WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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

SOT-7/ Doc. 9.1.1 (21.03.2013)

SHIP OBSERVATIONS TEAM (SOT)

ITEM: 9.1.1

Original: ENGLISH

SEVENTH SESSION

VICTORIA, CANADA, 22-26 APRIL 2013

REGIONAL SPECIALISED METEOROLOGICAL CENTRE (RSMC), EXETER, VOS **MONITORING REPORT**

(Submitted by Colin Parrett (United Kingdom), RSMC Exeter)

Summary and purpose of the document

This document provides information on the VOS data quality monitoring conducted by the Regional Specialized Meteorological Centre (RSMC) operated by the United Kingdom Met Office in Exeter.

ACTION PROPOSED

The Team will review the information contained in this report, and comment and make decisions or recommendations as appropriate. See part A for the details of recommended actions.

Appendices: A. Met Office on-line monthly VOS suspect list for February 2013

- Current criteria for monthly monitoring of marine surface observations
- C. Proposed criteria for monthly monitoring of marine surface observations
- Timeliness of VOS observations received at the Met Office, February 2013
- Met Office on-line time of receipt statistics for individual ships, February 2013 E.
- F. Met Office on-line time of receipt statistics for national fleets, February 2013
- Scheme for ranking VOS ships by quantity and quality of reports

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

9.1.1 - Regional Specialized Meteorological Centre (RSMC) Exeter VOS monitoring report

- 9.1.1.1 Ms Sarah North (United Kingdom) reported on the activities of the Regional Specialized Meteorological Centre (RSMC) Exeter, acting as CBS Lead Centre for monitoring the quality of surface marine observations. It routinely produces monthly and biannual quality reports as well as providing essential feedback to VOS operators regarding the quality of the data delivered by VOS ships.
- 9.1.1.2 The Met Office (RSMC Exeter) continues to compile lists of ships that have produced suspect observations each month (see Appendix A), which are available via the Met Office web site¹ and are also sent to the WMO Secretariat.
- 9.1.1.3 Following action 102 from SOT-6, the Met Office agreed that the criteria for labeling ships as 'suspect' should be substantially tightened for ships that report with automatic observing systems, because these systems are seen to be more reliable and less prone to errors than manual observing systems. Due to steady improvements in the background forecasts, the criteria for ships with manual observing systems should also be tightened slightly. The Team agreed that the monitoring criteria should be set at the values shown in Appendix C. To facilitate the separate monitoring of 'automatic ships' the station type ("ix") should be included in all reports; the alternative of using "atm" from the ship metadata would require changes at the Met Office, which may delay implementation of the separate monitoring of manual and automatic ships.
- 9.1.1.4 The Met Office also produces monthly lists of monitoring statistics for all VOS, which are sent to the VOS focal points and are also available from the Met Office web site. To maintain up to date lists of ships, the Met Office advised that it was using the latest data downloaded from the online E-SURFMAR metadata database, rather than from the WMO Pub47 database. In addition, the Met Office uses the masked call sign data available from the JCOMMOPS FTP site³.
- 9.1.1.5 It was noted that the SHIP masking scheme implemented by JMA in 2007 continues to prevent the Met Office from monitoring data from individual Japanese and possibly some US ships. Although the Met Office is able to collect data with real call-signs from JMA's FTP server, it is unable to route the data to its meteorological database due to problems with guaranteeing data security. In January 2013 there were 23457 reports of pressure from VOS with call-sign "SHIP", compared to just 3222 reports in March 2012, with the large increase being due to more automatic reports (now accounting for about 85% of the total) .
- 9.1.1.6 Timeliness information for VOS reports received at the Met Office is also made available from the observation monitoring web site² (see Appendices D and E). This information shows that the majority of ship reports continue to be received promptly, with about 70% received within 15 minutes and 90% within 60 minutes of the observation time. Timeliness information for individual ships is also available from the website. The Team agreed that the timeliness information for national fleets should be split into two, for automatic and manual reports.
- 9.1.1.7 The Team noted that the Met Office had made monthly VOS ranking scheme results available on their website for all VOS and for the national VOS fleets (action 101 from SOT-6). The monthly scheme is similar to the annual scheme that was described at SOT-6, ranking the VOS ships and whole fleets in terms of the timeliness, quantity and quality of their reports. Separate monthly lists of scores have been produced for automatic and manual ships. Details of the ranking scheme, an excerpt from the 2012 annual scores and national fleet rankings for February 2013 are shown in Appendix F. VOS operators were invited to consider the value of the monthly and annual performance ranking system and to advise the Met Office if they considered that the parameters used were appropriate.

 $^{^{1}:} http://research.metoffice.gov.uk/research/nwp/observations/monitoring/index.html\\$

^{2:} http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html

^{3:}ftp://mask2real:vosmask@ftp.jcommops.org/mask2real.csv

The meeting decided on the following action items:

- (i) RSMC to contact other monitoring centres regarding new monitoring criteria (*action*; *RSMC*; *August 2013*);
- (ii) Start using the new monitoring criteria (action; RSMC & other monitoring centres; deadline to be agreed possibly January 2014);
- (iii) PMOs to contact ships on monthly suspect lists to rectify any problems (*action*; *PMOs*; *ongoing*);
- (iv) RSMC to separate timeliness information for manual and automatic ships (*action; RSMC; April 2014*).

- B - BACKGROUND INFORMATION

Monitoring the quality and timeliness of VOS observations

- 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.
- Monthly lists of suspect marine platforms are sent to the WMO Secretariat and also exchanged among other monitoring centres (including JMA, NCEP, MeteoFrance and ECMWF) for comparison. Generally there is considerable agreement between the different centres, both in terms of suspect platforms (using the same criteria) and mean and standard deviation of differences from the background fields. The Met Office monthly suspect lists are available via the Met Office web site at http://research.metoffice.gov.uk/research/nwp/observations/monitoring/index.html. A recent example of our on-line VOS suspect list for February 2013 is shown in Appendix A. Monthly QC plots are also available from the website for each ship that is listed as suspect.
- Originally only mean sea level pressure was monitored, but wind speed, wind direction, sea surface temperature, air temperature and relative humidity have been added to the information being exchanged on a monthly basis. The current monthly monitoring criteria for the 6 variables are shown in Appendix B. In response to action 102 from SOT-6, we propose some tightening of these monitoring criteria. The selection criteria for labeling ships as 'suspect' have remained unchanged for up to 25 years (for pressure), during which time there have been large improvements in data assimilation, numerical modeling and data coverage (with many more satellite data types assimilated by the models). Consequently, the short-range background forecasts are more accurate now, resulting in smaller observation-background (o-b) differences overall. Thus we suggest a slight tightening of the criteria for manual observations (for which the criteria were originally agreed), as shown in Appendix C (i).
- Also, over recent years there has been a large increase in the number of ships that send in reports from automatic weather stations, which are generally more accurate and less prone to errors than manual reports. Therefore we suggest that the monitoring of 'automatic ships' be separated from the monitoring of 'manual ships' and tighter limits imposed for automatic ships), as shown in Appendix C (ii). These values are based on o-b statistics, with the mean (or bias) limits set at approximately 1.5 times the rms o-b values for all observations in each category over the past year. The meeting is invited to confirm that the monitoring criteria shown in Appendix C are set at the correct levels, or to propose more appropriate values. (N.B. The splitting of the monitoring into manual and automatic ships requires that "i_x" be set correctly in all reports. The alternative of using "atm" from the ship metadata would require changes to the Met Office processing and may delay implementation of the separate monitoring of manual and automatic ships.)

- 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 uses the meta-data available from the E-SURFMAR web-site.
- 6 Masked call sign data available from the JCOMMOPS Mask vs Real database is also taken into account when preparing the lists of VOS monitoring statistics.
- National focal points are 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 mailing list information is kept up to date. However, national 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.
- Every 6 months more detailed monitoring reports, for all platforms, are 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. The Team is invited to note that the Met Office intends to discontinue producing the individual time-series plots for each suspect platform, due to the time-consuming nature of this work and doubts as to the usefulness of these time-series for correcting problems, especially considering the monthly information available (mentioned above). If the general overview and statistics are still required these will continue to be produced and be available from the Met Office web site.
- 9 Timeliness statistics for VOS reports received at the Met Office are available from our web site at http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html where monthly timeliness data for individual VOS is available as well as tables and graphs showing the relative timeliness of national VOS fleets. A graphical example for February 2013 data is shown in Appendix D, where it can be seen from the upper graph that the majority of ship reports were received promptly, with about 70% received within 15 minutes and more than 90% received within 60 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 that about 95% of global VOS data are being received in time to be assimilated. An example of timeliness information for individual call-signs during February 2013 is shown in Appendix E. The timeliness has improved markedly over the last 4 years, mostly due to increased automation. The Met Office proposes separating the automatic ships from the manual ships to produce two sets of timeliness statistics for national VOS fleets.
- For the last 2-3 years the Met Office has been producing annual lists of all VOS ships, ranked in order of importance to the numerical weather prediction (NWP) system, available from the Met Office web-site at http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/VOSranking/index.html. The ships are ranked in terms of their quantity, quality and timeliness of reports, largely to assist in presenting awards to the best performing ships (initially in the UK VOS fleet). The method and latest results for the UK fleet are shown in Appendix F. Recently this system has been extended to produce monthly scores and ranking lists, separately for automatic and manual ships and for national VOS fleets. These monthly lists are also available from the above link.
- 11 As mentioned at SOT-5 and SOT-6, the Met Office's role as CBS Lead Centre for monitoring marine data is incomplete, with Japanese ships not being monitored individually, due to JMA's

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adoption of the 'SHIP' masking scheme. The Met Office continues to collect the original data from JMA's FTP server, but this data is not routed into our meteorological database due to issues concerning its security. Consequently, to ensure that the VOS can continue to be monitored efficiently, the Met Office (RSMC Exeter) would prefer that all countries adopt a masking method with a unique masked identifier for each ship, until a new ENCODE masking scheme is rolled out.

Appendices: 7

APPENDIX A

MET OFFICE ON-LINE MONTHLY VOS SUSPECT LIST FOR FEBRUARY 2013

Pub47 VOS Suspects for Feb 2013

SKAUBRYN

CA

To view the suspect threshold for each variable and statistic, hover your cursor over the relevant column. Please note that the bias and standard deviation statistics listed below exclude observations having gross errors.

| error | э. | | | | | | |
|----------|---------------------------------|----------------|----------|-----------|-----------------------|---------------|-------------------|
| | | RESSUR | E (hPa | | | | |
| CTR' | | CALL SIGN | TOTAL | GE (%) | BIAS | SD | Graph |
| CA | SAMUEL RISLEY | CG2960 | 166 | 45 | 0.0 | 0.7 | QC plo |
| DE | MSC ALTAIR | A8YN2 | 25 | 0 | -7.4 | 1.0 | QC plo |
| ΙT | COSTA FASCINOSA | ICPO | 44 | 0 | -4.5 | 4.3 | QC plo |
| NL | HAPPY RIVER | PCAW | 46 | 0 | -6.8 | 0.6 | QC plo |
| RU | VIKTOR TKACHEV | UCJX | 29 | 0 | 7.0 | 1.6 | QC plo |
| RU | VILNUS | UFJN | 33 | 12 | -4.1 | 0.9 | QC plo |
| US | ENSIGN | WBN3012 | 26 | 0 | -4.9 | 2.6 | QC plo |
| US | HONOR | WDC6923 | 29 | 0 | -4.3 | 0.9 | QC plo |
| US | NIEUW AMSTERDAM | PBWQ | 47 | 0 | -4.9 | 1.0 | QC plo |
| JS | VISION OF THE SEAS | C6SE8 | 27 | 0 | -4.4 | 0.9 | QC plo |
| | | PERATU | RE (de | | | | |
| CTR' | SHID NAME | CALL SIGN | TOTAL | GE (%) | BIAS | SD | Graph |
| CA | NEWFOUNDLAND LYNX | VAAZ | 124 | 84 | -12.4 | 3.7 | QC plo |
| CA | OCEANEX SANDERLING | VOLG | 602 | 36 | -0.4 | 1.1 | QC plo |
| | | ND SPEE | | | 0.1 | 1.1 | QC pic |
| CTR | Y | CALL | | GE | | | |
| COD | | SIGN | TOTAL | (%) | BIAS | SD | Graph |
| T | LA SUPERBA | ICGK | 90 | 3 | 5.9 | 3.4 | QC plo |
| JS | EVER DELUXE | 9V7953 | 60 | 10 | 8.2 | 3.5 | QC plo |
| JS | TROPIC OPAL | J8NW | 23 | 0 | 5.4 | 2.1 | QC plo |
| | WINI | DIREC | TION (| (deg) | | | |
| CTR | | CALL | TOTAL | GE | BIAS | SD | Graph |
| COD | E | SIGN | | (%) | | | |
| CA | ALGOSCOTIA | VAAP | 332 | 17 | 74.2 | 111.1 | QC plo |
| CA | NAMAO | CZ9742 | 51 | 0 | -36.8 | 13.0 | QC plo |
| -R | MAIDO | FNHC | 167 | 0 | 41.2 | 16.3 | OC plo |
| FR CO | MN COLIBRI (AWS) | FNHO | 208 | 0 | 72.5 | 74.4 | QC plo |
| GB | Berge Atlantic | LAIP5 ZCBU5 | 31 26 | 6 0 | - 54.3 14.5 | 68.3 118.1 | QC plo |
| GB GB | Grand Princess Maersk Patras | MYSU5 | 27 | 0 | -21.8 | 89.4 | QC plo |
| JP JP | NIKKEI PHOENIX | H9UY | 21 | 0 | -21.8 | 83.3 | QC plo |
| TR | HILDE A | TCXV7 | 31 | 0 | 61.5 | 24.1 | QC plo |
| JS | BULWARK | WBN4113 | 25 | 0 | -32.8 | 29.5 | QC plo |
| US | EAGLE TRENTON | S6NK4 | 26 | 0 | -0.1 | 92.2 | QC plo |
| US | EVER DELUXE | 9V7953 | 36 | 17 | -39.0 | 30.3 | QC plo |
| US | LAURENCE M. GOULD (AWS) | WCX7445 | 121 | 0 | 12.7 | 82.0 | QC plo |
| US | MARCUS G. LANGSETH (AWS) | | 53 | 8 | -19.2 | 87.5 | QC plo |
| | , , | TIVE HU | | _ | | | 40 pie |
| CTR | Y SHID NAME | CALL | TOTAL | GE | BIAS | SD | Graph |
| COD | E | SIGN | | (%) | | | |
| CA | AIVIK | VOPP | 426 | 7 | 31.2 | 15.5 | QC plo |
| CA | NEWFOUNDLAND LYNX | VAAZ | 71 | 0 | 29.8 | 7.3 | QC plo |
| CA | OOCL MONTREAL | VRYO3 | 170 | 0 | 16.5 | 11.7 | QC plo |

230

3FZK3

0 27.2

8.5

QC plot



APPENDIX B

CRITERIA FOR MONTHLY MONITORING OF MARINE SURFACE OBSERVATIONS

Monitoring procedures

```
:One calendar month.
Period
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
                          :Mean sea level pressure (hPa). :Wind speed (ms^{-1}).
Elements monitored
                          :Wind direction (degrees).
                          :Air temperature (°C).
                          :Relative Humidity (%).
                          :Sea surface temperature (°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
                         :Standard deviation 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).
                         :Root Mean Square difference of observations from
        RMS
                           background values, excluding those with gross errors.
GROSS ERROR LIMIT
                          :15 hPa
                                       (pressure)
                          :25 ms<sup>-1</sup>
                                      (vector wind)
                          :15 °C
                                       (air temperature)
                          :50%
                                       (relative humidity)
                          :10 °C
                                     (sea surface temperature)
SELECTION CRITERIA
                          :NOBS >= 20 , and one or more of the following:
                          1.Bias
                                               4 hPa
                                                           (pressure)
                                     >=
                                               5~\mathrm{ms}^{-1}
                                                           (wind speed)
                                               30 degrees (direction)
                                               4 ^{\circ}C
                                                          (air temperature)
                                                           (relative humidity)
                                     >=
                                               15%
                                               3 °C
                                     >=
                                                          (SST)
                          2.SD
                                               6 hPa
                                                           (pressure)
                                     >=
                                               80 degrees (direction)
                                     >=
                                               6 °C
                                                          (air temperature)
                                     >=
                                                           (relative humidity)
                                               25%
                                     >=
                                               5 °C
                                     >=
                                                           (SST)
                          3.PGE
                                               2.5
                                     >=
```

N.B. Observations of wind direction are only included in the wind direction statistics if the observed or background wind speed is greater than 5 $\rm ms^{-1}$

APPENDIX C

PROPOSED NEW CRITERIA FOR MONTHLY MONITORING OF (I) MANUAL VOS, (II) AUTOMATIC VOS

I. Manual ships

SELECTION CRITERIA :NOBS >= 15 , and one or more of the following: 3 hPa 1.Bias >= (pressure) $4~\mathrm{ms}^{-1}$ >= (wind speed) 30 degrees (direction) >= 3 °C >= (air temperature) 15% >= (relative humidity) $2.5~^{\circ}\text{C}$ >= (SST) 5 hPa (pressure) 2.SD >= 70 degrees (direction) >= 5 °C (air temperature) >= 25% 4 °C

>=

>=

3.PGE >=

II. Automatic ships

SELECTION CRITERIA

:NOBS >= 50 , and one or more of the following:

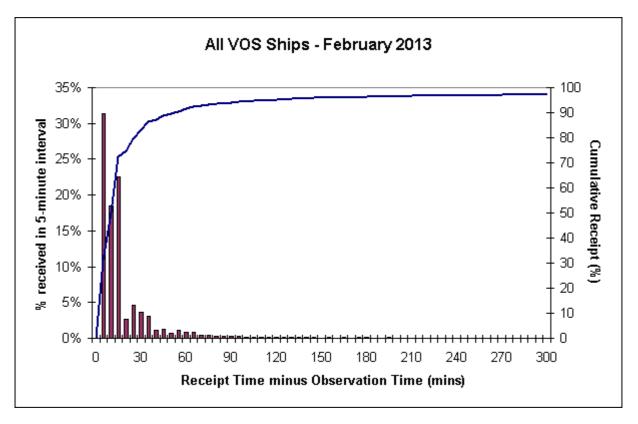
25

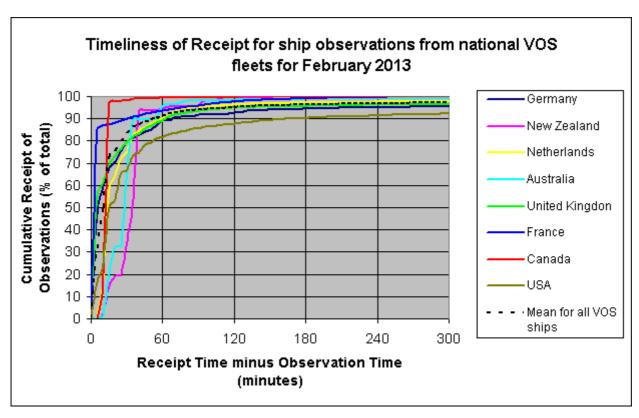
(relative humidity)

(SST)

| 1.Bias | >= | 2 hPa | (pressure) |
|--------|----|----------------------|---------------------|
| | >= | $4~\mathrm{ms}^{-1}$ | (wind speed) |
| | >= | 25 degrees | (direction) |
| | >= | 2.5 °C | (air temperature) |
| | >= | 12% | (relative humidity) |
| | >= | 2 °C | (SST) |
| 2.SD | >= | 4 hPa | (pressure) |
| | >= | 50 degrees | (direction) |
| | >= | 4 °C | (air temperature) |
| | >= | 20% | (relative humidity) |
| | >= | 3 °C | (SST) |
| 3.PGE | >= | 15 | |

APPENDIX D
TIMELINESS OF VOS OBSERVATIONS RECEIVED AT THE MET OFFICE, FEB 2013





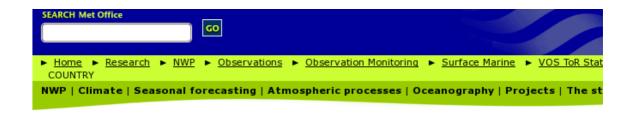
APPENDIX E

MET OFFICE ON-LINE TIME OF RECEIPT STATISTICS FOR INDIVIDUAL SHIPS, FEB 2013



APPENDIX F

MET OFFICE ON-LINE TIME OF RECEIPT STATISTICS FOR NATIONAL FLEETS, FEB 2013



Pub47 Time of Receipt Statistics by COUNTRY for February

| | | | Average | N<30 | N<60 | N<120 | N>36 <u>0</u> | %<3 <u>0</u> | %<6 <u>0</u> | %<120 | %>36 <u>0</u> | Average |
|---------|-------|--------------|-------------|--------|--------|--------|---------------|--------------|--------------|-------|---------------|----------------|
| COUNTRY | Ships | Observations | (Obs/Ships) | mins | mins | mins | mins | | | mins | mins | (R-O) (mins |
| AU . | 55 | 3964 | 72.1 | 2629 | 3787 | 3902 | 31 | 66% | 96% | 98% | 1% | 34.8 |
| DK : | 2 | 736 | 368.0 | 736 | 736 | 736 | 0 | 100% | 100% | 100% | 0% | 3.6 |
| EU : | 22 | 9314 | 423.4 | 8871 | 9312 | 9312 | 2 | 95% | 100% | 100% | 0% | 5.5 |
| FR ! | 56 | 16022 | 286.1 | 14397 | 15012 | 15658 | 5 | 90% | 94% | 98% | 0% | 13.0 |
| GB : | 259 | 23889 | 92.2 | 19010 | 21320 | 22660 | 769 | 80% | 89% | 95% | 3% | 51.7 |
| GR : | 2 | 5 | 2.5 | 4 | 4 | 5 | 0 | 80% | 80% | 100% | 0% | 23.8 |
| NL I | 83 | 2868 | 34.6 | 2152 | 2589 | 2761 | 60 | 75% | 90% | 96% | 2% | 37.4 |
| NZ : | 18 | 1043 | 57.9 | 360 | 989 | 1037 | 0 | 35% | 95% | 99% | 0% | 33.2 |
| CA . | 41 | 21784 | 531.3 | 21432 | 21652 | 21712 | 12 | 98% | 99% | 100% | 0% | 12.3 |
| DE . | 440 | 19637 | 44.6 | 15621 | 17475 | 18188 | 270 | 80% | 89% | 93% | 1% | 37.8 |
| HK : | 28 | 449 | 16.0 | 15 | 414 | 428 | 12 | 3% | 92% | 95% | 3% | 78.7 |
| IE : | 2 | 32 | 16.0 | 29 | 29 | 30 | 0 | 91% | 91% | 94% | 0% | 24.6 |
| IL | 4 | 49 | 12.2 | 41 | 45 | 45 | 4 | 84% | 92% | 92% | 8% | 65.7 |
| IN : | 11 | 89 | 8.1 | 29 | 58 | 75 | 4 | 33% | 65% | 84% | 4% | 103.5 |
| IS : | 3 | 112 | 37.3 | 105 | 107 | 111 | 0 | 94% | 96% | 99% | 0% | 4.3 |
| IT : | 3 | 296 | 98.7 | 200 | 264 | 286 | 2 | 68% | 89% | 97% | 1% | 25.7 |
| JP : | 13 | 1179 | 90.7 | 1068 | 1152 | 1166 | 7 | 91% | 98% | 99% | 1% | 38.1 |
| KR : | 3 | 5 | 1.7 | 0 | 0 | 0 | 2 | 0% | 0% | 0% | 40% | 423.0 |
| MY : | 3 | 97 | 32.3 | 0 | 93 | 97 | 0 | 0% | 96% | 100% | 0% | 56.6 |
| NO : | 5 | 2758 | 551.6 | 2753 | 2757 | 2757 | 0 | 100% | 100% | 100% | 0% | 11.6 |
| RU . | 57 | 1398 | 24.5 | 831 | 1230 | 1280 | 75 | 59% | 88% | 92% | 5% | 56.5 |
| SE : | 16 | 817 | 51.1 | 418 | 483 | 742 | 58 | 51% | 59% | 91% | 7% | 95.9 |
| US 4 | 429 | 24830 | 57.9 | 16639 | 20280 | 21796 | 1793 | 67% | 82% | 88% | 7% | 99.0 |
| ZA : | 1 | 17 | 17.0 | 5 | 10 | 12 | 2 | 29% | 59% | 71% | 12% | 173.8 |
| ZZ : | 2 | 36 | 18.0 | 20 | 35 | 35 | 1 | 56% | 97% | 97% | 3% | 59.7 |
| Total : | 1558 | 131426 | 84.4 | 107365 | 119833 | 124831 | 3109 | 82% | 91% | 95% | 2% | 42.2 |

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APPENDIX G

SCHEME FOR RANKING VOS SHIPS BY QUANTITY AND QUALITY OF REPORTS

Ranking Method

Statistics for each ship are accumulated for the year and these are used to rank the ships in terms of number of reports received, quality of the data and timeliness of the reports throughout the year.

The variables considered are:

- Pressure (P)
- Wind speed (Spd)
- Wind direction (Dir)
- Temperature (T)
- Relative humidity (RH)
- Visibility (Vis)
- Sea Surface Temperature (SST)
- these are the variables reported by SHIPs that are assimilated operationally at the Met Office.

Number of reports score

The set of numbers of reports received (Nobs) is 'capped' to limit the influence of any very high numbers from automatic stations, then a score is calculated for the number of observations (obs) received:

Firstly the values in Nobs are inversed to give low (good) scores to ships with high numbers of obs and vice-versa, Nobs = MAX(Nobs) - Nobs

Secondly, so that ships with below average numbers have scores greater than 1.0, and vice-versa, we set **NumObsScore** = **Nobs** / **MEAN(Nobs)**

Quality score

Quality scores for each variable are calculated, based on the following observation-minus-background (O-B) statistics:

MeanScore = (Absolute value of mean O-B) / VariableLimit

SDScore = (Standard Deviation of O-B) / VariableLimit

[where the following **VariableLimit** values are used, based on the Met Office reject list thresholds:

P = 2.0 hPa, Spd = 3.0 m/s, Dir = 40 degrees, T = 3.0 C, RH = 15.0 %, Log(Vis) = 1.0, SST = 1.0

3.0 C and GEScore = (Number of Gross Errors) / (Mean number of Gross Errors)

(N.B. For ships with 100% gross errors, the Mean and SD scores are set to the worst in the set.) All scores are capped at 2.0, then a "quality-score" is created for each variable:

QualityScore = (MeanScore + SDScore + GEScore) / 3

Time of receipt score

Time of receipt (ToR) scores are produced from yearly totals for the following ToR categories: reports received within 30 minutes of the report time, 30-60 minutes, 60-120 minutes, 120-360 minutes and after 360 minutes.

Each ship is given a score that is the sum of the following numbers of points for each category

multiplied by the number of observations in that category:

points_30 = 0.0, points_60 = 30.0, points_120 = 75.0, points_360 = 225.0, points_after = 345.0 (These scores are just the values of the mid points of the ranges minus the mid-point of the first range (15 minutes) to make the best score zero; and 'points_after' has just been set to 360 minus 15 as the range is unbounded.)

The ToR scores are then divided by the scores the ships would have received had all of their observations been received between 60 and 120 minutes, i.e. we are suggesting that observations should really have been received within two hours and that reports received later than that are less useful to NWP. The ToR scores are also capped at 2.0.

Combined score

The NumObs, Quality and ToR scores are combined with weights of 0.4, 0.4 and 0.2, respectively, for each variable.

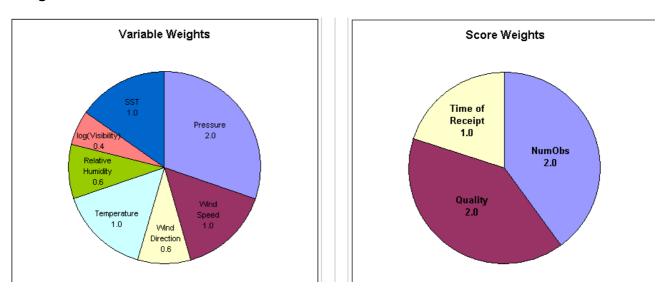
For ships that do not report certain variables the scores are set to the worst score for that variable (usually 2.0).

Then the scores for each variable are combined using the following weightings:

$$P = 2.0$$
, $Spd = 1.0$, $Dir = 0.6$, $T = 1.0$, $RH = 0.6$, $Vis = 0.4$, $SST = 1.0$.

These weightings are estimates of the relative importance of each variable to the NWP models (their values may need some further tuning).

Weights



N.B. The above ranking scheme is only intended to give an indication of the relative performance of individual observing ships and marine platforms. It is primarily aimed at usefulness for NWP and therefore only takes into account observations that have been received in near real time. It takes no account of delayed mode observations collected for climate studies (for which timeliness is largely irrelevant).

Annual VOS ranking scheme – some of the 'best' ships for 2012

| American | | Edit View I | P File Edit View Insert Format | Tools | Data Contr | Contributor Win | Window Help | | | | | | | | | | | Type a que | Type a question for help | 6 1 4 |
|--|---------|--|--------------------------------|---------|------------|-----------------|------------------------------------|---------|--------------|-----------|--|--------|----------|----------------|----------|--------------------|--------------|------------|--------------------------|------------|
| Marke Mark | - | | - <u>-</u> | 4 | 6 6 - 5 | 100 | W | → Z → | 100% | (S) | Arial | | + | I | | 171 | . % | 800 | • | . A . € |
| | U34 | Þ | ** | | | | | | | | | | | | | | | | | |
| Mine 0.12 0.555 0.147 0.10 0.105 | ∢ | 8 | O | ٥ | ш | Н | 9 | I | _ | ſ | × | _ | Σ | z | 0 | а. | o | œ | S | _ |
| Marco 0.124 656 0.156 0.166 0.0.05 | 1 Annua | al VOS ra | inking list f | or 2012 | ۰. | | | | | | | | | | | | | | 70.7 | |
| Marker 1715 186677 1589 1580 1484 1889 1445 1889 1445 1889 1444 1889 144 | 7 6 | | Min: | 0.124 | | 0.055 | _ | 0.106 | | 0.083 | - | 0.057 | _ | 1,094 | - | 0.105 | - | 0.129 | - | 000 |
| Company Comp | 0 4 | | Max: | 1.315 | 15667 | 1.589 | 8679 | 1.560 | 8698 | 1.445 | 59889 | 1.642 | 8685 | 1.411 | 8685 | 1.164 | 34637 | 1.503 | 62153 | 2.000 |
| Commitment Pressure Wind Direction Temperature Relative Humiday Visibility Combined Pressure Wind Direction Temperature Relative Humiday Visibility Combined Comb | | | Ave: | 0.711 | | 0.717 | 029 | 0.706 | 299 | 0.662 | 297 | 0.662 | 652 | 0.650 | 525 | 0.577 | 257 | 0.644 | 407 | 0.460 |
| Column Child Helmond Page Manole Page Manole Manol | | | | Comb | ined | Pressu | J. | Wind Sp | peed | Wind Dire | ction | Temper | | Relative H | lumidity | Visibili | | Sea Surfa | | Time of Re |
| 1-4-14 Herhold 0.124 24.075 0.065 8673 0.152 8899 0.063 0.157 0.156 0.154 0. | | · ShipID · | Ship N + C | .omb5 ▼ | Num0! → | | | SP Sci+ | NumO! → [| N Sci+ N | Ium0! → T | | um0t + R | H Sci + N | V → 10mm | | Ium0l → T | S Sci + N | | oR Si+le |
| NAME MARTHER 0.192 44752 0.085 6455 0.156 0.154 5624 0.157 7.056 0.154 7.757 0.456 0.155 | _ | LF4H | HEIMDAL | 0.124 | 50116 | | | 0.132 | 8698 | 0.083 | 5762 | | 8685 | 0.094 | 8685 | | 2538 | 0.270 | 2069 | 0.004 |
| DBMM MELVMER AND ASSOCIATION AND | 200 | KAOU | ROGER F | 0.192 | | 0.085 | 8455 | 0.166 | 8453 | 0.314 | 3624 | 0.157 | 7905 | 0.135 | 7773 | 0.476 | 114 | 0.313 | 8428 | 0.081 |
| DBRF WALTHER 12,72 43316 11,77 7767 12,10 7665 12,24 43916 11,77 7767 12,10 7667 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,77 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 43916 11,24 7767 12,24 | | DBJM | NEUWER | 0.207 | | 0.117 | 7794 | 0.131 | 8014 | 0.140 | 5297 | 0.099 | 8023 | 0.168 | 7948 N | #ISSING | 0 ; | 0.298 | 2830 | 0.008 |
| ODER WALTHELL 0.21 4.435 0.17 7787 0.13 7.84 0.12 4.84 0.02 4.84 0.02 4.84 0.02 4.84 0.02 4.84 0.02 4.84 0.02 7.84 0.02 | | DBBH | METEOR | 0.208 | | 0.178 | 7650 | 0.210 | 7653 | 0.234 | 4398 | 0.155 | 7650 | 0.214 | 7650 | 0.140 | 7644 | 0.325 | 7435 | 0.167 |
| VACAGE NET RATE NO. 1216 11734 0.0032 0.0022 0.1246 0.0034 | | DBFR | WALTHER | 0.212 | | 0.121 | //8// | 0.138 | 7984 | 0.235 | 3803 | 0.095 | 8817 | 6.13 | 2008/ | AISSING. | | 0.284 | 7826 | 0.009 |
| COSAGO WEEN HARDLY COZAGO | | VCRG | CIMAMA | 0.216 | | 0.093 | 8897 | 0.248 | 893 | 0.267 | 4035 | 0.081 | 500 | 0.133 133 | 7914 | 0.465 | [A] | 0.486 | 3209 | 90.0 |
| VCLM IACHTOL 0.224 38877 0.101 670 10.408 80.10 0.048 0.01 0.0100 0.01 0.04 0.04 VCCSB PIERPER 0.290 38875 0.105 670 10.143 7.24 0.165 8191 MISSING 0.10 0 | | 0.62365 | ₩. ₩. | 0.227 | | 0.092 | 7367 | 0.176 | /9/3 | 0.444 | 176 | 98 | (9/3 | 0.15/ | 7)6/ | 0.421 | 20 00 | 0.38 | 3/3/ | 0.000 |
| Vocasion Principal Vocasio | | 145 145 145 145 145 145 145 145 145 145 | INCL | 177.0 | | 0.002 | 2170 | 0.00 | 1010 | 0.034 | 000 | 0.000 | 2070 | DAING 0 400 | 0404 | 001.00 | 0 0 | 7000 | 2710 | 0.000 |
| Correct Corr | | NC-IMI | ARCIIC | 0.243 | | 0.107 | - 00 00 00 00 00 00 | 0.121 | 7/00 | 0.331 | 7007 | 0.45 | 2400 | 5 5 | 000 | DNING | 0 040 | 0.434 | 2/4/2 | 0.000 |
| DBMN CLINACLE C.2540 September C.2540 | | 2000 | FIERKE F | 0.20 | | 0.132 | 400 | 0.0 | 2000 | 0.406 | 000 000 0100 0100 0100 0100 0100 0100 | 0.161 | 200.00 | U. 1/3 | 2141 | 0.000 | y 24 0 | 0.947 | 7117 | 0.000 |
| UMED COUNTY COU | | L I I I I | ADIZONIA | 0.200 | | 2 0 0 | 7100 | 0.135 | 7447 | 0.00 | 2077 | 0.15 | 7424 | 0.00 | E790 M | ONIO OF | 0 0 | 0000 | 2117 | 0.000 |
| CGERS CORDON 1.256 37422 0.068 6662 0.144 6663 0.144 6053 MISSING 0.429 V VVVL MARADE 0.256 37422 0.160 7675 0.147 0.119 6199 0.144 8075 0.549 429 V VVVL MARADE 0.256 3866 0.187 6117 0.149 8119 0.144 8075 0.549 429 CGFSS SPIRIT OF 0.256 0.137 0.137 0.149 8119 0.144 8075 0.549 0.243 CGFSS SPIRIT OF 0.256 0.148 6875 0.256 0.347 0.148 0.045 0.045 0.048 0.048 0.347 0.348 0.247 0.048 0.048 0.347 0.348 0.048 0.048 0.347 0.348 0.048 0.347 0.348 0.347 0.348 0.348 0.348 0.348 0.348 0.348 0.348 0.348 0.348 0.348 | _ | NATIONAL PROPERTY. | 10 C C C | 0.234 | | 0.13 | 7556 | 0.00 | 7556 | 0.247 | 37.07 | 0.104 | 7556 | 0.203 | 7536 N | SOUND I | 9 0 | 0.325 | 5707 | 0.00 |
| V.V.W.L. MARIA DE OLOSE 35866 0.137 9113 0.336 1175 0.162 8110 0.194 8076 0.549 42 0.449 V.V.W.L. MARIA DE OLOSE 3.866 0.137 7675 0.139 1782 0.164 8076 0.549 42 0.449 V. CGJK SIR MALAC 0.167 7670 0.137 772 0.137 0.772 0.143 7789 0.164 8078 0.577 0.173 C.GJK SIR WILLF 0.275 310.20 0.167 0.234 0.277 0.172 6849 0.174 0.179 8070 0.170 0.177 0.178 | | CGBR | GORDON | 0.255 | | 0.122 | 855 | 0.200 | 855 | 0.620 | 1243 | 0.130 | 855 | 0.203 | 8253 N | AISSING AISSING | 0 0 | 0.323 | 2308 | 0.010 |
| CFFS9 STADACK 0.260 40642 0.167 7670 0.188 7675 0.339 3133 0.139 7682 0.164 7782 0.168 8772 0.436 2880 0.111 8199 0.144 8199 0.149 819 0.148 0.20 0.428 CGNSD LIMNOS 0.276 3170 0.120 6673 0.276 6674 0.347 234 0.211 6679 0.207 6679 < | | VCWL | MARIA DE | 0.256 | | 0.180 | 7876 | 0.137 | 8113 | 0.395 | 1757 | 0.162 | 8110 | 0.194 | 8076 | 0.549 | 42 | 0.459 | 1882 | 0.009 |
| VNNSZ SPIRIT OR 0, 0288 396907 0.0992 8199 0, 0.327 6476 0.456 2680 0, 0.141 8199 0, 0.149 8199 MISSING 0 0 0, 0.374 | 4 AU | C6FS9 | STADACC | 0.260 | | 0.167 | 7670 | 0.188 | 2/9/ | 0.339 | 3133 | 0.139 | 7682 | 0.164 | 7682 N | IISSING | 0 | 0.333 | 0089 | 0.110 |
| CCUIK SIR WILFI 0.273 32566 0.189 6873 0.239 6876 0.320 6874 0.320 6879 0.276 664 0.347 2334 0.271 6679 0.276 664 0.347 2334 0.271 6679 0.276 664 0.347 2334 0.271 6679 0.276 664 0.347 0.327 6229 0.670 347 0.327 671 0.670 462 486 0.328 C62390 BATFRS3 #WA 0.281 3622 0.261 6274 0.294 2974 0.272 0.262 6276 0.276 6276 0.276 6276 0.276 6276 0.276 6276 0.276 6276 0.277 0.280 0.271 678 0.277 0.289 0.377 0.289 0.377 0.289 0.377 0.289 0.377 0.289 0.377 0.289 0.377 0.289 0.377 0.289 0.377 0.289 0.377 0.289 | | ZSNA | SPIRIT OF | 0.268 | | 0.092 | 8198 | 0.327 | 6772 | 0.436 | 2680 | 0.111 | 8199 | 0.149 | 8199 N | 1ISSING | 0 | 0.374 | 5459 | 0.005 |
| BATFR46 | | SGK | SIR WILFI | 0.272 | | 0.158 | 6873 | 0.239 | 9/89 | 0.385 | 1940 | 0.232 | 9/89 | 0.207 | 0289 | 0.570 | 192 | 0.428 | 2939 | 0.005 |
| CC2360 LIMNOS 0.281 33629 0.123 7466 0.154 749 7511 0.198 7499 MISSING 0 0.473 CC2360 LIMNOS 0.287 20475 0.264 0.284 2047 6222 0.462 489 0.028 CC2900 SAMURE 0.289 20475 0.191 6949 0.243 3867 0.140 7714 0.360 6318 MISSING 0 0.461 BENT HENZ LASTROL 0.229 3673 0.243 287 0.241 287 0.262 6318 MISSING 0 0.461 BENT LASTROL 0.229 3673 0.242 2874 0.271 0.289 0.271 0.289 0.271 0.289 0.271 0.289 0.371 0.289 0.371 0.289 0.371 0.289 0.371 0.289 0.371 0.289 0.371 0.289 0.371 0.289 0.371 0.289 0.371 0.389 0.371 | # _ | BATFR4 | (0) | 0.275 | | 0.220 | 6299 | 0.276 | 5664 | 0.347 | 2334 | 0.211 | 6299 | 0.252 | 6299 | 0.509 | 342 | 0.328 | 5643 | 0.002 |
| MATCHES #WA 0.287 | 8 CA | CG2350 | | 0.281 | 33629 | 0.123 | 7466 | 0.152 | 7541 | 0.439 | 1645 | 0.183 | 7511 | 0.198 | 7469 N | 4ISSING | 0 | 0.473 | 1997 | 0.005 |
| CC22960 SAMUEL 0.287 34353 0.176 7867 0.449 1368 0.184 7799 0.205 7779 MISSING 0 0.461 DBCK HENCKE 0.293 38636 0.131 6751 0.191 6849 0.243 3607 0.186 0.361 0.367 0.360 0.361 0.360 0.361 0.360 0.361 0.360 0.361 0.360 0.361 0.360 0.361 0.361 0.360 0.361 0.361 0.360 0.361 0.361 0.360 0.361 0.361 0.360 0.361 0.361 0.360 0.361 0.361 0.361 0.362 0.361 0.362 0.361 0.362 0.361 0.362 0.361 0.362 <td></td> <td>BATFRS</td> <td>0</td> <td>0.287</td> <td>29475</td> <td>0.261</td> <td>5222</td> <td>0.296</td> <td>5215</td> <td>0.294</td> <td>2974</td> <td>0.237</td> <td>5222</td> <td>0.262</td> <td></td> <td>0.452</td> <td>485</td> <td>0.325</td> <td>5135</td> <td>0.004</td> | | BATFRS | 0 | 0.287 | 29475 | 0.261 | 5222 | 0.296 | 5215 | 0.294 | 2974 | 0.237 | 5222 | 0.262 | | 0.452 | 485 | 0.325 | 5135 | 0.004 |
| PBCK HEINOKE 0.290 36636 0.213 6751 0.191 6349 0.243 3607 0.150 7114 0.380 6318 MISSING 0 0 0.386 0.245 1.101 0.245 1. | CA | CG2960 | | 0.287 | | 0.131 | 7743 | 0.176 | 7867 | 0.449 | 1388 | 0.184 | 7799 | 0.205 | 7799 N | 4ISSING | 0 | 0.461 | 1777 | 0.004 |
| Patrice Lasirhou U.292 36/72 U.128 BH33 U.233 7/112 U.387 U.351 U.235 U.235 U.246 | 1 DE | DBCK | HEINCKE | 0.290 | | 0.213 | 6751 | 0.191 | 6949 | 0.243 | 3607 | 0.150 | 7114 | 0.360 | 6318 № | #ISSING | 0 | 0.366 | 5897 | 0.005 |
| BATIFICIA MAYA 0.293 310.34 0.246 5/51 0.276 5/53 0.259 3010 0.250 5514 0.416 4452 0.391 1103 0.431 0.416 0.4245 0.246 0.234 0.245 0.243 0.244 0.416 0.416 0.416 0.416 0.244 0.416 0.244 0.243 0.244 0.245 0.243 0.244 0.255 0.234 0.245 0.256 0.243 0.256 0.257 0.256 0.257 0.256 0.256 0.256 0.257 0.256 0.257 0.256 0.257 0.256 0.257 | | LH41 | LASIRO | 7670 | | 071.0 | 2 2 2 | 0.233 | 7117 | 0.387 | 2315 | 0.201 | 8183 | 0.252 | /842 N | IISSING 0 000 | 0 00,7 | 0.435 | 700 | 0.227 |
| DBMA PUSEIDU 0.234 3425 0.240 0.134 0.234 0.137 0.224 0.197 0.252 0.255 0.235 0.235 0.235 0.335 0.317 0.256 0.165 0.16 | | 0.4 F R | \$ # Q | 0.233 | | 0.240 | 2/2 | 0.270 | 2/3/ | 0.233 | 2010 | 0.450 | 23.14 | 0.418 | 4430 | B 0 | 3 | 0.331 | 2000 | 0.004 |
| DBA DENIED 1.237 37'862 1.237 1.326 1.32 | | A CO | | 10000 | | 0.200 | 0100 | 0.234 | 9202 | 715.0 | 4767 | 0.197 | 930/ | 0.239 | 2000 | DNING | 5 0 | 0.045 | 0100 | 0.000 |
| Decay Close Clos | | \$000 \$100 \$100 \$100 \$100 \$100 \$100 \$100 | | 267.0 | | 0.20 | 1 00 | 0.200 | 1000 | 0.020 | 7067 | 0000 | 0304 | 0 00 | 7,000 19 | 5 NIN 0 0 | 5 0 | 0.000 | , ,000 | 0.000 |
| December 1975 December 1975 December 1975 December 2975 December 297 | | DATEDA | L . | 0.200 | | 1770 | 4000 | 0.337 | 0000 | 0.100 | 04470 | 0.200 | 4000 | 0.203 | 4007 | D A73 | 673 | 0.044 | 7000 | 0.000 |
| WECB MELVILLE 0.308 33779 0.414 6999 0.226 6759 0.231 3414 0.239 6976 0.246 6999 0.266 6799 0.267 6991 0.247 6999 0.268 6769 0.241 6999 0.268 6769 0.241 6999 0.268 6799 0.248 6993 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.249 6976 0.240 6763 0.240 6763 0.340 4537 0.403 1521 0.373 | | 2 1901 | IOHAN H | 0.307 | | 0.237 | £439 | 0.33 | #300 6465 | 0.207 | 2714 | 0.234 | 5465 | 0.322 | FABS N | IISSING | 7 0 | 0 393 | 4549 | 0.03 |
| WECB MELVILLE 0.308 37715 0.294 6976 0.293 3411 0.239 6976 0.406 6091 0.515 474 0.389 DBBI ATAIR 0.312 34712 0.232 6564 0.271 6931 0.341 2631 0.189 6933 0.238 6623 MISSING 0 0.366 BATUKO1 #N/A 0.314 31792 0.243 6761 0.377 6323 0.319 3164 0.240 6763 0.302 6741 0.587 292 0.368 JPBN KEIFU MA 0.314 35647 0.193 6764 0.474 6761 0.502 3682 0.184 6759 0.205 6750 0.265 6750 0.205 6750 0.366 0.367 6750 0.387 3682 0.184 6759 0.205 6750 0.205 6750 0.667 0.667 0.786 0.786 0.786 0.786 0.786 0.787 0.749 | # 6 | BATEUO | | 0.308 | | 0.241 | 5999 | 0.285 | 5759 | 0.291 | 3449 | 0.250 | 9669 | 0.288 | 5989 | 0.800 | 133 | 0.350 | 5442 | 0.005 |
| DBBI ATAIR 0.312 34712 0.232 6564 0.271 6931 0.341 2631 0.189 6933 0.238 6623 MISSING 0 0.366 BATUKOT #N/A 0.314 31792 0.243 5761 0.377 5323 0.319 3164 0.240 5763 0.302 5741 0.587 292 0.363 JPBN KEIFU M/ 0.314 35647 0.193 6764 0.474 6761 0.502 3562 0.184 6759 0.206 6750 0.561 105 0.341 VRYO3 OOCL MC 0.314 35647 0.193 6764 0.474 6761 0.502 3682 0.184 6759 0.205 6750 0.561 105 0.341 VRYO4 OCCX GEORGE 0.316 34141 0.143 7163 0.308 7163 0.390 1766 0.169 7049 0.202 6902 MISSING 0 0.504 BATER13 #WA 0.318 28430 0.291 4521 0.314 4508 0.315 3072 0.287 4524 0.287 4524 0.287 4524 0.315 3177 0.414 878 0.387 DBBC WEGA 0.318 28430 0.291 4521 0.314 4508 0.315 3072 0.287 4524 0.281 4517 0.414 878 0.387 DBBC WEGA 0.316 34141 0.443 4508 0.316 3072 0.287 4524 0.281 4517 0.414 878 0.387 DBBC WEGA 0.316 34141 0.443 4508 0.316 3454 0.287 4524 0.281 4517 0.414 878 0.387 DBBC WEGA 0.316 34141 0.443 4508 0.316 3454 0.287 4524 0.281 4517 0.414 878 0.387 DBBC WEGA 0.316 34141 0.443 4508 0.316 3454 0.287 4524 0.281 4517 0.414 878 0.387 DBBC 0.387 34141 0.443 0.444 4508 0.316 3414 4508 0.387 4524 0.281 4517 0.414 878 0.387 DBBC 0.387 0.387 0.387 4524 0.387 45 | SN 0 | WECB | | 0.308 | | 0.294 | 9269 | 0.219 | 6703 | 0.293 | 3411 | 0.239 | 9269 | 0.406 | 6091 | 0.515 | 474 | 0.359 | 7084 | 0.154 |
| BATUKOT #N/A 0.314 31792 0.243 5761 0.377 5323 0.319 3164 0.240 5763 0.302 5761 0.367 5923 0.316 40.240 5763 0.302 5761 0.302 5763 0.340 4539 0.243 4549 0.243 | | DBBI | ATAIR | 0.312 | | 0.232 | 6564 | 0.271 | 6931 | 0.341 | 2631 | 0.189 | 6933 | 0.238 | 6623 N | 4ISSING | 0 | 0.366 | 5030 | 0.005 |
| JPBN KEIFU M4 0.314 26791 0.274 4539 0.318 4539 0.306 2906 0.285 4538 0.340 4537 0.403 1521 0.373 (VRYO3 OOCL M4 0.314 35547 0.193 6764 0.474 6761 0.502 3582 0.184 6759 0.205 6750 0.561 105 0.381 (VRYO3 OOCL M4 0.314 31277 0.213 6748 0.202 7063 0.390 1766 0.189 7049 0.202 6902 MISSING 0 0.504 (VEGA 0.314 31277 0.213 6648 0.202 7063 0.390 1766 0.189 7049 0.202 6902 MISSING 0 0.504 (VEGA 0.314 31277 0.213 6648 0.202 7063 0.314 4508 0.315 3072 0.287 4524 0.281 4517 0.414 878 0.387 | | BATUKD | | 0.314 | | 0.243 | 5761 | 0.377 | 5323 | 0.319 | 3164 | 0.240 | 5763 | 0.302 | 5741 | 0.587 | 292 | 0.363 | 5748 | 0.044 |
| VRYO3 OOCL MG 0.314 36547 0.193 6764 0.474 6761 0.602 3682 0.184 6759 0.205 6750 0.561 105 0.381 | 43 JP | JPBN | KEIFU MA | 0.314 | | 0.274 | 4539 | 0.318 | 4539 | 0.306 | 2906 | 0.285 | 4538 | 0.340 | 4537 | 0.403 | 1521 | 0.373 | 4211 | 0.019 |
| CGCX GEORGE 0.316 34141 0.143 7163 0.308 7163 0.387 2525 0.238 7156 0.243 7155 MISSING 0 0.458 BBBC WEGA 0.317 31277 0.221 6648 0.202 7063 0.390 1766 0.169 7049 0.202 6902 MISSING 0 0.504 BATFR13 #WA 0.318 28430 0.291 4521 0.314 4508 0.315 3072 0.287 4524 0.291 4517 0.414 878 0.387 | | VRY03 | OOCL MC | 0.314 | | 0.193 | 6764 | 0.474 | 6761 | 0.502 | 3582 | 0.184 | 6529 | 0.205 | 6750 | 0.561 | 105 | 0.381 | 4826 | 200.0 |
| DBBC WEGA 0.317 3127 0.221 6648 0.202 7.063 0.390 1766 0.169 7.049 0.202 6902 MISSING 0 0.504 BATFR13 #N/A 0.318 28430 0.291 4521 0.314 4508 0.315 3072 0.287 4524 0.291 4517 0.414 878 0.387 | | X (200 | GEORGE | 0.316 | | 0.143 | 7163 | 0.308 | 7163 | 0.387 | 2525 | 0.238 | 7156 | 0.243 | 7155 N | AISSING | 0 | 0.458 | 2979 | 90.0 |
| BATER13 #WA U.318 2643U U.291 452 U.314 4508 U.315 3U/2 U.287 4524 U.291 4517 U.414 6/8 U.367 | | DBBC | > . | 0.317 | | 0.221 | 554g | 0.202 | (Ub3 | 0.390 | 1/86 | 0.169 | (049 | 0.202 | M 2002 | AISSING 6 44 4 | O oto | 0.504 | 1849 | 900.0 |
| \$40.00 - 10.00 0.00 0.00 0.00 0.00 0.00 0. | # | BAIFKI | | 0.318 | | 0.291 | 4521 | 0.314 | 4508 | 0.315 | 30/2 | /87'n | 4254 | 167.0 | 4517 | U.414 | 00/0 | 0.387 | 4410 | 0.004 |
| | | | | | | | | | | | | | | | | | | | | |

| on | | ly | V | Ο | S | na | ati | OI | na | 1 1 | le | et | ra | an | ki | nς | js | fc | r | Fe | eb | ru | ıaı | у | 20 |)1: | 3 - | <u>-</u> r | na | เท ⊢ | ual | Seint & | a | ut | on | na | tic | r | ep | 00 | rts | S | | | |
|----|-------------------|---|-------|----------|-------|-----------|--------|-------|-------|--------------|-------|-------|-------|-------------|-------|-------|-------|----------|-------|-------|---------|--------------|------------|---------|----------|---------|---------|------------|-------|----------|---|-------------------|---|---------------|--------------|-------------|---------|---------------|--------|-------------|---------|-------|------------|--------------|-----------|
| | Time of Receipt | TS Sci+ NumOt+ ToR Si+ e | ≌ | | 0.217 | 4 MISSING | 0.206 | 0.317 | 0.389 | 0.262 | 0.248 | 0.311 | 0.419 | 0.111 | 0.568 | 0.411 | 0.016 | 0.791 | 0.604 | 0.411 | 0.297 | 4704 MISSING | 0.500 | 0.500 | 0.900 | 1.306 | 7.000 | | | S | ua | Time of Re | TS Sci+ NumOt+ ToR Si+he | 2590 MISSING | 0.177 | 0.008 | 0.218 | 0.023 | 0.064 | 5 MISSING | 0.347 | 0.266 | 읡 | 0.021 | 1.454 |
| | ce Temp | 10mn | 2843 | 2195 | 198 | ব | 23 | 2136 | 5965 | 33 | 464 | 98 | 96 | 100 | 518 | 8162 | 27 | 18071 | 391 | 1073 | 22 | 4704 | 0 | 0 | 9 | 4 | 0 | | = | œ | | ce Tem | 10mn | 2590 | 8266 | 640 | 2365 | 2751 | 12249 | Ω. | 0 | 1312 | 1799 | 1176 | 000 |
| | Sea Surface Temp | S Sci + | 0.134 | 0.088 | 0.492 | 0.503 | 0.549 | 0.528 | 0.565 | 0.649 | 0.492 | 0.562 | 0.564 | 0.421 | 0.516 | 0.597 | 0.505 | 0.642 | 0.672 | 0.607 | 0.608 | 0.660 | 31 MISSING | MISSING | 0.838 | 0.773 | MISSING | | | o | | Sea Surface Temp | S Sci+ | 0.10 | 0.289 | 0.427 | 0.383 | 0.622 | 0.528 | 1.417 | MISSING | 0.318 | 0.541 | 0.339 | 111 |
| | | 10mn | 2940 | 0 | 214 | ঘ | 420 | 2731 | 7193 | 33 | 462 | 1168 | 97 | 111 | 230 | 9985 | 47 | 14043 | 433 | 1312 | 46 | 4641 | 31 | | 88 | | 2 | | | _ | | | | | 0 | 0 | 0 | 0 | 88 | 0 | 2 | 83 | 141 | 0 | C |
| | Visibility | Sco - N | 0.083 | MISSING | 0.328 | 0.488 | 0.499 | 0.474 | 0.482 | 0.518 | 0.492 | 0.488 | 0.477 | 0.451 | 0.460 | 0.538 | 0.639 | 0.596 | 0.581 | 0.578 | 0.539 | 0.590 | 0.575 | 0.782 | 0.724 | 0.893 | MISSING | | | 0 | | Visibility | Sco + N | SSING | 8573 MISSING | 640 MISSING | MISSING | ISSING | 0.449 | 733 MISSING | MISSING | 0.480 | 0.399 | 2595 MISSING | 010000000 |
| | umidity | Λ 10mn | 2804 | 2733 M | 386 | 4 | 289 | 2581 | 7019 | Ж | 8 | 1149 | 88 | 0 | 392 | 9649 | 25 | 14067 | 396 | 112 | 14 | 3868 | 0 | 2 | 83 | | Σ 0 | | | z | | umidity | VI → IOmn | 14818 MISSING | 8573 M | 640 M | 2565 M | 17658 MISSING | 13677 | 733 M | | 12047 | 1754 | 2595 M | |
| | Relative Humidity | Scor - NumOt - RH Sc - NumOt - VI Sco - NumOt - | 0.120 | 0.163 | 0.333 | 0.609 | 0.560 | 0.568 | 0.550 | 0.621 | 0.656 | 0.578 | 0.575 | 110 MISSING | 0.579 | 0.638 | 0.564 | 0.675 | 0.688 | 0.548 | 0.699 | 0.713 | MISSING | 0.648 | 0.867 | 0.838 | MISSING | | | Σ | | Relative Humidity | Scor - Numot - IRH Sc - Numot - IVI Sco - Numot | 1 188 | 0.368 | 0.574 | 0.473 | 0.456 | 0.653 | 0.537 | 0.549 | 0.537 | 0.587 | 0.432 | 01400011 |
| | ature | lum0} ◀ | 2938 | 2758 | 38 | 4 | 230 | 2803 | 7229 | Ж | 464 | 1160 | 88 | 110 | 272 | 10301 | 33 | 21701 | 432 | 1323 | 46 | 4989 | 78 | 2 | 8 | ঠ | ≥. | - | | | | | um0! → R | 17859 | 8864 | 640 | 2696 | 21630 | 15212 | 735 | 448 | 15396 | 2318 | 2595 | |
| | Temperature | Scor | 0.116 | 0.121 | 0.389 | 0.532 | 0.530 | 0.559 | 0.541 | 0.582 | 0.511 | 0.568 | 0.561 | 0.451 | 0.527 | 0.613 | 0.656 | 0.626 | 0.681 | 0.687 | 0.672 | 0.699 | 0.792 | 0.650 | 0.80 | 0.787 | 1.037 | | | × | | Temperature | Scor + IN | 0.162 | 0.330 | 0.573 | 0.431 | 0.342 | 0.637 | 0.517 | 0.532 | 0.485 | 0.823 | 0.417 | |
| | ction | 10mn | 2103 | 1087 | 137 | 4 | 410 | 1802 | 4326 | 19 | 352 | 705 | 88 | 84 | 362 | 5789 | 32 | 14244 | 254 | 750 | æ | 2860 | 22 | 0 | 24 | 4 | m | | | | | ction | T → 10mn | 92.29 | 4936 | 473 | 972 | 7968 | 8458 | 498 | 33 | 1243 | 1209 | 1166 | (|
| | Wind Direction | SP_Sc. NumOt - DR_Sc NumOt - | 0.167 | 0.208 | 0.541 | 0.513 | 0.546 | 0.577 | 0.609 | 0.625 | 0.517 | 0.589 | 0.671 | 0.495 | 0.545 | 0.602 | 0.509 | 0.641 | 0.680 | 0.642 | 0.615 | 0.683 | 0.629 | MISSING | 0.770 | 1.427 | 0.955 | | | | | Wind Direction | SP Sci+ NumOi+ DR Sci+ NumOi+ | 0.19 | 0.321 | 0.385 | 0.572 | 0.499 | 0.532 | 0.377 | 0.757 | 0.316 | 0.814 | 0.632 | 01400040 |
| | eed | lum0} → | 2946 | 2758 | 583 | 4 | 29 | 2798 | 7239 | Ж | 464 | 1184 | 88 | 111 | 23 | 10325 | 23 | 23024 | 427 | 1292 | 49 | 4994 | 33 | | 83 | 5 | e | | | エ | | pee | nm0l ← | 17942 | 8889 | 640 | 2551 | 21720 | 13375 | 731 | 194 | 1716 | 2715 | 2014 | |
| | Wind Speed | P Sci N | 0.177 | 0.127 | 0.535 | 0.642 | 0.594 | 0.616 | 0.625 | 0.638 | 0.583 | 0.616 | 0.724 | 0.578 | 0.566 | 0.636 | 0.683 | 0.679 | 0.699 | 0.707 | 0.665 | 0.719 | 0.693 | MISSING | 0.791 | 1.320 | 0.991 | | | 9 | p reports | Wind Speed | P Sci → N | 0.220 | 0.342 | 0.564 | 0.514 | 0.357 | 0.702 | 0.535 | 0.851 | 0.491 | 0.878 | 0.794 | 01410004 |
| - | _ | _ | 2944 | 2750 | 78 | ঘ | 59 | 2814 | 7260 | Ж | 465 | 1154 | 97 | 111 | 525 | 10321 | ස | 22363 | 431 | 1319 | 43 | 5015 | 32 | | 8 | ঠ | m | | | ட | | و | | | 8441 | 640 | 2141 | 20235 | 15864 | 734 | 448 | 14420 | 2307 | 8713 | 100 |
| | Pressure | Scol | 0.231 | 0.061 | 0.591 | 0.545 | 0.584 | 0.553 | 0.585 | 0.572 | 0.585 | 0.590 | 0.589 | 0.543 | 0.549 | 0.636 | 0.732 | 0.700 | 0.763 | 0.741 | 0.754 | 0.791 | 0.674 | 629.0 | 0.953 | 0.831 | 1.210 | | | ш | for autor. | Pressure | 100 | 0.277 | 0.442 | 0.564 | 0.445 | 0.337 | 0.632 | 0.576 | 0.442 | 0.490 | 0.875 | 0.448 | 1100 |
| | ned | lum0l ⋅ P | 19518 | 14281 | 1693 | 88 | 3702 | 17665 | 46231 | 223 | 2719 | 7511 | 628 | 627 | 3384 | 64532 | 317 | 127513 | 2764 | 7181 | 255 | 30071 | 146 | 00 | 451 | 102 | 17 | 5 | | _ | eet scores | led | d → 10mn | 76890 | 47949 | 3673 | 13290 | 91962 | 79643 | 3436 | 1613 | 46192 | 12243 | 18259 | 000 |
| | Combined | omb dmo | 0.166 | 0.178 | 0.493 | 0.551 | 0.582 | 0.585 | 0.592 | 0.601 | 209.0 | 0.615 | 0.617 | 0.622 | 0.633 | 0.644 | 0.694 | 0.716 | 0.723 | 0.769 | 0.778 | 0.780 | 0.834 | 0.887 | 0.924 | 0.948 | 1.149 | sMan_1302 | | ၁ | nal VOS fl | Combined | N → qmo | 0.312 | 0.471 | 0.616 | 0.631 | 0.685 | 0.723 | 0.797 | 0.886 | 1.132 | 1.282 | 1.286 | 000, |
| | | Country NumSty Comb v NumOty P Scoty NumOty | _ | 5 | m | _ | 16 | 88 | 217 | 2 | 5 | 45 | m | m | Ξ | 419 | 4 | 409 | 24 | 52 | 4 | 185 | 2 | - | 60 | - | = | | | <u> </u> | February 2013 national VOS fleet scores for automatic shi | | Countr ← NumSr ← Comb ← NumOf ← P | - | 17 | 2 | 9 | 41 | 54 | 2 | - | æ | 4 | 22 | |
| | | ountr ▼ N | "SHP" | NO No | _ | GR GR | ZN | | 89 | 12 Ancillary | 띯 | AU | 47 | | 마 | 回 | CA | NS Sn | 壬 | R | | 24 Unknown | 11.1 | 띺 | | × | اع | ▶ Mont | | ∢ | ebruary 2 | | ountr • N | "SHP" | 出 | 맠 | AU | CA A | 띺 | X | Z | 界 | 14 Unknown | EO | I (|
| | | | | 2 | 7 | 8 | 2 0 | 10 | 11 6 | 12 A | 13 S | 4 | 15 MY | 16 IS | | 18 | 19 | 20 | 21 H | | Z3 = | 2 4 U | 22 E | 26 F | <u>≥</u> | ≴ ജ | 82 Æ | - | Ready | | ← c | ν m | | | 9 | 7 | ≪ | 0 | 다 교 | | 2 Z | 13 GB | 14 C | | 0 |