

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC  
COMMISSION (OF UNESCO)

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JOINT WMO/IOC TECHNICAL COMMISSION FOR  
OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)  
SHIP OBSERVATIONS TEAM

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SOT-IV/Doc. IV-3  
(15.II.2007)

FOURTH SESSION

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ITEM IV-3

GENEVA, SWITZERLAND, 16 TO 21 APRIL 2007

Original: ENGLISH

**VOSP-V  
MONITORING AND DATA MANAGEMENT**

**RSMC, Exeter, and VOSClm RTMC reports**  
*(Submitted by Colin Parrett)*

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**Summary and purpose of document**

This document provides information on the data quality monitoring conducted by the Met Office (RSMC Exeter, UK) which has now been extended to include data timeliness information. The document also provides a status report on the progress made by the the VOSClm Real Time Monitoring Centre (RTMC) since SOT-III/VOSClm-V and requests the meeting to take decisions on a number of monitoring issues (the Met Office (UK) agreed to act as the RTMC at VOSClm-II).

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**ACTION PROPOSED**

The Ship Observations Team is invited to consider the information given in this document and to make comments or suggestions, as appropriate, regarding the current monitoring procedures. In particular the Team is invited to:

- (a) respond to the final point made in paragraph 1.3 of this document;
- (b) respond to the suggestion made in paragraph 1.4 of this document;
- (c) note the timeliness information referred to in paragraph 1.7 of this document;
- (d) consider and take note of the points made in paragraph 1.8 and 1.9 of this document;
- (e) Consider whether it agrees with the changes made by the RTMC and documented in paragraph 2.5 of this report, relating to the continued inclusion in statistics of ship reports made at model land points and the removal of 'candidate' ship statistics;
- (f) Consider whether it agrees with the statement in paragraph 2.8 of this report concerning monitoring criteria;
- (g) Discuss the ideas in paragraph 2.9 of this report concerning the availability of remedial actions and suggest a solution.

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- Appendices:**
- A. Monitoring of marine surface observations by the Met Office (UK), Monthly Suspect List, Dec 2006;
  - B. Examples of content of Met Office Observation Monitoring Web Pages;
  - C. Timeliness of VOS observations received at the Met Office (UK), Dec 2006;
  - D. Quality monitoring issues related to masking of ship call signs;
  - E. Project Monitoring Criteria;
  - F. Monitoring Statistics for VOSClm Ships (Jan 2007);
  - G. Monitoring 'Suspect' list for VOSClm Ships (Jan 2007);
  - H. BUFR template.

## DISCUSSION

### 1. Monitoring the quality and timeliness of VOS observations

1.1 The Met Office (RSMC Exeter), as WMO-designated lead centre for monitoring the quality of surface marine meteorological data (observations from ships, buoys and other *in situ* marine platforms), compares observations from individual platforms with the Met Office's global model background 6-hour forecast fields for each variable. Platforms for which the observed values differ from the background by a significant amount are flagged as suspect.

1.2 Monthly lists of suspect platforms are sent to the WMO Secretariat (a recent suspect list for ships, fixed buoys and platforms, dated December 2006, is attached at **Appendix A** for information). These lists are also exchanged among the 4 lead monitoring centres (Met Office, JMA, NCEP and ECMWF), and other centres, for comparison. Generally there is considerable agreement between the different centres, both in terms of suspect platforms and mean and standard deviation of differences from the background field. Since SOT-III, these monthly lists have been made available via the Met Office web site at :

<http://www.metoffice.gov.uk/research/nwp/observations/monitoring/index.html>

Examples of the website content together with an extract from the suspect monitoring list for December 2006 are attached at **Appendix B**. It will be noted that each suspect ship can now be linked to a QC plot covering the previous month, showing time-series of observation-background values. Two examples are shown: the first plot shows a temporary bias in pressure and the second shows a more persistent but variable bias in relative humidity. (N.B. The plots of pressure currently show the values after any corrections have been applied at the Met Office.)

1.3 Initially only mean sea level pressure was monitored, but wind speed, wind direction, sea surface temperature, air temperature and relative humidity have also been added to the information being exchanged on a monthly basis. The current monitoring criteria for the 6 variables are shown in **Appendix A**. The meeting is invited to confirm that the monitoring criteria continue to be set at the correct levels.

1.4 The Met Office also produces monthly lists of monitoring statistics for the VOS fleets recruited by certain countries. To maintain up to date lists of the VOS fleets for each country concerned, the Met Office now uses WMO Pub 47, which should currently be updated quarterly. However, to ensure that recently recruited VOS vessels are also included, the Met Office also receives monthly fleet updates from a number of countries. These national lists would not be needed if the Pub 47 list could be updated monthly in the future. The Team is therefore invited to consider whether the frequency of Pub 47 procedures should be revised to allow countries to make monthly metadata submissions. This would help to ensure that observational problems can be dealt with in a more prompt manner. (N.B. At the time of writing, the Pub47 list has not been updated for 9 months, between June 2006 and March 2007.)

1.5 National focal points are now notified when the latest VOS monthly monitoring reports and suspect lists become available on the Met Office website by means of an email sent by the Met Office to the SOT, VOS and PMO mailing lists, which are maintained by JCOMMOPS. It is important therefore that focal points wishing to receive this monitoring information check that their JCOMMOPS mailing list information is kept up to date. However, the monthly monitoring statistics continue to be emailed directly to major VOS operating countries, and as mentioned in reports to previous SOT meetings, any other national focal points who may wish to receive directly emailed copies of the monthly monitoring lists or 'suspect' ship lists should advise the Met Office of their email address.

1.6 Every 6 months more detailed monitoring reports, for all platforms, are also produced and made available to the WMO Secretariat via the Met Office web site. The statistics relating to suspect VOS operated by specific members are extracted from the report and distributed by the Secretariat to national focal points for the members concerned, under a covering letter requesting that remedial action be taken to correct the problems. Paper copies of the 6-month report are also circulated by the Met Office, but they no longer contain the individual time-series plots for each suspect platform, which made the report very bulky; the general overview and statistics are deemed to be more useful on this time-scale, although the time-series are still available from the Met Office web site.

1.7 Timeliness information for VOS reports received at the Met Office is now also being made available from our web site at

<http://www.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html>,

where there is a table summarising the data timeliness for each country as well as graphs showing the timeliness of all VOS ships and for the main VOS operating countries. A graphical example for December 2006 data is shown in **Appendix C**, where it can be seen from the upper graph that the majority of ship reports were received promptly, with over 40% received within 30 minutes and 90% within 90 minutes of the observation time. The cut-off time for operational NWP global data assimilation is typically 90-150 minutes after the analysis times of 00, 06, 12 and 18 UTC, so at least 90% of global VOS data should be received in time to be assimilated. Timeliness information for individual call-signs on the Pub47 list is also available from the website.

1.8 Currently the Met Office's role as CBS Lead Centre for monitoring marine data cannot be properly fulfilled, because Japanese ships cannot be monitored individually due to their unilateral adoption of a 'SHIP' masking scheme. For the Met Office to be able to resume monitoring of the Japanese ships will require work to set up special collection of the original data from JMA's FTP server, once it is available. In addition to the costs this will incur, it will introduce extra complexity into the system and has implications for the timeliness of the data being made available.

1.9 Consequently, to ensure that VOS can continue to be monitored efficiently, Met Office (RSMC Exeter) would prefer that all countries adopt a masking method with a unique masked identifier for each ship. The impact of ship masking on monitoring activities was discussed at the Joint WMO-IMO Consultative Meeting in Geneva in February 2007 and the views of the Met Office are repeated here in **Appendix D**.

## **2. VOSClim Real-Time Monitoring Centre (RTMC) report**

2.1 The Met Office agreed to act as the Real Time Monitoring Centre (RTMC) for the project at the second meeting of the VOS Climate Project (VOSClim-II).

2.2 In accordance with the Terms of Reference agreed for the RTMC, the observed project variables (i.e. pressure, air temperature, relative humidity, sea surface temperature, wind speed and wind direction) are extracted from the GTS for each project ship and co-located with the associated model field values prior to transfer to the Data Assembly Centre (DAC). In addition, ship monitoring statistics are produced by the RTMC and provided to the DAC on a monthly basis, with statistics for 'suspect' ships being sent to the national focal points.

2.3 Further information and details of progress made by the RTMC since the last project meeting are given below.

### ***Monitoring Statistics***

2.4 At the last project meeting (SOT-III/VOSClim-V) it was agreed to keep the values for the real time monitoring of the observed variables at the levels given in **Appendix E** to this report.

2.5 Since the SOT-III/VOSClim-V meeting:

- The RTMC has continued to update its list of project ships, following notification of changes to the list of project ships maintained on the VOSClim website.
- In accordance with the agreement at SOT-III (III-B/2.1.2), the RTMC has modified its software to only include those ship reports made over model sea points in the statistics used

for deciding whether a ship is 'suspect'. However, the complete monthly statistics sent to the DAC still include all ship reports, including those from model land points (otherwise some ships that regularly report close to land would not appear in the list of statistics). The meeting is invited to comment on whether they wish the RTMC to modify its monthly statistics supplied to the DAC to exclude ship reports made at model land points.

- The RTMC has replaced the sending of the monthly statistics and suspect lists to the DAC by e-mail with placement on the Met Office's external FTP server, ready for the DAC to download.
- The RTMC has recently stopped producing monthly statistics for the list of prospective (or candidate) ships held on the project web site. This has been done because the list has not changed in two years and appears to be of little use in recruiting new ships. As the project is now nearing its initial target of 200 ships, it is suggested that there is no longer a need to monitor these candidate ships and suggested that the list can now be deleted from the VOSCLim website.
- Due to major changes in the software used in the monitoring of data at the Met Office, the RTMC has had to modify its monitoring statistics. The normalised standard deviation and the 'true bias' can no longer be calculated and have been removed from the 4 variables for which they were previously produced. This has had the side effect of simplifying the system and should reduce confusion among PMOs about the different criteria.

2.6 The RTMC now produces the following monitoring statistics for project ships:

- **Monthly Ship Statistics** – As mentioned above, a list of monitoring statistics for all participating project ships is put on to the Met Office external FTP server on a monthly basis, ready for the DAC to retrieve for inclusion on the project web-site. A recent example of these statistics, for January 2007, is given in **Appendix F** (pressure only, to save space).
- **Monthly 'Suspect' List** - A list of monitoring statistics for project ships identified as having submitted 'suspect' observations, is sent to the project focal point in each participating National Met. Service (NMS) on a monthly basis. A copy of the list is also put on to the Met Office external FTP server, ready for the DAC to retrieve for inclusion on the project web site. The suspect lists are based upon the criteria established for the six observed variables (in **Appendix E**). The lists should enable VOSCLim Focal Points and their associated PMO networks to resolve any quality problems. A recent example of the suspect list, for January 2007, is given in **Appendix G**.

2.7 In order to ensure that the monitoring process operates effectively it is essential that:

- National focal points to whom the monitoring statistics are to be disseminated are clearly identified, with e-mail addresses kept up to date on the project web site.
- The call signs of ships participating in the project are maintained up to date on the project web-site, as this list is used as the basis for generating monitoring statistics. It would be helpful if updates to this list could also be copied to the RTMC.

2.8 On the basis of almost 5 years of monitoring, the RTMC considers that most of the criteria for the real time monitoring (in **Appendix E**) have been set at approximately the correct levels. The exception may be the bias limit for relative humidity, which seems to be slightly low. The meeting is asked to consider whether a slightly higher limit of 12% or 15% may be more appropriate (the RTMC favours 12%).

2.9 At previous VOSCLim meetings it was suggested that details of any remedial action taken by the PMOs in response to the monitoring information should be sent to the DAC via national focal points. The information could then be made available through the project web-site in order to avoid duplication of effort by PMOs in other countries who may be intending to visit a suspect project ship. Unfortunately,

due possibly to pressures on PMO workloads, this does not appear to have been happening. By recording such actions it should be easier to pre-empt such problems from recurring in the future, whilst at the same time allowing an analysis of the type of problems being encountered to be made. The meeting is therefore invited to further consider whether details of remedial actions taken should be made available and how this could best be achieved.

### **Data Transfer**

2.10 The RTMC is also responsible for ensuring the transfer of project ships' observations, and the associated co-located model data, to the DAC.

2.11 From April 2003 the Met Office has produced the VOSClm BUFR data on a daily basis and transmitted it to Washington via the GTS, from where it is sent on to the DAC.

2.12 Work has begun on putting a backup copy of the daily VOSClm BUFR data onto the Met Office's operational external FTP server, to be available for the DAC to access in case of problems with the GTS data. This work has been delayed somewhat due to the Met Office changing its external FTP server system.

2.13 The 47 elements included in the BUFR messages have not changed since they were agreed at VOSClm-III in January 2002. For ease of reference the list is attached at **Appendix H**.

### **Masked Call signs**

2.14 The masking of ship call signs has been discussed elsewhere, including in Item IV-A 3.1, but it should be noted that the use of generic 'SHIP' callsigns may cause problems with the data transfer and the monitoring of VOSClm ships.

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## APPENDIX A

## EXAMPLE OF MONTHLY SUSPECT LIST

MONITORING OF MARINE SURFACE OBSERVATIONS  
 MONTHLY SUSPECT LIST - SHIPS, FIXED BUOYS AND PLATFORMS  
 MONITORING CENTRE: EXETER  
 MONTH: DECEMBER 2006

## Monitoring procedures

Period :One calendar month.  
 Data monitored :Reports from each unique identifier for ships,  
 fixed buoys and platforms.  
 Standard of comparison :Background field from Exeter global model.  
 Observation times :All hours  
 Elements monitored :Mean sea level pressure (hPa).  
 :Wind speed ( $\text{ms}^{-1}$ ).  
 :Wind direction (degrees).  
 :Air temperature ( $^{\circ}\text{C}$ ).  
 :Relative Humidity (%).  
 :Sea surface temperature ( $^{\circ}\text{C}$ ).  
 Parameters monitored  
     NOBS :Number of observations received, excluding duplicates.  
     %GE :Percentage of observations with gross errors.  
     %REJ :Percentage of observations flagged, excluding  
           those with gross errors.  
 SD :SD of difference of observations from background  
 values,  
     excluding those with gross errors.  
 BIAS :Mean difference of observations from  
     background values, excluding those with gross errors  
     (N.B. a positive bias indicates the wind  
     observation is veered to the background).  
 RMS :Root Mean Square difference of observations from  
     background values, excluding those with gross errors.  
 GROSS ERROR LIMIT :15 hPa (pressure)  
                     :25  $\text{ms}^{-1}$  (vector wind)  
                     :15  $^{\circ}\text{C}$  (air temperature)  
                     :50% (relative humidity)  
                     :10  $^{\circ}\text{C}$  (sea surface temperature)  
 SELECTION CRITERIA :NOBS  $\geq 20$  , and one or more of the following:

1. Bias  $\geq$  4 hPa (pressure)  
 $\geq$  5  $\text{ms}^{-1}$  (wind speed)  
 $\geq$  30 degrees (direction)  
 $\geq$  4  $^{\circ}\text{C}$  (air temperature)  
 $\geq$  15% (relative humidity)  
 $\geq$  3  $^{\circ}\text{C}$  (SST)  
 2. SD  $\geq$  6 hPa (pressure)  
 $\geq$  80 degrees (direction)  
 $\geq$  6  $^{\circ}\text{C}$  (air temperature)  
 $\geq$  25% (relative humidity)  
 $\geq$  5  $^{\circ}\text{C}$  (SST)  
 3. PGE  $\geq$  25

N.B. Observations of wind direction are only included in the wind direction statistics if the observed OR background wind speed  $> 5 \text{ ms}^{-1}$

IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
62147	P	60	0	93	1.7	-4.6	4.9
9VKY3	P	31	0	52	0.7	-5.1	5.2

A8DE3	P	26	0	100	1.4	-4.5	4.7
A8GU7	P	58	2	2	0.7	4.4	4.4
A8HJ4	P	21	0	76	1.7	4.5	4.8
C6FZ6	P	33	0	0	1.2	8.6	8.7
C6PZ3	P	22	0	18	3.5	4.8	6.0
CGDS	P	175	1	100	3.8	-5.1	6.3
DEDM	P	38	0	66	0.6	4.9	4.9
KS049	P	219	0	0	1.1	-4.2	4.4
LADC2	P	28	36	86	7.2	-6.4	9.6
MLTH5	P	27	0	70	3.4	-4.7	5.8
PBJF	P	57	0	65	2.1	4.9	5.3
TEST	P	218	100	100			
TESTCA7	P	131	0	100	0.7	-11.7	11.7
UCFT	P	50	2	12	2.3	-4.3	4.9
UDYN	P	34	0	85	2.7	-6.4	7.0
UGOU	P	57	0	47	2.9	-4.7	5.5
UICO	P	30	20	53	6.1	3.0	6.8
V2AW5	P	34	0	79	9.8	2.4	10.1
V2BN9	P	27	4	4	1.1	-5.7	5.8
V2OB8	P	41	0	41	0.9	4.3	4.4
V7BX3	P	20	0	20	2.2	4.2	4.7
V7FW7	P	27	0	44	2.7	4.3	5.0
VTXK	P	43	2	84	2.7	6.6	7.1
WMLG	P	28	0	100	6.0	3.1	6.8
WRTF	P	39	0	49	1.1	-4.6	4.7
IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
4XGU	SPEED	43	2	67	3.5	5.1	6.2
62108	SPEED	727	21	71	3.9	-9.6	10.3
A8CF9	SPEED	30	10	100	4.8	5.4	7.2
C6FN4	SPEED	28	0	4	2.7	5.1	5.8
ELOV9	SPEED	22	9	50	4.4	6.1	7.5
ELXG9	SPEED	23	0	17	3.3	8.5	9.1
FNNB	SPEED	32	53	69	4.9	2.3	5.4
OUSE6	SPEED	22	0	14	2.9	5.2	6.0
OWFU2	SPEED	23	35	100	3.6	4.5	5.8
OXRA6	SPEED	33	3	9	2.3	5.1	5.6
PBHU	SPEED	31	39	52	4.1	6.4	7.6
SCKM	SPEED	21	0	43	3.7	6.8	7.7
VROB	SPEED	110	40	62	4.8	2.9	5.6
VTXK	SPEED	43	5	65	4.4	5.1	6.7
WQZ9670	SPEED	34	0	0	2.9	5.2	6.0
IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
23173	DIRN.	55	0	0	63.5	141.3	154.9
42362	DIRN.	1194	0	0	32.8	-37.0	49.5
53057	DIRN.	53	0	0	17.5	*****	126.5
62108	DIRN.	235	66	0	103.6	-22.1	106.0
62116	DIRN.	477	0	0	12.1	35.3	37.3
DCUJ2	DIRN.	33	6	0	95.6	9.1	96.0
FNNB	DIRN.	25	68	0	46.7	25.6	53.2
OWFU2	DIRN.	22	36	0	16.4	4.3	16.9
PBHU	DIRN.	30	40	0	36.4	0.1	36.4
UCUC	DIRN.	42	0	0	25.2	-31.7	40.5
UDYN	DIRN.	22	0	0	17.7	-51.4	54.4
VROB	DIRN.	68	65	0	68.6	1.8	68.6

VRY09	DIRN.	52	0	0	83.1	-30.2	88.4
VRY09	DIRN.	34	0	0	91.1	5.6	91.2

IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
44140	T	707	0	100	2.0	5.4	5.7
46088	T	1441	0	100	1.8	5.9	6.2
46131	T	672	0	100	1.4	6.2	6.3
46146	T	720	0	100	1.6	5.8	6.0
CGJK	T	210	0	100	2.9	4.3	5.1

TEST	T	218	100	100			
UCFT	T	50	0	100	1.7	-4.6	5.0
WCY2306	T	170	0	100	2.9	4.4	5.3
WXJ63	T	224	0	100	2.6	4.4	5.1

IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
62301	RH	709	13	100	18.2	-15.7	24.1
A8IF4	RH	32	0	100	10.4	19.1	21.7
A8IY9	RH	23	0	100	13.0	19.0	23.1
DACF	RH	485	9	100	11.5	-25.0	27.5
ELWX5	RH	189	40	100	18.2	-25.8	31.6

ELXT8	RH	44	0	100	14.4	17.4	22.6
LADY5	RH	32	0	100	13.2	16.4	21.0
MSHE2	RH	57	0	100	8.3	18.2	20.1
OVOT2	RH	104	1	100	8.7	16.6	18.8
OVYA2	RH	44	9	100	10.2	-28.5	30.3

PHET	RH	118	3	100	13.8	-17.0	21.9
PMSA	RH	54	0	100	10.2	15.3	18.4
VQGQ4	RH	45	0	100	12.2	17.5	21.3
VRVN6	RH	26	0	100	8.8	20.2	22.0

IDENTIFIER	ELEM	NOBS	%GE	%REJ	SD	BIAS	RMS
41035	SST	1086	0	89	0.9	-4.1	4.2
41112	SST	1096	0	90	0.6	-3.5	3.5
42007	SST	549	0	93	0.7	-4.0	4.1
44140	SST	523	0	88	1.1	-3.0	3.2
C6IO9	SST	34	0	97	2.6	-3.2	4.1

C6UG4	SST	31	0	100	2.0	-3.3	3.9
DGGV	SST	40	0	5	0.7	3.0	3.1
DNDD	SST	34	0	100	0.6	3.3	3.4
LADC2	SST	29	0	55	5.1	-1.3	5.2
TEST	SST	216	100	100			

V2AW5	SST	26	4	100	2.9	-5.8	6.4
V7BW8	SST	37	0	100	0.8	-4.4	4.4
V7IP9	SST	45	0	100	1.4	-7.0	7.1
VRBH8	SST	23	4	30	1.6	-3.0	3.4
WAAH	SST	67	0	100	1.1	3.1	3.3

WCY2306	SST	115	0	84	0.6	-3.9	3.9
WDB9444	SST	29	0	45	2.4	3.3	4.1
WZJD	SST	46	0	100	1.9	-4.0	4.4



APPENDIX B

EXAMPLES OF CONTENT OF MET OFFICE OBSERVATION MONITORING WEB PAGES

PRESSURE (hPa)							
CTRY CODE	CALLSIGN	WMO ID	TOTAL	GE (%)	BIAS	SD	Graph
CA	GRIFFON	CGDS	175	1	-4.4	4.7	QC plot
DE	APL CHILE	V2OB8	41	0	4.7	0.7	QC plot
DE	CAP PALMAS	A8DE3	26	0	-4.4	1.0	QC plot
DE	CIMBRIA	A8HJ4	21	0	4.4	1.4	QC plot
DE	FEDERAL MIRAMICHI	V2BN9	27	4	-5.5	0.9	QC plot
DE	LONDON SENATOR	DEDM	38	0	5.2	0.6	QC plot
DE	MAERSK DUNBAR	A8GU7	57	2	4.5	0.6	QC plot
DE	NORTHERN FORTUNE	V2AW5	34	0	2.8	7.3	QC plot
DE	USL CONDOR	9VKY3	31	0	-4.9	0.4	QC plot
IN	Sabarimala	VTXK	43	2	6.7	2.3	QC plot
NL	PRINSENBORG	PBJF	57	0	5.1	1.8	QC plot
RU	MAKSIM STAROSTIN	UDYN	34	0	-6.4	2.6	QC plot
US	ALASKAN NAVIGATOR	WDC6644	23	0	4.1	3.1	QC plot
US	ANTARES VOYAGER	C6P23	22	0	4.9	2.9	QC plot
US	CHEROKEE BRIDGE	V7FW7	27	0	4.6	1.9	QC plot
US	POLAR ENTERPRISE	WRTF	39	0	-4.4	1.0	QC plot

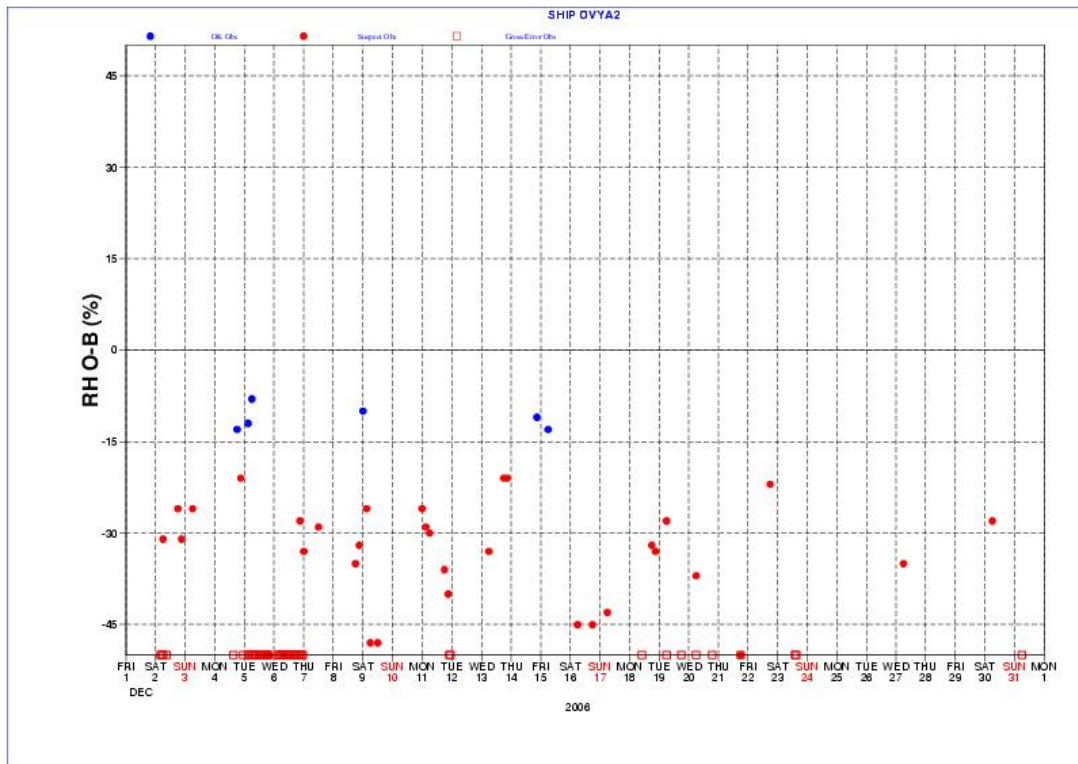
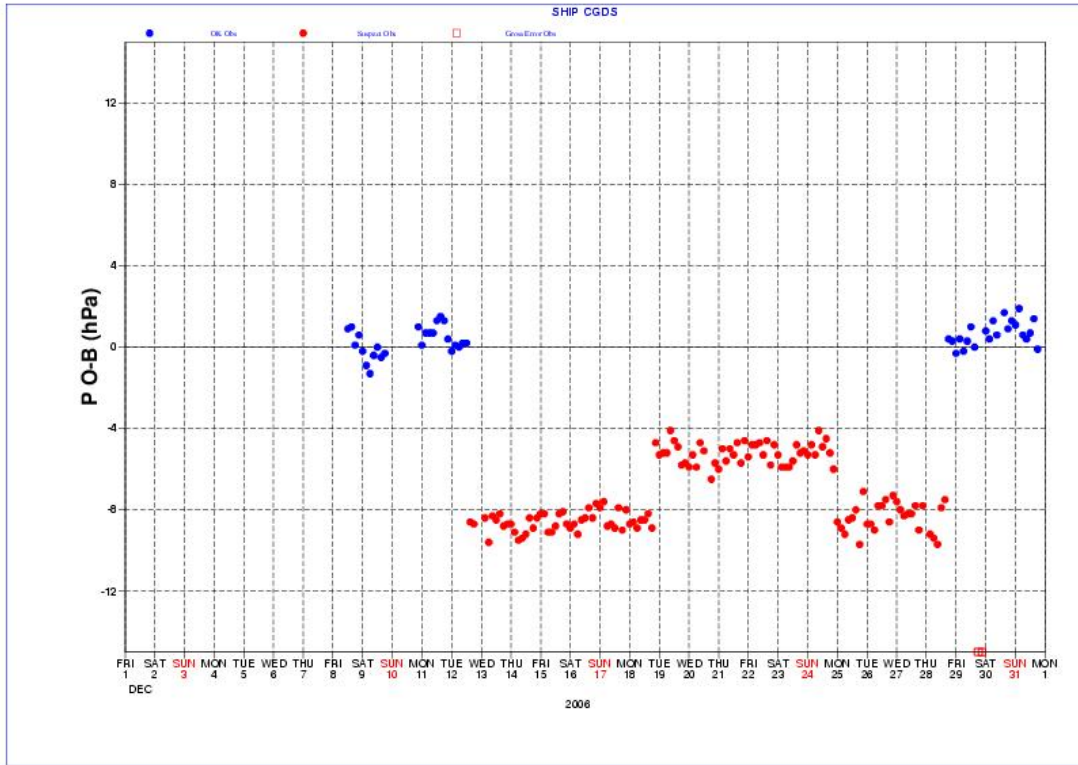
  

TEMPERATURE (deg C)							
CTRY CODE	CALLSIGN	WMO ID	TOTAL	GE (%)	BIAS	SD	Graph
CA	SIR WILFRID LAURIER	CGJK	204	0	4.4	2.7	QC plot
US	SEABULK NEVADA	WCY2306	167	0	4.4	3.0	QC plot
US	VALDEZ RESEARCH	WXJ63	222	0	4.4	2.5	QC plot

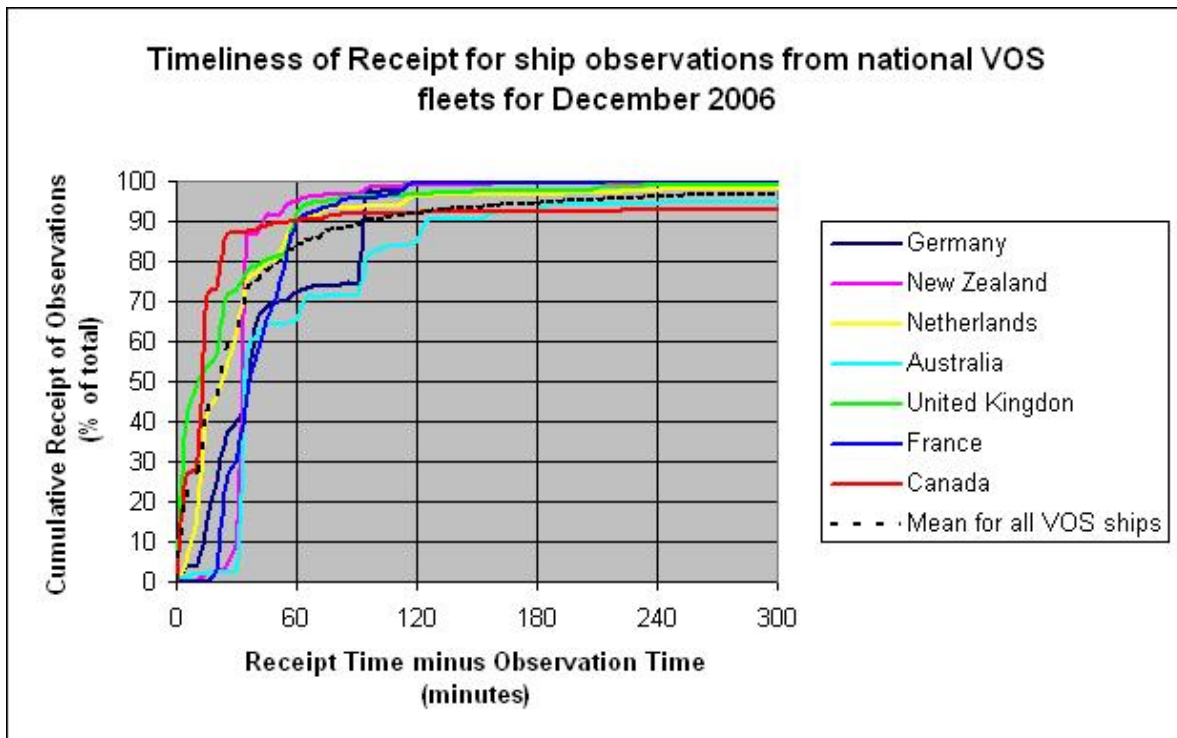
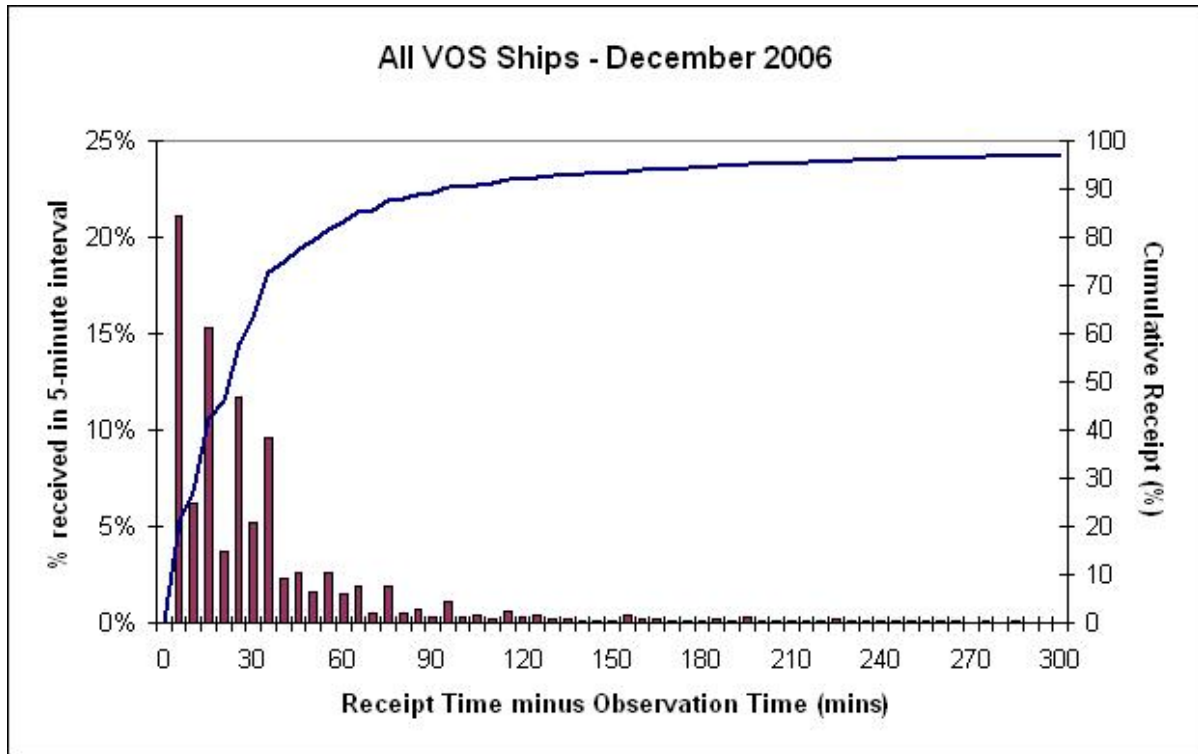
WIND SPEED (m s-1)							
CTRY CODE	CALLSIGN	WMO ID	TOTAL	GE (%)	BIAS	SD	Graph
AU	KIRIBATI CHIEF (HONG KONG)	VROB	71	48	2.2	2.1	QC plot
CA	GORDON REID	CGBR	29	0	-5.7	2.4	QC plot
DE	HORNCLIFF	ELOV9	22	0	5.9	2.0	QC plot
DE	INDEPENDENT ACTION	A8CF9	30	0	5.8	2.7	QC plot
FR	NAPOLEON BONAPARTE	FNNB	24	25	6.0	3.1	QC plot
IN	Sabarimala	VTXK	39	0	5.3	2.3	QC plot
NL	CORAL PAVONA	ELXG9	23	0	7.6	1.4	QC plot

Examples of QC Plots – for Pressure (top) and Humidity (below)



APPENDIX C

TIMELINESS OF VOS OBSERVATIONS RECEIVED AT THE MET OFFICE (UK)  
DEC 2006



Met Office: Observation Monitoring - Microsoft Internet Explorer provided by The Met Office

Address: http://www.metoffice.gov.uk/research/hwp/observations/monitoring/marine/TOR/Pub47\_Tor\_by\_CTRY.html

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**Pub47 Time of Receipt Statistics by COUNTRY for December**

COUNTRY	Ships	Observations	Average (Obs/Ships)	N<30 mins	N<60 mins	N<120 mins	N>360 mins	% <30 mins	% <60 mins	% <120 mins	% >360 mins	Average (R-D) (mins)
AU	61	3301	54.1	158	2443	2825	72	5%	74%	86%	2%	65.5
CA	34	3872	113.9	3589	3753	3824	1	93%	97%	99%	0%	17.0
DE	432	19928	46.1	14905	18181	19353	159	75%	91%	97%	1%	24.2
DK	19	1315	69.2	1121	1262	1306	0	85%	96%	99%	0%	27.3
ES	1	179	179.0	0	0	0	11	0%	0%	0%	6%	283.2
FR	20	1813	90.7	632	1621	1810	0	35%	89%	100%	0%	41.2
GB	190	6895	36.3	3572	5201	6182	202	52%	75%	90%	3%	61.7
GR	2	8	4.0	7	7	7	1	88%	88%	88%	13%	178.9
HK	25	529	21.2	229	361	504	13	43%	68%	95%	2%	56.7
IE	2	20	10.0	3	3	10	2	15%	15%	50%	10%	140.3
IL	4	100	25.0	85	91	96	0	85%	91%	96%	0%	20.0
IN	21	224	10.7	54	114	174	5	24%	51%	78%	2%	95.3
IS	6	260	43.3	228	248	259	0	88%	95%	100%	0%	14.2
JP	35	1611	46.0	1055	1453	1538	19	65%	90%	95%	1%	46.1
MY	3	54	18.0	5	34	54	0	9%	63%	100%	0%	70.8
NL	131	3464	26.4	2186	3093	3339	36	63%	89%	96%	1%	36.6
NO	14	4485	320.4	3936	4043	4437	13	88%	90%	99%	0%	22.3
NZ	32	1129	35.3	185	1018	1101	3	16%	90%	98%	0%	39.5
RU	92	2112	23.0	887	1328	1608	230	42%	63%	76%	11%	117.8
SA	4	184	46.0	120	156	172	4	65%	85%	93%	2%	46.1
SE	6	175	29.2	76	133	148	15	43%	76%	85%	9%	93.9
SG	1	88	88.0	86	88	88	0	98%	100%	100%	0%	14.0
US	428	17159	40.1	11669	14565	15990	291	68%	85%	93%	2%	41.8
ZA	2	148	74.0	89	118	136	2	60%	80%	92%	1%	49.4
Grand Total	1565	69053	44.1	44877	59314	64961	1079	65%	86%	94%	2%	40.0

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## APPENDIX D

### QUALITY MONITORING ISSUES RELATED TO MASKING OF SHIP CALL SIGNS

1. During 2006 several ship call-sign masking systems have been set up, in order to help stop the withdrawal of ships from the VOS fleet over security concerns in having their positions displayed on the internet. However, masking ship identities in meteorological reports can potentially cause problems with the important activity of quality monitoring of individual ships' weather reports.
2. For European ship reports participating in the E-SURFMAR programme a scheme using unique masked call signs has been proposed and is already being used for some ships. Similarly Australia is proposing the use of masked call signs based on a different scheme (built from Australian identification numbers). From a data monitoring view point it will always be preferable to have unique call signs, even if different masking schemes are being used in different parts of the world. The use of the same call sign within two different schemes should therefore be avoided, e.g. there should be no possibility of a clash of call signs between the Australian and E-SURFMAR schemes. Also, monitoring centres will need to have access to a global database of masked call signs located in a single secure repository.
3. Japan has set up a non-unique masking system. Ship reports with real call signs are received at their Inmarsat Land Earth Station, where they replace the call sign by the letters 'SHIP' and insert the data onto the GTS. Thus GTS users see only the masked 'SHIP' reports. JMA is planning to make the original ship data available in near real time on a secure server, from where it can be downloaded via FTP by monitoring centres, who can then discard the GTS 'SHIP' data. But this approach relies on the monitoring centres having the necessary infrastructure within their observation processing systems to be able to set this up. At the Met Office, the Message Switching Team will need to set up a system to obtain the data from JMA's server and route it into our meteorological database (MetDB) instead of JMA's 'SHIP' data (RJTD bulletins); the MetDB Team will then need to set up a system to accept and decode the server data and ingest it into the MetDB.
4. There is also the risk that other countries may decide to adopt similar schemes to the JMA, and similarly put their data onto dedicated servers. Therefore, if such schemes are adopted more generally, it would be better to have a single secure central server (possibly at JCOMMOPS?) where all countries could place their data and/or their call sign lists.
5. In summary, the Met Office (RSMC Exeter) considers that the generic 'SHIP' masking solution proposed by JMA will require all monitoring centres to set up special solutions for just the Japanese data (plus more work if other countries adopt similar solutions), which will delay the resumption of the monitoring of the Japanese ship data. In addition to the costs this will incur, it will introduce extra complexity into the system and may have implications for the timeliness of the data being made available. Consequently, the Met Office, as the CBS Lead Centre for the quality monitoring of marine data, would prefer that all countries adopt a masking method similar to that of either E-SURFMAR or Australia, with a unique masked identifier for each ship. Best practice would be to set up an agreed international system of masked call signs.

**APPENDIX E****MONITORING CRITERIA FOR SUSPECT SHIPS**

1. For each ship and each variable there should be at least 20 reports during the period (if there are fewer reports the statistics may be unreliable and no action is needed).
2. Then, either:
  - a) The number of gross errors should exceed 10% of the number of observation reports (where the observation-background (o-b) limits for individual gross errors are shown in column 4 of the following table); or,
  - b) One of the limits shown in columns 2 and 3 in the table should be exceeded for either:
    - (i) the mean value of o-b over the period (absolute value), or
    - (ii) the standard deviation of o-b over the period

(1) Variable	(2) Mean o-b limit	(3) Std. Dev. o-b limit	(4) Gross error limit
Pressure (hPa)	2.5	5.0	15.0
Wind speed (m/s)	5.0	10.0	25.0
Wind direction (degrees)	30.0	60.0	150.0
Air Temperature ( <sup>o</sup> C)	2.0	4.0	10.0
Relative humidity (%)	10.0	20.0	50.0
Sea surface temp. ( <sup>o</sup> C)	2.0	4.0	10.0

3. If either of the limits on o-b statistics in columns 2 and 3 are exceeded the project ship's observations will be considered 'suspect' and corrective action will need to be taken (e.g. by the Port Met Officers). Column 4 contains the o-b limits for each ship observation beyond which the observation will be regarded as a 'gross error'.

## APPENDIX F

## MONITORING STATISTICS FOR VOSCLIM SHIPS FOR JANUARY 2007

Standard of comparison: 6-hour forecast (background) from the Met Office Global NWP Model.

Column headings:

CallSign - Ship's call sign.  
 NumObs - Number of observations from each ship received during the period of the report.  
 %GrEr - Percentage of observations with 'gross errors' (excluded from the statistics).  
 Bias - Mean value of the observation-minus-background (o-b) values.  
 RMS - Root mean square of the o-b values.  
 StdDev - Standard deviation (SD) of the o-b values.

	Pressure (hPa)				
CallSign	NumObs	%GrEr	Bias	RMS	StdDev
8PNK	17	0.0	1.5	2.3	1.7
9KWH	43	0.0	0.2	0.6	0.6
9KWP	15	0.0	0.2	0.5	0.5
A8CN8	21	0.0	0.6	1.0	0.8
A8ET9	24	0.0	2.0	2.1	0.6
C6IZ7	14	0.0	-1.3	3.0	2.7
C6KD5	51	0.0	-0.7	3.1	3.0
C6KD6	53	0.0	-0.0	1.9	1.9
C6KD7	77	1.3	1.0	2.2	2.0
C6SS3	45	0.0	-0.7	2.0	1.9
CG2958	434	0.0	0.6	1.1	0.9
CGDS	238	0.0	0.5	0.9	0.7
CGJK	233	0.0	0.2	0.9	0.9
CGTF	58	0.0	-0.5	1.2	1.1
DGHX	26	0.0	0.5	1.1	1.0
DGXS	25	0.0	0.2	0.6	0.6
DQVH	46	0.0	-0.1	1.0	1.0
DQVI	27	0.0	-0.8	2.2	2.1
DQVJ	20	0.0	-1.8	2.3	1.5
DQVK	43	0.0	-0.6	0.9	0.7
DQVL	51	2.0	0.4	1.0	0.9
DQVM	36	0.0	-0.6	1.2	1.0
DQVN	63	0.0	-0.5	0.9	0.7
DQVO	8	0.0	-0.1	0.7	0.7
ELXS8	75	0.0	0.3	1.0	1.0
ELXT8	28	0.0	-0.9	1.3	0.9
ELZU8	52	0.0	1.2	1.4	0.7
FNCI	5	0.0	-0.5	0.7	0.5
FNCM	153	0.0	1.2	1.3	0.4
FNJI	109	0.0	0.4	0.8	0.7
GBQM	10	0.0	2.5	3.8	2.8
GBTT	37	0.0	1.0	2.6	2.4
IBPW	25	0.0	1.0	1.3	0.9
JCCX	166	0.0	0.2	0.8	0.8
JDWX	141	0.0	0.0	0.7	0.7
JGQH	307	0.0	-0.1	0.6	0.6
JIVB	204	0.0	0.0	0.6	0.6
JPBN	348	0.0	0.3	0.7	0.6
MHCQ7	31	0.0	-0.1	1.2	1.2
MHMZ8	9	0.0	-1.3	2.1	1.7
MLBB4	15	0.0	0.5	0.8	0.6
MQEC7	52	0.0	-0.2	0.6	0.6

MXBC6	6	0.0	-0.5	1.2	1.1
MXMM5	28	0.0	0.0	0.8	0.8
MYJM3	17	0.0	1.2	2.0	1.6
MYSU5	35	0.0	-0.0	1.6	1.6
MZER8	46	0.0	-0.5	1.1	1.0
MZFC6	39	0.0	0.2	0.6	0.6
MZGK7	19	0.0	-0.3	0.6	0.5
MZIM8	35	0.0	-0.5	1.5	1.4
ONDB	21	0.0	-0.8	1.4	1.1
OVS2	24	0.0	-0.6	1.4	1.3
OVZV2	19	0.0	0.0	0.6	0.6
OYK2	16	0.0	-0.3	0.9	0.9
OYYL2	23	0.0	-0.8	1.2	0.9
PCHS	9	0.0	0.1	1.4	1.4
PDHO	48	0.0	-2.7	2.8	0.9
PDHP	11	0.0	0.7	1.1	0.9
PDZS	64	0.0	-0.5	2.1	2.0
PECS	30	0.0	-0.6	0.9	0.7
S6TS	34	0.0	0.4	0.8	0.7
V2FM	21	0.0	0.2	0.9	0.9
VCLM	191	0.0	-0.2	1.2	1.2
VMAL	14	0.0	0.4	3.2	3.2
VNNM	37	0.0	0.4	1.0	0.9
VOCJ	221	0.0	-0.0	0.8	0.8
VQB2	19	0.0	-0.4	1.1	1.0
VQGB2	26	0.0	0.1	1.1	1.1
VTXG	27	0.0	2.1	2.5	1.3
VTXK	68	0.0	6.5	6.7	1.5
VVGQ	16	0.0	-0.5	1.0	0.9
VVJV	9	0.0	2.0	2.6	1.7
VWNS	9	0.0	0.9	1.6	1.3
VWVG	12	0.0	-0.3	0.6	0.5
WCX8812	39	0.0	-1.3	1.6	0.9
WCX8882	24	0.0	0.6	1.1	0.9
WCX8884	27	0.0	-0.9	1.5	1.2
WFLG	58	0.0	-2.3	2.6	1.3
WNDP	18	0.0	-1.5	2.3	1.8
WRYC	27	0.0	-1.7	1.9	0.9
WRYD	15	0.0	-1.6	2.9	2.4
ZCBD3	27	0.0	1.0	1.3	0.8
ZCBN5	26	3.8	0.2	0.8	0.8
ZCDH7	23	0.0	0.6	3.3	3.2
ZDLP	50	0.0	-0.1	1.0	1.0
ZDLS1	52	0.0	0.2	0.9	0.9
ZNQO3	9	0.0	-0.0	1.8	1.8
ZQAY4	63	0.0	-2.1	2.9	2.0



## APPENDIX G

## VOSCLIM SHIP SUSPECT LIST FOR JANUARY 2007

All VOSCLim ship data is monitored against background 6-hour forecast fields for all variables except SST, for which analysed fields from the previous day are used.

Key to table below

NumObs : number of observations (obs) from the ship during the month  
 %GE : percentage of obs with gross errors (for GE limits see below)  
 StdDvn : standard deviation of obs-background, excluding obs with gross errors  
 Bias : mean obs-background, excluding obs with gross errors  
 RMS : root mean square of obs-background, excluding obs with gross errors

Suspect selection criteria for each variable:

at least 20 observations from the ship and one or more of the following:-

%GE	>	10%
Bias	>	Bias limit (see below)
StdDvn	>	StdDvn limit (see below)

Limits:	Press.	Wind Speed / Direct.		Air Temp.	Rel.Hum.	SST
-----	(hPa)	(m/s)	(deg)	(deg C)	(%)	(deg C)
Bias limit	2.5	5	30	2.0	10	2.0
StdDvn limit	5.0	10	60	4.0	20	4.0
GE limit	15.0	25	150	10.0	50	10.0

Callsign	Element	NumObs	%GE	StdDvn	Bias	RMS
PDHO	Press	48	0	0.9	-2.7	2.9
VTXK	Press	68	0	1.5	6.5	6.7
VCLM	Speed	35	11	4.8	4.1	6.3
VTXK	Speed	63	0	3.0	7.4	8.0
ZDLP	Speed	50	14	2.4	0.5	2.5
CGJK	Temp	233	0	1.5	4.1	4.3
PDZS	Temp	63	0	2.2	2.3	3.2
CGJK	RelHu	233	0	8.8	-10.7	13.8
C6SS3	RelHu	45	0	5.6	12.5	13.7
ELXT8	RelHu	28	0	14.0	20.0	24.4
IBPW	RelHu	25	0	7.5	17.1	18.6
PDZS	RelHu	62	0	12.6	-13.0	18.1
VOCJ	RelHu	221	0	8.2	-10.5	13.3
VTXG	RelHu	27	0	9.8	10.0	14.0
ZCBN5	RelHu	25	0	6.1	10.4	12.0
DQVN	SST	65	0	0.6	2.1	2.2
VOCJ	SST	39	0	2.4	3.3	4.1

**APPENDIX H**

**BUFR CODE TEMPLATE**

CALL\_SIGN  
LTTD  
LNGD  
YEAR  
MNTN  
DAY  
HOUR  
MINT  
COLTN\_CNTR  
BLTN\_IDNY  
MSL\_PESR  
SRFC\_WIND\_SPED\_RCRDG\_IDNY  
SRFC\_WIND\_DRCTN  
SRFC\_WIND\_SPED  
SRFC\_WIND\_U  
SRFC\_WIND\_V  
SRFC\_AIR\_TMPR  
WET\_BULB\_RCRDG\_IDNY  
WET\_BULB\_TMPR  
SRFC\_DEW\_PONT\_TMPR  
SRFC\_RLTV\_HUMDY  
HRZL\_VSBLY  
CRNT\_WTHR\_TYPE  
PRMY\_PAST\_WTHR\_TYPE  
TOTL\_CLOD\_AMNT  
LWST\_CLOD\_AMNT  
LWST\_CLOD\_BASE\_HGHT  
LOW\_CLOD\_TYPE  
MEDM\_CLOD\_TYPE  
HIGH\_CLOD\_TYPE  
Q3HOUR\_SHIP\_DRCTN  
Q3HOUR\_SHIP\_SPED  
SEA\_SRFC\_TMPR\_RCRDG\_IDNY  
SEA\_SRFC\_TMPR  
BCKD\_YEAR  
BCKD\_MNTH  
BCKD\_DAY  
BCKD\_HOUR  
BCKD\_FRCT\_LNGH  
MODL\_SRFC\_TYPE  
MODL\_SRFC\_HGHT  
BCKD\_MSL\_PESR  
BCKD\_SRFC\_WIND\_U  
BCKD\_SRFC\_WIND\_V  
BCKD\_SRFC\_AIR\_TMPR  
BCKD\_SRFC\_RLTV\_HUMDY  
BCKD\_SEA\_SRFC\_TMPR