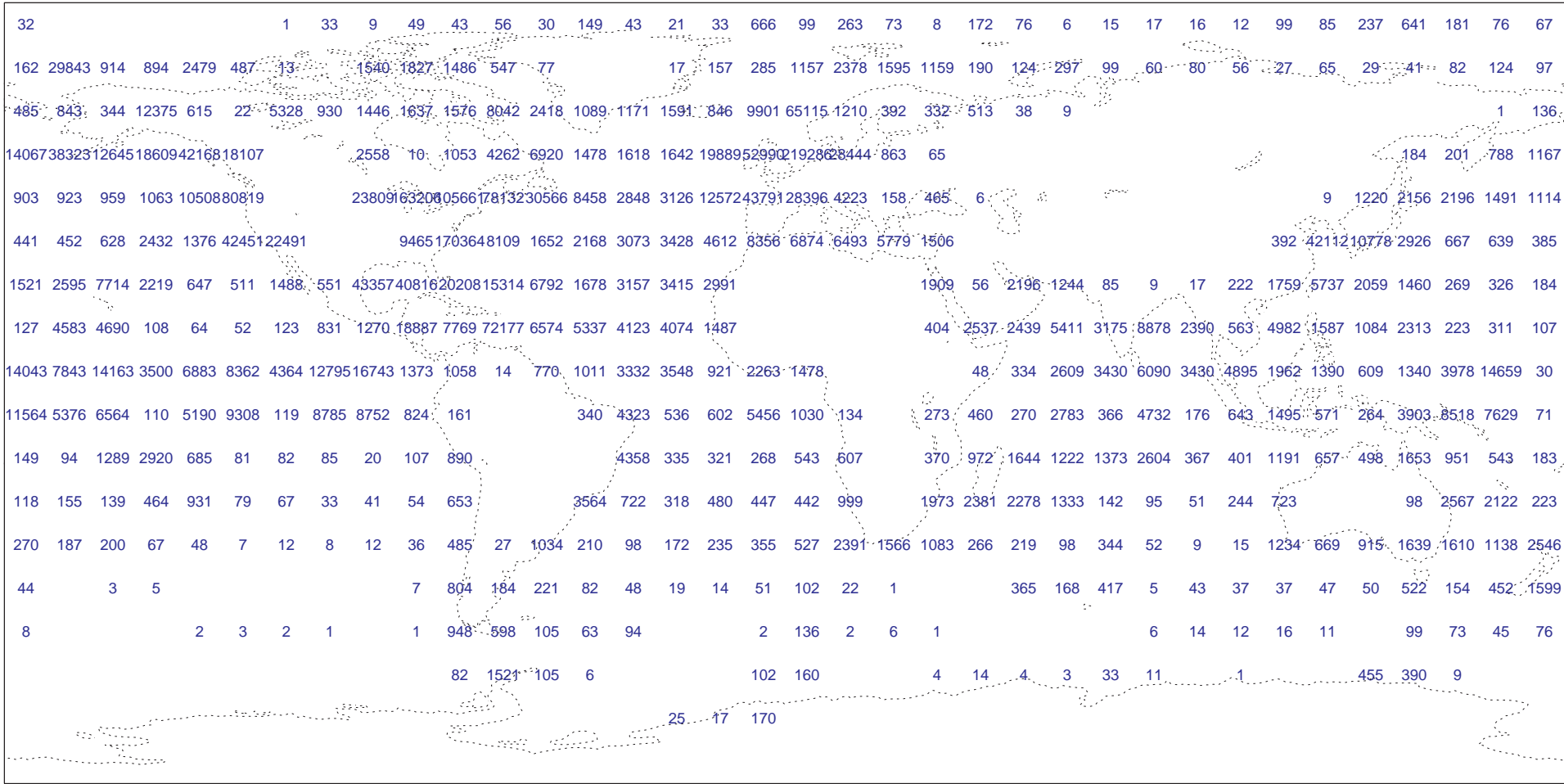


Figure 10: Standard Deviation of Ship O-B Wind Direction (degrees). Date:- July - December 2014
 Only Observations passing quality control used in statistics
 10 degree box values plotted if the number of observations is greater than 10

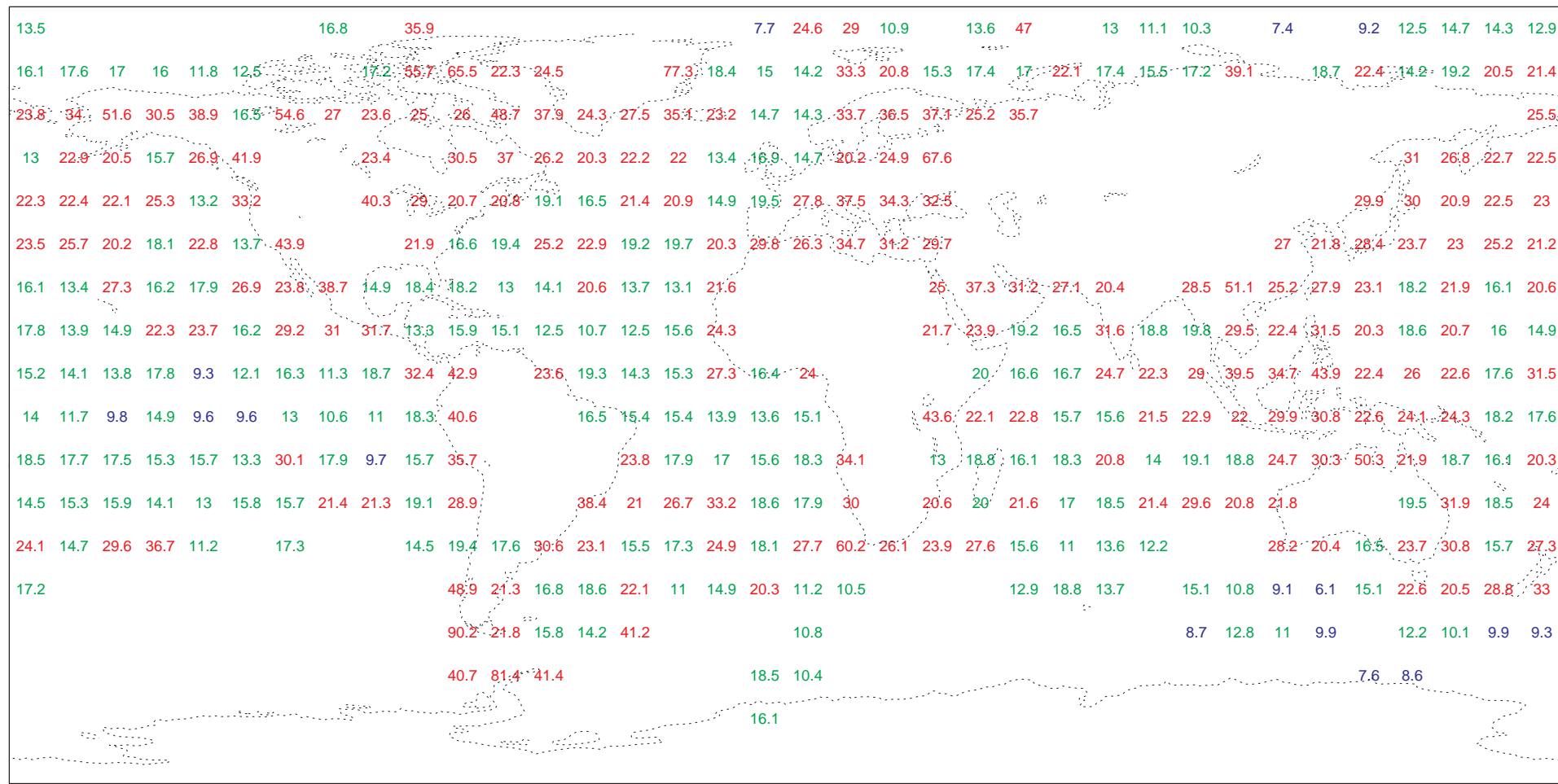


Figure 13: Standard Deviation of Ship O-B SST (degrees C). Date:- July - December 2014
Only Observations passing quality control used in statistics
10 degree box values plotted if the number of observations is greater than 10

